



Australian Government
Productivity Commission

Public Infrastructure

Productivity Commission Draft Report Volume 2

March 2014

This is a draft report prepared for further public consultation and input. The Commission will finalise its report after these processes have taken place.

© Commonwealth of Australia 2014

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, the work may be reproduced in whole or in part for study or training purposes, subject to the inclusion of an acknowledgment of the source. Reproduction for commercial use or sale requires prior written permission from the Productivity Commission. Requests and inquiries concerning reproduction and rights should be addressed to Media and Publications (see below).

This publication is available from the Productivity Commission website at www.pc.gov.au. If you require part or all of this publication in a different format, please contact Media and Publications.

Publications Inquiries:

Media and Publications
Productivity Commission
Locked Bag 2 Collins Street East
Melbourne VIC 8003

Tel: (03) 9653 2244
Fax: (03) 9653 2303
Email: maps@pc.gov.au

General Inquiries:

Tel: (03) 9653 2100 or (02) 6240 3200

An appropriate citation for this paper is:

Productivity Commission 2014, *Public Infrastructure*, Draft Inquiry Report, Canberra.

The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Further information on the Productivity Commission can be obtained from the Commission's website (www.pc.gov.au) or by contacting Media and Publications on (03) 9653 2244 or email: maps@pc.gov.au

Opportunity for further comment

You are invited to examine this draft inquiry report and comment on it by written submission to the Productivity Commission, preferably in electronic format, by Friday 4 April 2014 and/or by attending a public hearing.

The final report will be prepared after submissions have been received and will be forwarded to the Australian Government in May 2014.

Further information on how to provide a written submission or register your attendance at the public hearings (as a participant or an observer) is available on the inquiry website: www.pc.gov.au/projects/inquiry/infrastructure.

Public hearing dates and venues

<i>Location</i>	<i>Date</i>	<i>Venue</i>
Melbourne	Wednesday 9 April 2014	Productivity Commission Rattigan Room Level 12, 530 Collins Street
Brisbane	Friday 11 April 2014	Mercure Hotel Brisbane Burke Room 85-87 North Quay
Sydney	Monday 14 April 2014	The Grace Hotel Pinaroo 5 Room 77 York Street

Commissioners

For the purposes of this inquiry and draft report, in accordance with section 40 of the *Productivity Commission Act 1998* the powers of the Productivity Commission have been exercised by:

Peter Harris AO

Presiding Commissioner

Dr Warren Mundy

Commissioner

Paul Lindwall

Associate Commissioner

Draft

Contents

The Commission's report is in two volumes. **This volume 2 contains chapters 8 to 14 and appendixes A to D.** Volume 1 contains the Overview, draft recommendations and findings and chapters 1 to 7. Below is the table of contents for both volumes.

Volume 1	
Opportunity for further comment	iii
Terms of reference	v
Abbreviations and explanations	xv
Overview	1
Draft recommendations, findings and information requests	33
1 Introduction	45
1.1 What has the Commission been asked to do?	46
1.2 Australia's public infrastructure and its importance	49
1.3 The role of government in infrastructure provision	53
1.4 The increasing role of the private sector	55
1.5 The Commission's approach	62
1.6 Conduct of the inquiry	65
1.7 Guide to the draft report	66
2 Efficient provision	69
2.1 The importance of project selection	70
2.2 The role of cost–benefit analysis	72
2.3 Alternative institutional and governance arrangements	80
2.4 Reforming institutional arrangements	87
3 Achieving benefits from private sector involvement	89
3.1 The various models of public infrastructure provision	91

3.2	The potential benefits and challenges of private sector involvement in infrastructure delivery	93
3.3	Selecting a delivery model	101
3.4	Principles for efficient risk allocation	104
3.5	Risk allocation in practice	113
3.6	Assessing value for money under different delivery models	117
3.7	The importance of government institutions and governance	120
4	Funding mechanisms	121
4.1	User charges	122
4.2	Value capture	142
4.3	Developer contributions	147
4.4	Government funding	150
5	Raising finance	155
5.1	The role of the private sector has grown	156
5.2	Sources of public sector finance	158
5.3	Sources of private sector finance	160
6	Financing mechanisms	173
6.1	Assessment framework	174
6.2	Assessment of alternative financing mechanisms	184
7	Improving governance and institutional arrangements	217
7.1	The case for governance and institutional reform	218
7.2	Principles for good governance	221
7.3	Current institutional arrangements for infrastructure provision	224
7.4	Options for improving governance and institutional arrangements in the roads sector	235
7.5	The influence of the Australian Government	254
	References	265

Volume 2

8	Cost drivers, trends and benchmarks	277
8.1	What has been happening to aggregate construction costs?	280
8.2	Input cost drivers and trends	282
8.3	Interim summing up	292
8.4	Benchmarking	293
8.5	International comparisons of cost	303
8.6	Concluding comments	305
9	Productivity issues	307
9.1	Recent Australian performance	308
9.2	Main productivity challenges	325
9.3	Concluding comments	334
10	Competition and the structure of the infrastructure construction market	335
10.1	Concentration in the infrastructure construction market	337
10.2	Barriers to entry	342
10.3	Segmentation in the infrastructure construction market	346
10.4	Countervailing power of government	348
10.5	Competition issues in input markets	349
10.6	Concluding comments	352
11	Tendering and contracting	355
11.1	Tendering and contracting arrangements used for major infrastructure projects	356
11.2	Are government tendering arrangements too onerous?	367
11.3	Do tendering arrangements elicit least cost bids?	379
11.4	Do contracts provide incentives for cost minimisation throughout the build?	394
12	Industrial relations	405
12.1	What is industrial relations?	407
12.2	Industrial relations in the Australian construction sector	408

12.3 A framework for understanding the role of industrial relations in construction	417
12.4 Is construction different in other ways?	423
12.5 The impacts of industrial relations at the project level	429
12.6 The aggregate effects of the IR environment on the construction industry	440
12.7 The scope for improving the IR environment	457
13 Workforce Skills	461
13.1 Evidence of civil construction skill shortages	462
13.2 The impact of skill shortages on infrastructure construction costs	469
13.3 The causes of recent skill shortages	473
13.4 Policy options for skill shortages in infrastructure construction	484
13.5 Conclusion	498
14 Social and environmental regulation	499
14.1 Nature and scope of the regulation	501
14.2 Participants' concerns	502
14.3 Impacts on costs	505
14.4 General reform issues	506
14.5 Federal safety accreditation	510
14.6 Regulation affecting quarries	517
A Conduct of the inquiry	519
B Australian and international public infrastructure case studies	527
C Building information modelling	557
D EBAs: A small sample analysis	561
References	581

8 Cost drivers, trends and benchmarks

Key points

Infrastructure costs in Australia appear high, but significant uncertainty applies to many published comparisons. Evidence suggests recent significant (but cyclical) increases in the costs of constructing major public infrastructure in Australia.

- The cyclical element is connected to broader movements in economic conditions.
- Recent increases in fuel and labour costs have also driven up infrastructure costs.
- Some evidence points to the high costs of land in brownfields/urban locations as a further factor pushing up costs for many projects in Australia.
- It is also likely that increasing costs connected to design and environmental requirements have played a part, but available data is insufficiently detailed to establish the extent of this effect.

A systematic framework for benchmarking the costs of major project construction is yet to be developed in Australia, but some valuable sectoral work has been done, particularly in road, rail and airports.

- This deficiency must be addressed in a future structure for infrastructure as a whole.
- The present lack of detailed cost benchmarks makes tracking the movements of costs and performance across time difficult.
- Available benchmarking results do illustrate the key roles that the choice of construction method and project scope have in driving costs.

Comparisons of the costs of major project construction, both within Australia and elsewhere, are subject to a range of methodological and practical problems.

- The main problems include output measurement, allowance for climactic and geographical factors, and, in the international case, exchange rate movements.
- The bespoke nature of many major projects makes comparisons of 'like for like' particularly difficult.
- Some cost differentials between Australia and other countries also result from broader factors, such as the country's stage of economic development and standards of living. While notable, these may be the result of desirable differences between Australia and other countries.

There is a compelling need for more and better major project data to be publicly available and for greater coordination of such data. Improved data would assist buyers of construction services (including governments) and may provide a broader guide to all market players on efficient costs of construction. It could reduce transactions and other costs.

The Commission's terms of reference ask it to examine the cost structure of major infrastructure projects in Australia, and to consider if infrastructure costs have increased considerably compared with other countries. This chapter looks at these issues, and analyses the recent performance of the Australian construction industry with regard to cost, focusing on infrastructure construction where feasible. Productivity performance, which is also a key contributor to time and cost outcomes, is considered in greater detail in chapter 9.

The analysis takes place with a backdrop of competing claims about the industry's recent performance (box 8.1). Some commentators have argued that recent cost performance has been poor by international standards, and that Australia has become a 'high cost, low productivity' location for major project construction (see, for example, Chandler 2013, p. 1 and BCA 2012, p. 12). Other commentators have an opposing view, and argue that recent Australian performance with regard to cost is on a par, or better than, comparable countries (see, for example, Best 2012, p. 1).

Due to the lack of consolidated data on many aspects of major project construction cost, the Commission has drawn on a broad range of evidence in assessing these claims, including: aggregate data on the main input cost elements within construction; benchmarking data, including sectoral and international cost benchmarks; regulatory benchmarks; performance indicators correlated with cost (such as data on project delays, reworks and variations); and case studies. While each of these elements considered in isolation provides an incomplete picture of cost trends, when considered together, they can provide a more comprehensive view of recent trends in construction costs.

The main focus of the chapter is on cost trends, however levels of cost are discussed where relevant (as indicators, for example, of prevailing levels of efficiency or inefficiency). This is particularly the case in section 8.4 which discusses cost benchmarking.

The Commission is also proposing new systems which would systematically improve data collection and provide substantially greater opportunities for benchmarking and cost comparison.

Box 8.1 Differing views from participants on costs and international comparisons

The Department of Infrastructure and Regional Development (sub. 64, p. 25):

Infrastructure projects in Australia are considered to be costly relative to other comparative countries. Based on road and rail projects funded through the Infrastructure Investment Programme, key factors in cost growth in recent times have been:

- the cost of capital; and
- land acquisition, particularly in regard to meeting environmental requirements. For example, the required biodiversity offsets are approximately four times the size of the land purchased for the infrastructure itself.

Austrade (sub. 74, p. 14):

... a European company (with operations in over 20 countries and that is undertaking work in Australia currently) advised Austrade in 2013 that Australian bid costs are double the second most expensive country they operate in.

University of New South Wales (sub. 44, p. 2):

The evidence available indicates that productivity increases evident in the industry have been eroded by cost increases and that our competitive advantage has declined over the last decade.

The Minerals Council of Australia (sub. 70, p. 5):

... whereas a few years ago Australia could build iron ore and coal projects as cheaply as our competitors, now iron ore projects are 30 per cent more expensive than the global average, while for thermal coal the figure is 66 per cent. Labour costs are rising faster than the national average and are amongst the highest in the world. Energy and transport costs are also much higher in Australia than in competitor countries.

Lend Lease (sub. 46, p. 20):

While the resources boom has seen the costs of physical capital soar in recent years (construction and mining equipment sales rose by 23% in 2011), intermediate costs have increased at a significantly higher rate than wages and salaries in the construction sector. For example, Lend Lease Engineering in NSW experienced oil prices rises of approximately 200% in the decade to 2013; asphalt by 110% and concrete by 63% in the same period.

Engineers Australia (sub. 26, p. 1):

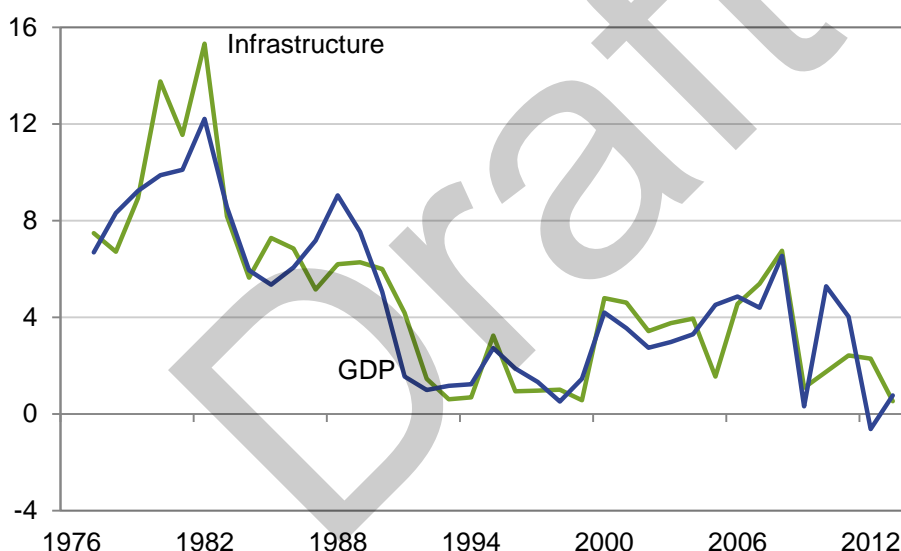
So little information (on infrastructure costs) is available that it has been accepted at face value in many quarters. However, when carefully examined, this information is seen to be flawed and the directions it points to are unreliable. Choosing similar but different data sources leads to an entirely different story. Engineers Australia cautions against undue reliance on cost data that has not been subjected to rigorous scrutiny, that cannot be replicated or that is not available from official sources.

8.1 What has been happening to aggregate construction costs?

For much of the last thirty years, infrastructure construction costs in Australia, at least as they are measured in aggregate terms, have not changed out of step with general price movements in the rest of the economy. Further, in recent years, data from the ABS suggests that overall ‘price’ increases in infrastructure construction industry outputs do not seem to have been significant.¹ Indeed, price inflation for infrastructure outputs seems to have followed the general prices rises seen for production in the economy as a whole (figure 8.1).

Figure 8.1 GDP and engineering construction implicit price deflators, 1976-2013

Per cent changes in the implicit price deflators

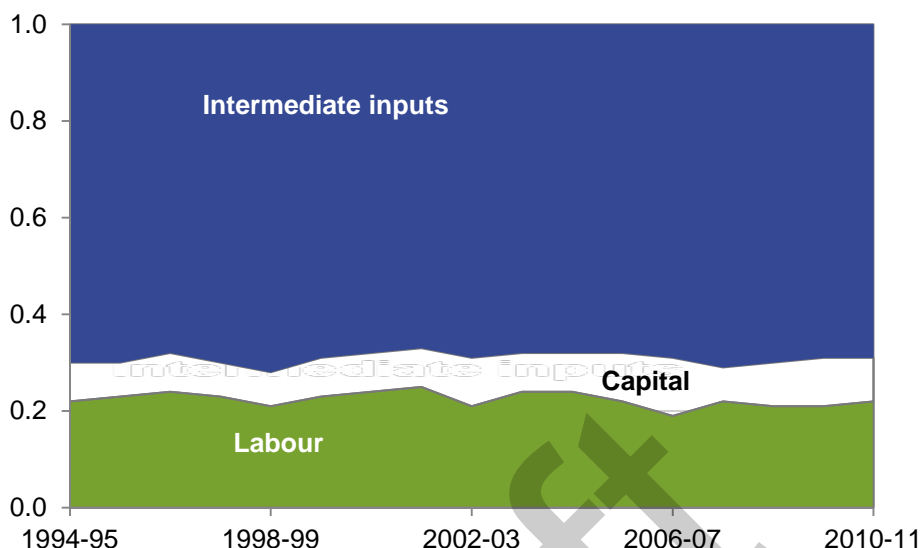


Data source: ABS (Australian National Accounts: National Income, Expenditure and Product, Cat. no. 5206.0, table 5).

For the construction industry as a whole (which includes construction of commercial buildings and residential construction), cost shares, deriving from the relative use of labour, capital and intermediate inputs, have also remained stable over the past decade or so. Between 1994-95 and 2010-11, the construction industry’s relative use of labour, capital and intermediate inputs has virtually remained unchanged (figure 8.2). Unfortunately, such data is not separately available from the ABS for the infrastructure sector.

¹ For ABS statistics, infrastructure is defined as the heavy and civil engineering sub-sector. Infrastructure prices are measured, by proxy, by the implicit price deflator for gross fixed capital formation for non-dwelling construction, new engineering construction.

Figure 8.2 Cost shares in the construction industry, 1994-95 to 2010-11
Proportion of all costs



Data source: ABS (*Estimates of Industry Multifactor Productivity, Australia: Detailed Productivity Estimates*, Cat. no. 5260.0.55.002, table 19).

This relatively stable aggregate picture does, however, obscure some differing trends in costs. Narrowing to the infrastructure sector, differences are apparent between the cost of private and public sector construction since 2009 — that is, infrastructure built for, and subsequently owned by, the public sector versus that which is built and subsequently owned by the private sector. Taking a longer perspective, however, reveals that there are significant similarities in the trends for infrastructure built for the private and public sectors (figure 8.3).

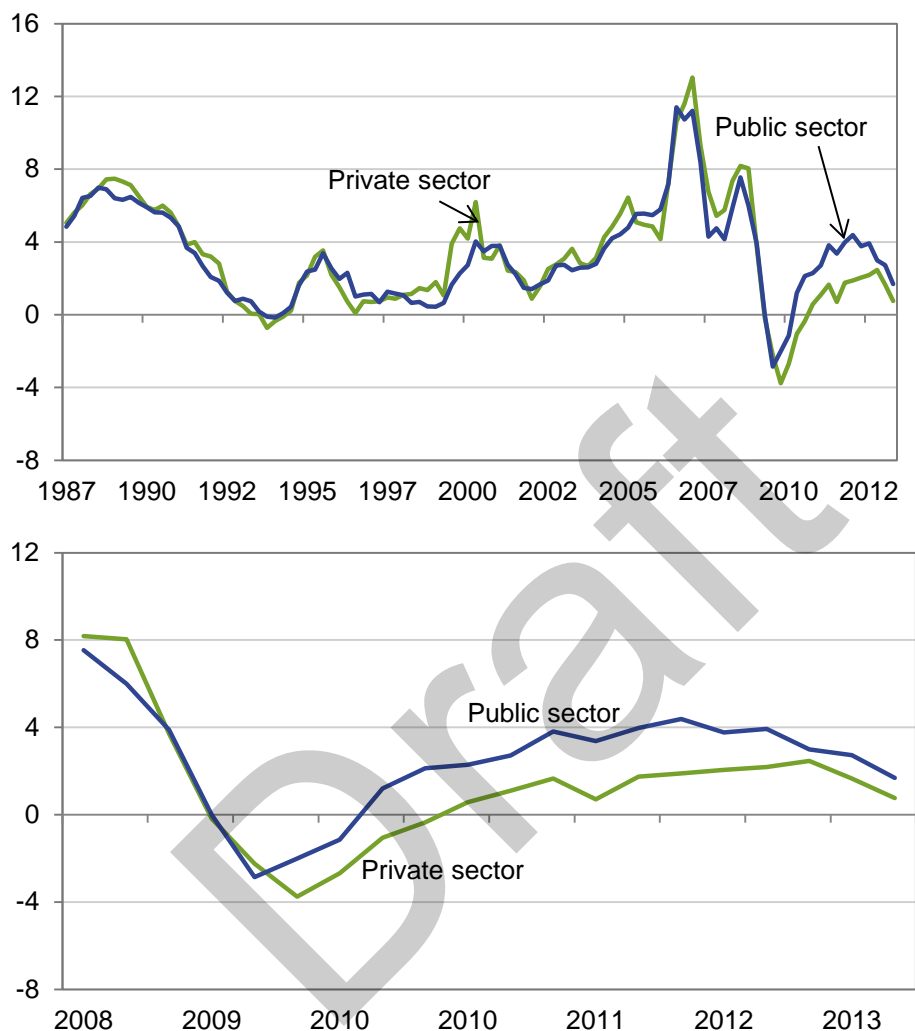
Some significant variation in regional costs have also been observed. For example, a report by the Property Council of Australia (2012), using Rawlinson's cost data, found that:

- Brisbane appears to have a competitive cost advantage in the development of all forms of high rise construction
- construction costs across most forms of development are higher in Perth than other states
- for most forms of development, construction costs in Brisbane are relatively similar to Melbourne with a 10 per cent margin depending on the development type.

Some further aspects of regional cost variation are discussed in chapter 12.

Figure 8.3 The long and the short of it: public and private sector construction costs, 1987-2013 and 2008-2013

Per cent

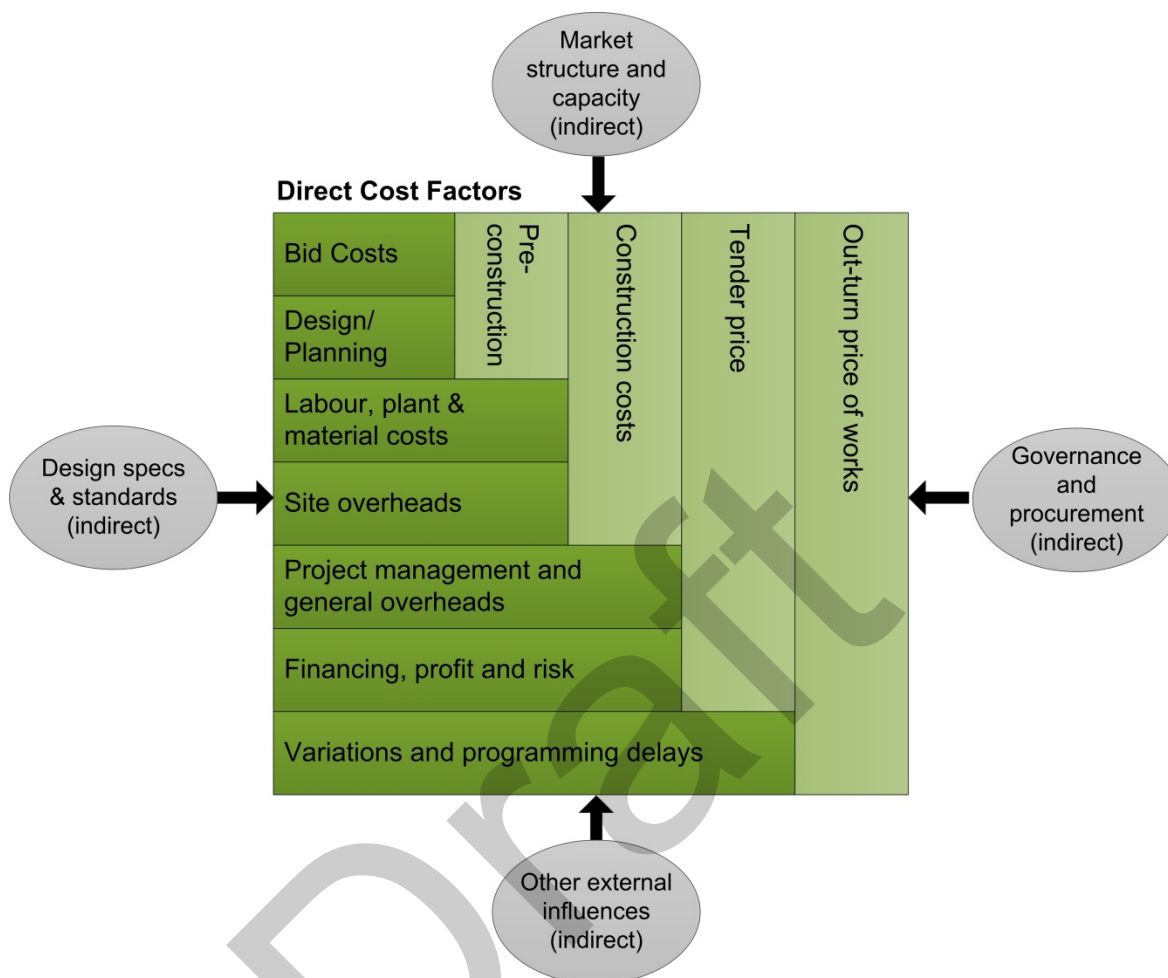


Sources: ABS cat. 8762.0, Lend Lease (sub. 46, p. 28).

8.2 Input cost drivers and trends

Costs can generally be divided into those incurred prior to the construction phase (including approval, bidding and design costs); the input costs (direct and indirect) of construction; and those costs incurred following the construction phase (for example, operation and maintenance costs) (figure 8.4). Most of the focus of this chapter is on the middle phase of costs related to inputs within the actual construction phase.

Figure 8.4 Main cost elements



Source: HM Treasury (United Kingdom) 2010, p. 5.

Costs prior to construction

Before construction begins, a number of costs are incurred which add to the total cost of an infrastructure project. These relate to the cost in obtaining the work by the contractor (bidding costs) along with the costs associated with designing the project (some design services will still be used during the construction phase). Acquiring land on which projects are to be built are another critical ingredient.

Bidding and design costs

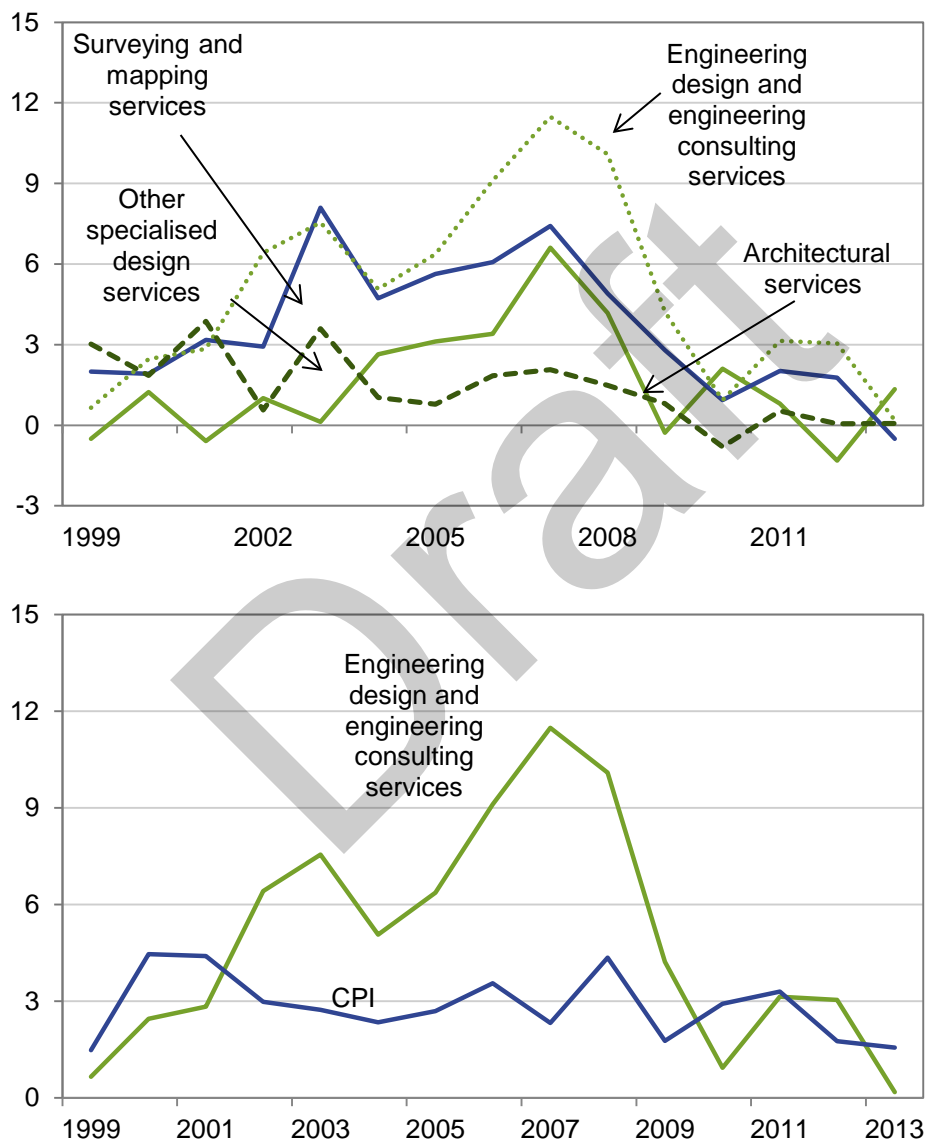
Within the industry, there is a view that bidding and design requirements, and associated costs, have become increasingly onerous and costly in recent years. Data on price trends for services that are directly involved in design do point to a trend

towards higher costs over the period 2005–10, but with some recent movement back towards levels around CPI (figure 8.5).

The issue of design requirements is discussed in greater detail in chapter 11.

Figure 8.5 Prices for design-related services

Annual changes in output prices, per cent



Data source: ABS (*Producer Price Index*, Cat. no. 6427.0, Sep 2013 table 24).

Land costs

A number of submissions identified the purchase costs of land, particularly in established urban areas, as a significant further recent cost driver. For example, the Urban Development Institute of Australia stated:

Urban land is a key direct input into infrastructure such as rail and road projects, which can require the acquisition of large corridors of land, often at a very high cost. In some cases, the cost to acquire the necessary corridors for new infrastructure is so prohibitively high that techniques such as extensive underground tunnelling must be employed, also at very high cost. (sub. 40, p. 16)

The Institute also argued that high land costs have significant flow on effects to all other inputs in construction, and have inflationary effects across the economy.

Lend Lease (sub. 46) cited examples of rail projects where differences in land costs between capital cities and remote areas have had significant effects on construction costs (figure 8.6).

The Australian Railways Association also argued that infrastructure projects in brownfield locations were increasingly expensive, stating:

The complexity and constraints imposed because of brownfields construction significantly reduces construction productivity compared to greenfields construction and requires significant additional design, construction and management resources, from both the contractor and the client organisations. The ARA has estimated the difference of construction costs between the two is at an average of \$40 million. (sub. no. 58, p. 13)

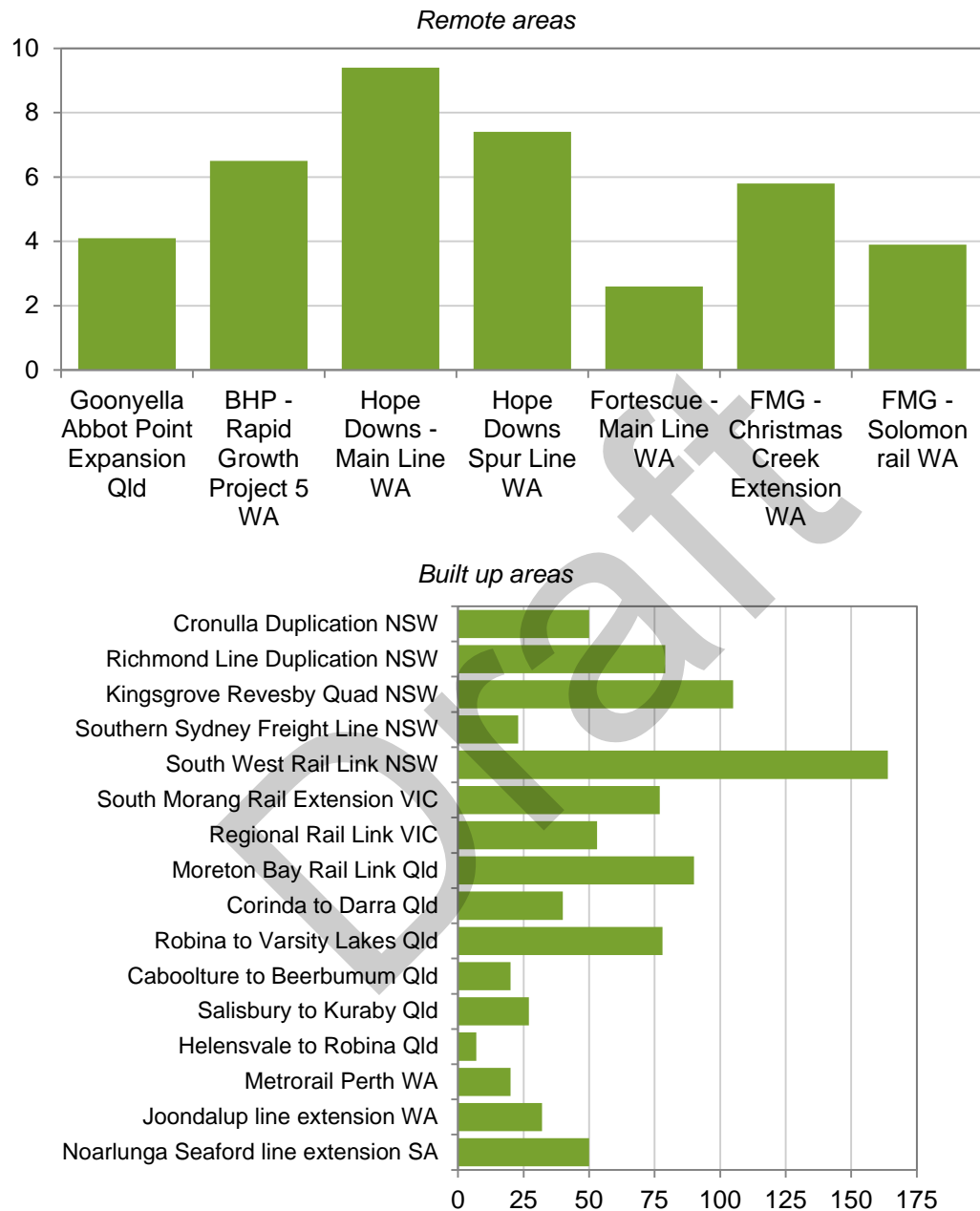
Recent evidence does point to significant rises in land values within major capital cities (table 8.1).

In part, these costs are an unavoidable result of Australia's highly (and increasingly) urbanised population. Related cost impacts are therefore especially apparent in infrastructure projects whose primary purpose is to service large populations within these urban areas (especially road and rail).

It is likely that land costs will also influence the choice of construction technique used to deliver infrastructure, and lead to more costly solutions such as tunnelling and viaduct construction — as seen in the construction of Sydney's North West Rail Link project. Building in highly urbanised environments also requires measures to be taken to minimise the disruption caused to the use of existing and interconnecting infrastructure. Such measures also come at some cost, such as determining when construction can take place (for example, works are conducted at night) and at what rate.

Figure 8.6 Lend Lease's comparison of rail project costs in remote and built-up areas

Cost per km \$m



Source: Lend Lease (sub. 46, p. 22).

In the Commission's view, as a general principle, there is a need to ensure that resort to very expensive techniques and projects takes place only after other alternatives are exhausted. This would include detailed consideration of the enhanced use of existing infrastructure, possibly in combination with pricing instruments, and consideration of cheaper build alternatives.

Table 8.1 Capital city land value growth rates, 1993-2012
Annual Capital Growth Rate – All Land Use Categories (Per Cent)

	Inner Zone	Middle Zone	Outer Zone	20-year Growth Average	20-year CPI Average
Sydney	5.31	5.34	6.42	5.69	2.63
Melbourne	8.47	7.44	8.49	8.13	2.60
Brisbane	9.53	7.86	9.22	8.87	2.84
Average	7.77	6.88	8.04	7.56	2.69

Source: Urbis Australia (2013, p. 11).

Given such cost rises, there is also an important role for improved planning and corridor reservation policies. These are discussed in greater detail within chapter 14.

DRAFT RECOMMENDATION 8.1

Given high and rising land costs in urban areas, Australian governments should ensure that project selection take explicit and detailed account of available alternatives, including the enhanced use of existing infrastructure, pricing solutions and cheaper build options. Australian governments should also consider ways in which land policies can be improved in this area, given the deficiencies in the current planning of land reservation in most jurisdictions in Australia.

INFORMATION REQUEST 8.1

The Commission seeks more detailed information from participants about techniques used in other countries to deal with the issue of land reservation.

Construction input costs: breakdown and recent changes

As a first step in considering claims of recent construction cost increases in Australia, the Commission looked at the main elements of input costs incurred during the construction phase in Australia and recent trends in these elements. In particular, it considered²:

- *labour costs* — wages paid to directly employed construction workers and specialised labour (such as engineers and quantity surveyors)
- *the costs of physical capital* — equipment and other capital used in construction (such as cranes, earth moving equipment, tunnel boring machines and dredges)³

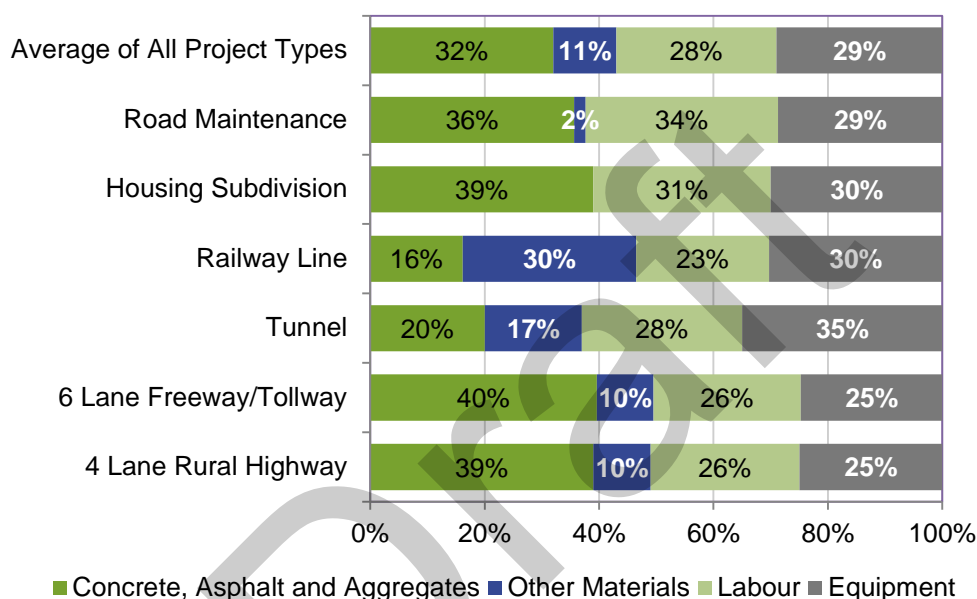
² Costs related to financing are considered separately in chapter 5.

³ ABS measures of gross fixed capital formation are used to determine the price of physical capital. The value excludes the cost of land and repair and maintenance activity, as well as the value of any transfers of existing assets.

- *intermediate inputs* — the costs of materials purchased (such as fuel, concrete, aluminium, bitumen, steel and metal fabricated products) and services from other sectors (such as insurance and payroll services).

The relative shares of these inputs will vary with the type of construction (with figure 8.7 providing some examples).

Figure 8.7 Estimated composition of project costs in Victoria
Percentage of total project costs



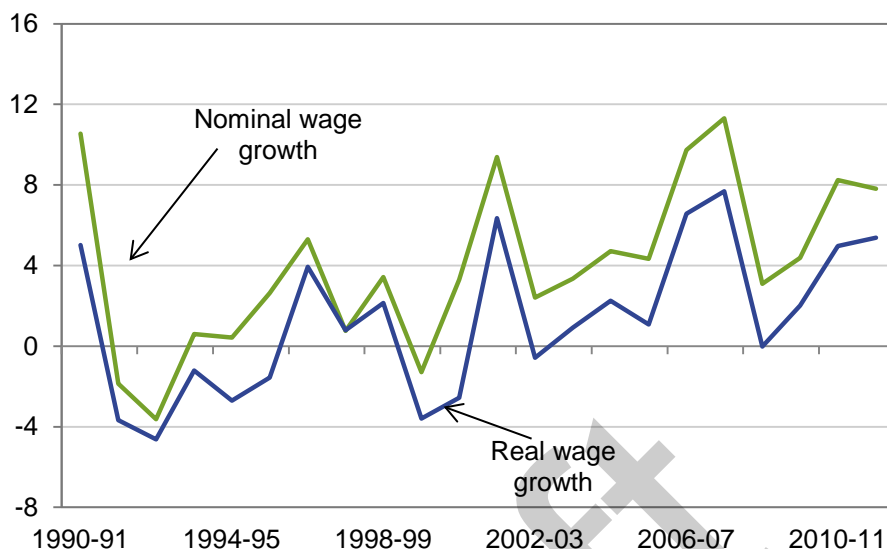
Source: Cement Concrete and Aggregates Australia (sub. 17, p. 3).

Labour costs

Several submissions to the inquiry focused on labour costs and argued that the differences between labour costs in Australia and many other countries were a significant factor in making construction more costly here.

Certainly, aggregate data on labour costs support the view of rising costs over select periods in Australia. Since 1999, labour costs have fluctuated considerably, but with some periods of pronounced increases (figure 8.8). These increases have generally occurred at a faster pace than seen for other sectors of the economy. The sector level statistics are complicated by wages paid in residential and commercial building construction activities, but given labour is likely to be reasonably substitutable between the subsectors, are generally indicative of some periodic labour cost pressures in infrastructure construction activities. (Trends in labour costs are discussed in further detail in chapter 12.)

Figure 8.8 Labour costs in the construction industry^a
Annual change, per cent



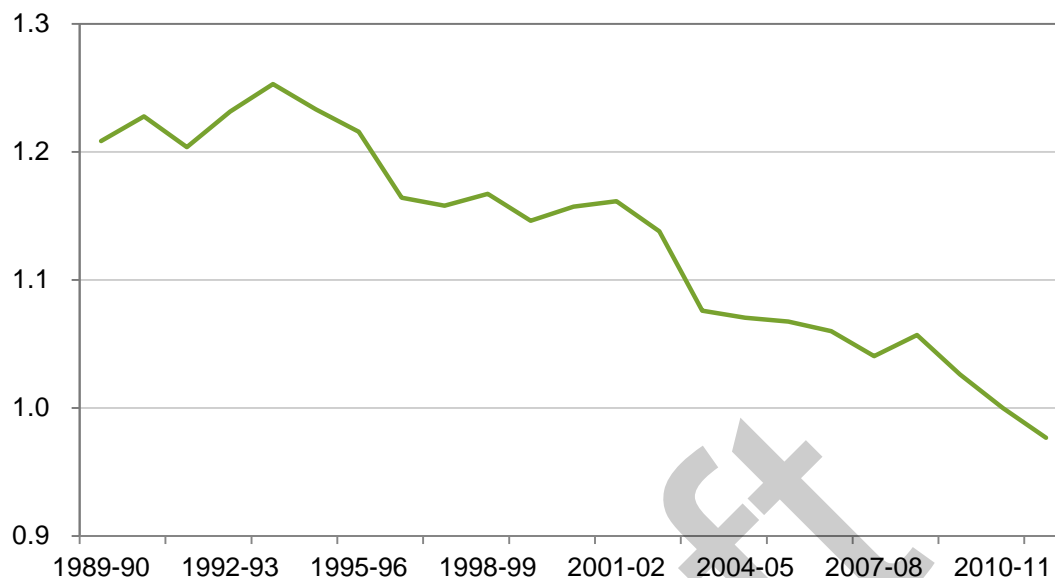
^a Calculated as compensation of employees divided by total hours worked.

Data sources: ABS (Australian System of National Accounts, Cat. no. 5204.0); ABS (Wage Price Index, Cat. no. 6345.0).

When considering labour costs there are two aspects: the wages and allowances received by the workers and the total costs paid to employ the labour force. To the extent that these diverge, there is a gain from trade. In principle, the employer could pay lower labour costs while the employee receives higher remuneration. The data used shows the changes in remuneration but does not address changes in the cost of employing a worker. Another aspect is the number of workers employed to perform a given job, which submissions have suggested has grown substantially to reflect workplace safety, environmental and other such activities demanded by the evolving regulatory environment. This affects productivity, the subject of chapter 9.

Costs of capital

While there is some evidence of rising labour costs in infrastructure construction activities, the cost of physical capital employed in the sector does not appear to have increased (figure 8.9). Again, while data only exists at the sector level the unit price of capital appears to have fallen consistently since the early 1990s. At the same time, the capital share of income generated in the sector has risen, but this relates to the division of the returns to the industry, not to the costs of inputs (chapter 12).

Figure 8.9 Capital costs for the construction industryPrice of capital per unit, 2011-12 prices^a

^a Derived as the ratio of gross fixed capital formation in current prices to gross fixed capital formation in chain volume measures.

Data source: ABS (Australian System of National Accounts, Cat. no. 5204.0).

Intermediate input costs

In addition to labour and capital, material inputs make up a considerable share of total construction costs — often 30-50 per cent (figure. 8.7) and potentially higher (figure 8.2).

Fuel costs, in particular, have been cited by past Australian studies as an important cost contributor. For example, a recent study by GHD Meyrick produced for Infrastructure Australia stated:

Trends in world oil prices and fuel prices are seemingly the main cost drivers which regularly have explained trends in Australian infrastructure costs over a sufficiently long and representative period of time. (GHD Meyrick 2011, p. 5)

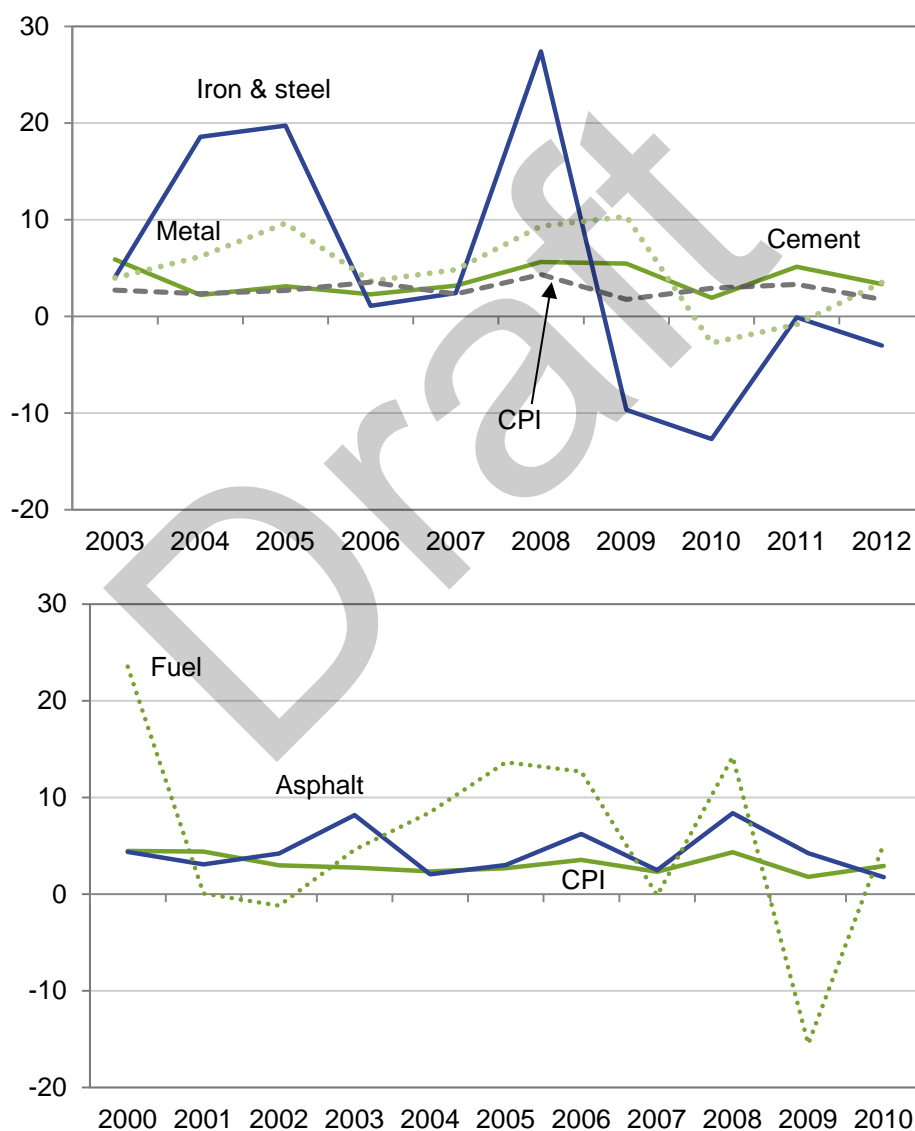
Many other cost elements flow from, or are directly affected by, fuel costs, and are therefore likely to fluctuate with changes to internationally determined fuel and oil pricing. Aggregate data shows that the costs of fuel and of other materials have fluctuated considerably since the early 2000s (figure 8.10).

Other intermediate inputs into the infrastructure construction industry come from other parts of the construction sector — around 30 per cent, of which construction services is the largest component. Manufacturing and professional, scientific and

technical services are the next largest, accounting for 25 and 16 per cent of inputs respectively. For these non-construction inputs, prices changes are mixed. While data on individual manufacturing industry outputs is not readily available, for the sector prices have moved in line with the CPI (figure 8.11). For technical services (of which design is one element), price increases have generally exceeded CPI, particularly in the period between 2003 and 2012.

Figure 8.10 Cost of inputs into infrastructure construction

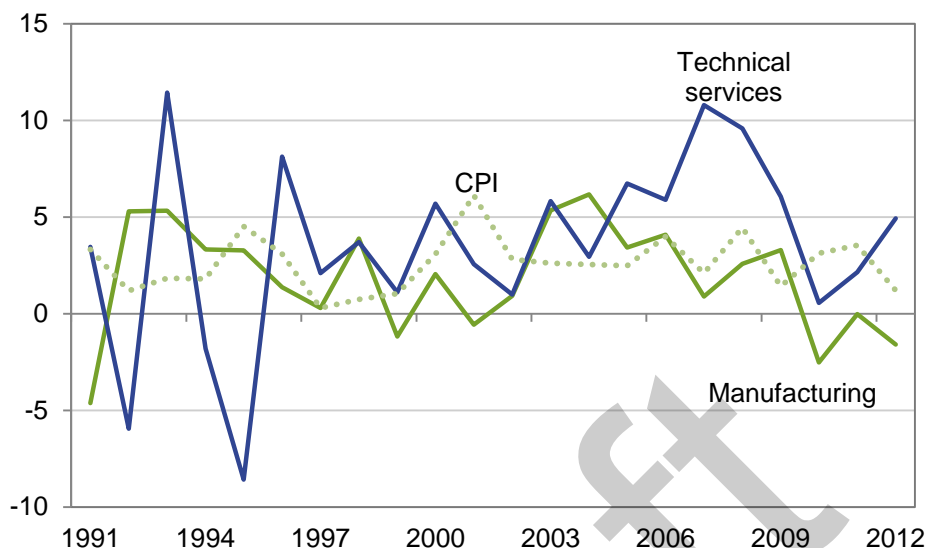
Annual change, per cent



Data source: ABS (Australian System of National Accounts, Cat. no. 6401.0).

Figure 8.11 Annual price movement of manufacturing and technical services industry output, 1991 to 2013

Per cent changes in the implicit price deflators



Data sources: ABS (*Australian National Accounts: National Income, Expenditure and Product*, Cat. no. 5206.0); ABS (*Consumer Price Index, Australia*, Cat. no. 6401.0).

8.3 Interim summing up

The main picture emerging from the above aggregate data is that several input cost elements, including fuel, labour and land costs, have risen substantially above CPI at a number of points in the last ten years. Rises are particularly apparent for these inputs across 2006–2007 (in the period immediately preceding the GFC) and again in the later period from 2010 (coinciding with the peak of the mining boom). These trends are partly supported by an earlier study by GHD Meyrick (2011), which is discussed in greater detail in section 8.4, and also focused mainly on aggregate statistics.

There is also some evidence, albeit less clear, of recent rises in costs related to environmental requirements. While it is difficult from available evidence to establish the exact magnitude of this increase, one proxy is the average time taken to develop a proposal to startup. In the Commission's recent inquiry into major project approval processes, the Department of Sustainability, Environment, Water, Population and Communities (now the Department of the Environment), based on a sample of 17 projects of varying type and complexity, found average approval times of 37 months (PC 2013, p. 21).

DRAFT FINDING 8.1

Aggregate data indicate that the costs of construction inputs, particularly labour, fuel and land, have risen substantially recently. While such data shed little light on design, environmental and many other cost elements, other evidence suggests that there have recently been periodic increases in these elements.

8.4 Benchmarking

In searching for further sources of information with which to assess claims of large construction cost rises, the Commission also looked at recent Australian and international benchmarking studies.

Benchmarking is a common approach used to gauge relative performance across industries and jurisdictions. It involves collecting data to construct indicators that enable comparisons of economic performance and of approaches to policy across jurisdictions. Indicators can either be quantitative (statistical or empirical) or qualitative (descriptive).

When done well, benchmarking can be a powerful analytical tool that helps to identify practices that work well and those that do not. Benchmarking to international or other local jurisdictions can help identify persistent levels of inefficiency even if there has been no trend change. It fosters accountability and can lead to improved efficiency and effectiveness by: exposing areas where improvement is needed; identifying good practice processes; setting targets for improvement; and encouraging innovation (PC 2013, p. 42).

Recent cost benchmarks in Australia and overseas

There have been a limited number of recent attempts to benchmark major project construction costs in Australia, looking mainly at costs in road, rail and airport construction. Internationally, there are also a range of studies, with the United Kingdom's recent initiatives to provide publicly available benchmarking data for various construction types being a notable example of how benchmarking might be used to further inform project design and evaluation.

The Ernst and Young (2011) study

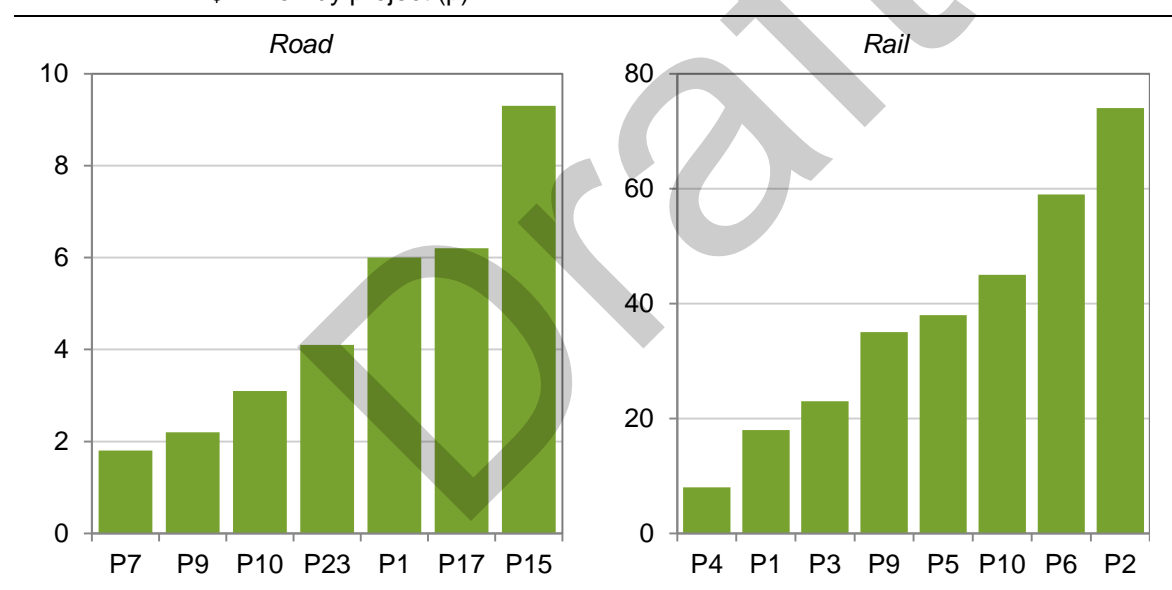
This Australian study (Ernst & Young 2011) was produced for Transport for NSW and developed basic benchmark information for 49 road and rail projects in four

jurisdictions (New South Wales, Western Australia, Victoria and Queensland). The projects selected had a total outturn cost of \$50 million or over.

The main focus of the study was on client costs (that is, costs related to planning, project design, community and communication, project and program management and corporate overheads), but it also provided some basic construction cost benchmarks. In producing benchmarks an emphasis was given to determining costs on cost per kilometre (a sample of results is shown in figure 8.12). In order to make comparisons of ‘like with like’ several projects were excluded, namely those:

- road projects where the tunnel, busway or bridge component were material
- rail projects involving track electrification, stabling and stationing (Ernst & Young 2011, p. 56).

Figure 8.12 Total construction cost per kilometre
\$ million by project (p)



Source: Ernst & Young (2011, pp. 56–7).

These exclusions, together with the relatively small overall sample size of the study, clearly limit the applicability of its findings, but the study may nevertheless provide some useful indicative benchmarks for basic civil land transport. These include:

- for road construction, the study found that construction costs per kilometre in New South Wales were \$6 million, while for the rest of Australia (based on 5 projects) average costs per kilometre were \$5 million
- for rail, New South Wales construction costs per kilometre of track were \$48 million. The average cost per kilometre for the rest of Australia (based on 4 projects) was \$27 million

- In the case of rail, the sample mixed greenfield and brownfield projects and passenger and freight projects, further limiting the extent to which results can be generalised (Ernst & Young 2011, p. 7).

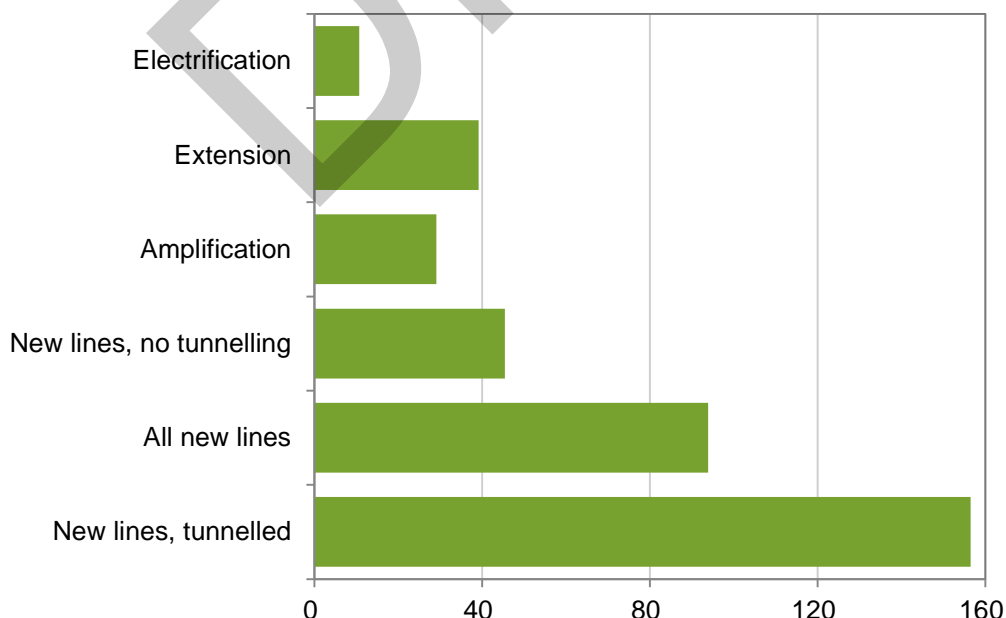
A more recent paper on rail projects

A further Australian paper providing some basic cost benchmarks is Martin (2012). This study looked at 28 passenger rail projects constructed over the period 2000–2012, including six light rail projects and 22 heavy rail projects.

From the total sample, five projects were selected representing construction of new heavy railway lines. These included tunnelled routes (Epping-Chatswood: \$208.2 million/km; Sydney Airport: \$125.1 million/km) and more conventional lines (such as Brisbane’s Darra-Richlands line: \$94 million/km). Including those project involving tunnelling resulted in an average construction cost for new heavy rail lines in Australia of \$93.9 million/km, and excluding the two tunnelled projects produced an average cost of \$45.4 million (Martin, S. 2012, pp. 554–5). The paper also provides rough cost benchmarks for a range of other rail construction types, including electrification, extension and amplification (figure 8.13).

Figure 8.13 Comparative per-route kilometre costs of urban passenger rail

Cost per km \$m



Source: Martin (2012, p. 555).

While these benchmarks are also produced based on very small sample sizes, they nevertheless yield some interesting insights. First, they again illustrate the

importance of choice of technique, particularly tunnelling, in driving up total project costs (box 8.2). Second, the results of the paper are broadly in line with key aspects of international benchmarking work on rail costs. As the author states:

The ratio between the average per route-kilometre costs for both underground and ‘at-grade’ rail construction (approximately 3.5:1) is also roughly consistent with the cost ratios for new-build metro systems in Europe, the Americas and Asia as outlined in Flyvbjerg, Bruzelius and Van Wee, who claim that their study shows underground alignments cost between 4-6 times more than at-grade alignments. (Martin (2012, pp. 556)

The paper does not attempt benchmarking comparisons of cost between Australia and other countries, except with regard to these rough ratios.

Box 8.2 Choice of technique as a driver of cost in the rail sector

The recent rail survey by Martin (2012) describes the large cost impacts that result from the decision to tunnel:

The greatest escalation factor in the construction costs for new heavy rail projects is the decision to pursue tunnelled rights of way. The technical and geological complexity and risk of tunnelling projects greatly increases this cost...

In determining an indicative per-route kilometre construction cost for new lines in tunnelled rights-of-way, the two predominantly underground rail projects, being Epping-Chatswood (\$208.2 million/km) and the Sydney Airport railway (\$125.1 million/km) in this study were used, in addition to a third project, the section from Perth station to The Narrows bridge which formed ‘Package F’ of the Perth-Mandurah line.

While the vast majority of the 72-kilometre long Perth-Mandurah railway line was constructed along freeway medians and sandy scrubland south of Perth, the last few kilometres into Perth’s CBD presented complex engineering challenges, including the Swan River crossing at the Narrows. The tunnelled approach to Perth station and connection to the Joondalup line (‘Package F’) provides another example of the high costs of tunnelling in an inner urban environment. The final cost of package F was \$398.1 million (2007 dollars), or approximately 36% of the project’s total construction costs. Package F encompassed 2.2 route kilometres of underground railway construction costing a total of \$299.6 million/km (2012 dollars) or \$136.2 million per route-kilometre...

Source: Martin (2012, pp. 555–6).

Airport construction cost benchmarking

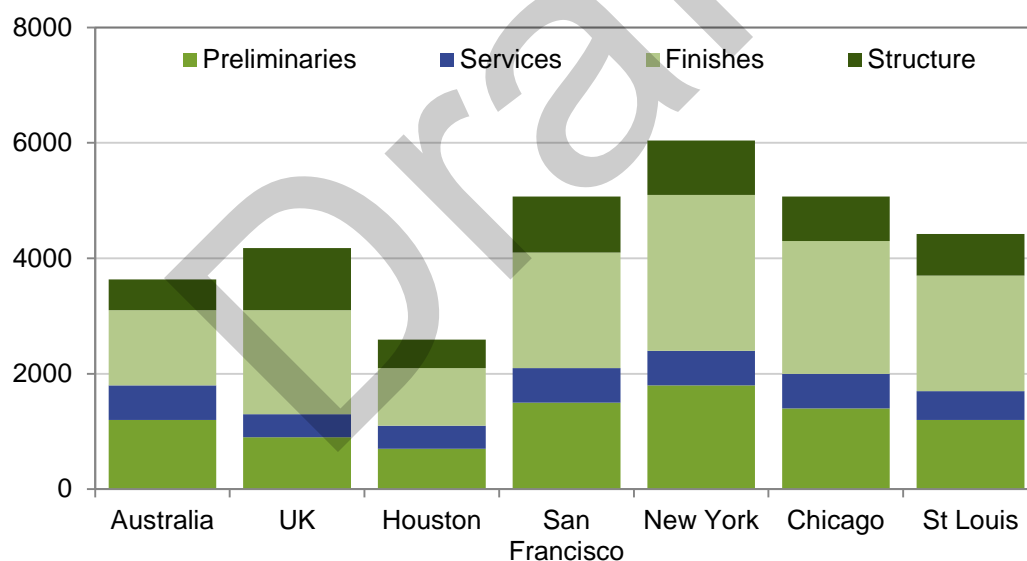
In 2012, the international construction consultancy firm Turner and Townsend produced indicative cost benchmarks on airport construction for Brisbane Airport Corporation (sub. 90, p. 11). These compared construction costs for a hypothetical low cost terminal in Australia with those in the US and UK.

The benchmarking exercise considered construction of a 14 915 square metre airport terminal to accommodate low cost carriers, involving the following features:

- basic standard finish
- greenfield site
- current rates and no allowance for escalation or contingency
- terminal building only excluding specialist equipment, external works and airside walkway
- exchange rates 1 (GBP) = 1.55 (AUD), 1 (USD) = 0.96 (AUD).

The work found that Australian costs compared well with the UK, and with unionised regions of the US (lower costs were observed in non-unionised locations in the US such as Houston)(figure 8.15).

Figure 8.14 Costs of benchmarked plan, US, UK and Australia
\$ rate per square metre



Data source: Turner & Townsend (2012).

International cost benchmarks

Internationally, there have been efforts to implement a more comprehensive approach to project planning and appraisal involving the use of cost benchmarking data.

In the United Kingdom, for example, there has been a recent Government-wide initiative, led by Infrastructure UK, to publish comprehensive cost benchmarks

across a range of sectors to guide project planners and purchasers. This has been driven by a perceived absence of consistent benchmarking information in the public domain:

There is currently not a central collection and publication of infrastructure cost or performance benchmarks. Even where such benchmarks are collated within infrastructure sectors, there is not a consistent approach to applying cost and performance intelligence to inform future investment decisions. (HM Treasury (United Kingdom) 2013, p. 14)

The UK now publishes annual representative unit cost benchmarks from public, private and regulated infrastructure sectors. These benchmarks allow some comparison of cost changes across time to be made (see, for example, table 8.2 and figure 8.15).

Table 8.2 UK construction cost benchmarks — Highways Agency — single point average title

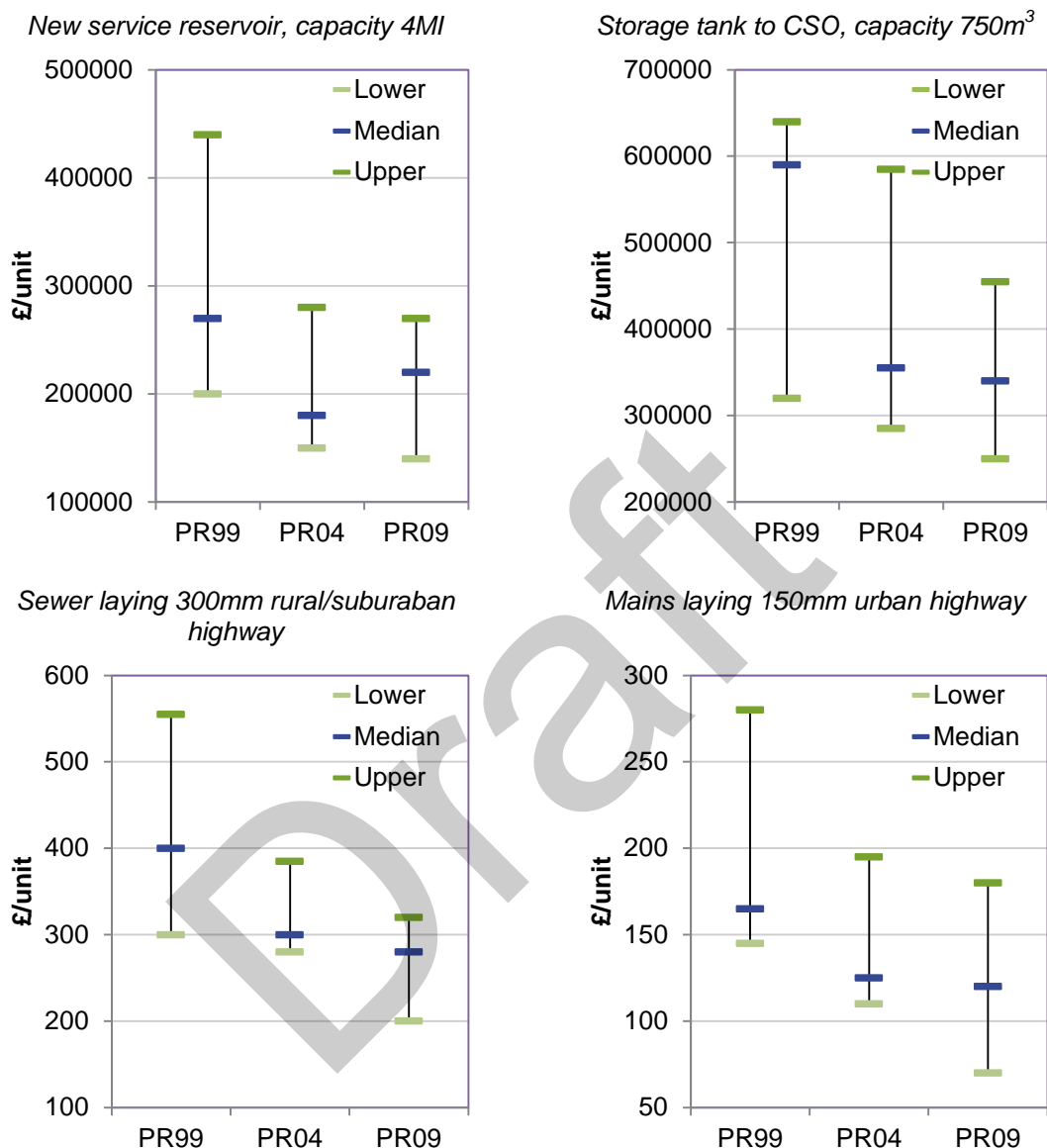
<i>Benchmark</i>	<i>2009-10</i>	<i>2010-11</i>	<i>2011-12</i>
Trunk road improvement – total construction cost per additional lane provided	£9.7m/km	No data	£7.2m/km
Junction improvement – total construction cost per junction or interchange	£21.0m/junction	£20.3m/junction	No data
Managed motorways – total construction cost per additional lane provided	£6.3m/km	£9.6m/km	£4.3m/km

Source: UK Cabinet Office in HM Treasury (United Kingdom) 2013, p. 15.

A need for more effective and systematic benchmarking in Australia

The development and use of cost and other benchmarks for infrastructure projects in Australia is disappointingly limited at present, even after a number of previous reports highlighting the issue. Existing cost benchmarks tend to be based on relatively small samples of projects, and to be based mainly on projects in single sectors (in particular road and rail construction). This means that existing cost benchmarks can only be used as rough approximations by those attempting to gauge the reasonableness of proposed costs within future project proposals. While there is some qualitative benchmarking that considers time and quality aspects, this approach is also relatively underdeveloped in Australia, and tends to be undertaken at the smaller end of the construction spectrum.

Figure 8.15 UK Water sector cost benchmarks – PR99, 04 and 09
2011-12 prices



Source: Ofwat in HM Treasury (United Kingdom) 2013, p. 17.

Several participants have called for a more effective and strategic approach to benchmarking and data provision in Australia. For example, the University of New South Wales stated:

Governments, clients and industry should invest in more research to provide an evidence-base to inform better decision-making, benchmarking and monitoring of cost and productivity drivers and trends. (sub. 44, p. 6)

The Australian Trucking Association argued that more publicly available data would assist both investment decisions and user charging during operation:

...having this expenditure data publicly available would enable unit cost estimates of road maintenance and investment (e.g. by lane kilometres on a given network tier). These estimates would be developed into efficient benchmark investment and maintenance costs that could be used to inform the amount of expenditure that is recovered from heavy vehicle road users. (sub. 27, p. 6)

Geoff Holman stated that:

... solid and reliable data on this subject is dispersed and difficult to locate. A priority must be the collection and collation of data in a unified, useful, consistent and comprehensive form. (sub. 96, p. 3)

de Valence (sub. 16, p. 2) argued for the use of benchmarks within a broader approach that employed reference class forecasting (box 8.3), stating:

That Reference Class Forecasting or a similar process be applied to all proposed projects, and that an Australian database of public infrastructure projects be developed and maintained. All public infrastructure projects' time and cost estimates should be compared and evaluated against previous project outcomes and performance.

Box 8.3 Reference class forecasting

Reference class forecasting consists in taking a so-called 'outside view' on the particular project being forecasted. The outside view is established on the basis of information from a class of similar projects. The outside view does not try to forecast the specific uncertain events that will affect the particular project, but instead places the project in a statistical distribution of outcomes from this class of reference projects. Reference class forecasting requires the following three steps for the individual project:

- (i) identification of a relevant reference class of past projects. The class must be broad enough to be statistically meaningful but narrow enough to be truly comparable with the specific project;
- (ii) establishing a probability distribution for the selected reference class. This requires access to credible, empirical data for a sufficient number of projects within the reference class to make statistically meaningful conclusions; and
- (iii) comparing the specific project with the reference class distribution, in order to establish the most likely outcome for the specific project.

Source: Flyvbjerg 2009, p. 354.

The use of project benchmarks, within a reference class forecasting framework, has also been supported by a recent Victorian Parliamentary Committee inquiry into major projects (Parliament of Victoria Public Accounts and Estimates Committee 2012, p. xx).

Given the underdeveloped state of consistent and comparable benchmarking data on major public infrastructure, one question that arises is whether more should be done to develop such information?

The Commission notes that there are already several recent government initiatives of note in this area, including:

- Infrastructure Australia's benchmarks for efficient procurement of major infrastructure (IA 2012)
- preliminary work by the Department of Infrastructure and Regional Development on methods to benchmark infrastructure project costs (box 8.4, sub. 64, p. 26).

These are potentially quite limited in their impact, depending on the willingness of states and other parties with major projects to participate actively in benchmarking. Confidentiality restrictions, as discussed, for example, by Lend Lease (sub. 46), appear to be a serious and unnecessary impediment to benchmarking. Such restrictions should be revisited in future infrastructure planning as the creation of effective benchmarking has the capacity not just to assist tender evaluation, but also to indicate to bidders that lower project costs are likely to lead to a more sustainable and predictable pipeline of projects.

A number of options are worthy of further consideration. These could include an expansion of Infrastructure Australia's remit to cover collection and oversight of such data; collection of such data by the Australian Bureau of Statistics; the establishment of a funded group of academic institutions with expertise in this area; or performance of this function by a state-based unit (such as currently occurs in the case of Australian Gambling Statistics, which are currently collected by the Queensland Government Statistician). In implementing an expanded approach to benchmarking, another option would involve the Bureau of Infrastructure, Transport and Regional Economics being funded to develop and implement a detailed benchmarking framework. The Bureau would also be well-equipped to perform such a role given that it has previously produced work of this nature.

Regardless of which option is chosen, the performance of this function by a single agency would have the advantage of providing a single coordinator of benchmarking data collection and a single repository of such information.

Box 8.4 **The Department of Infrastructure and Regional Development's Project Cost Breakdown**

In mid-2012 the Department, in conjunction with state and territory road and rail agency representatives (particularly in regard to definitions), developed standard road and rail Project Cost Breakdown (PCB) structures, and since then has required proponents to include completed PCB templates with all funding submissions for infrastructure investment.

The key features of the templates are that:

- only high level data is being sought, noting that each state/territory have different reporting structures, and as such will need to “map” from their own reporting structures into the Department’s structures, and seeking data at a significantly lower level would appear to be an unwarranted burden on states/territories for little utility
- each cost element is accompanied by a comprehensive definition
- the Base Estimate, Contingency and Escalation components of the project cost estimate are reported separately
- proponents are required to provide significant contextual information so as to inform useful comparison (this includes the project location and key features, and the project phase noting that as a project proceeds through its lifecycle from scoping through development and delivery and completion, the overall cost estimates will become progressively more refined and contingency representing risk, is expected to decrease).

Source: Warren Fletcher, pers. comm., 21 February 2014.

DRAFT RECOMMENDATION 8.2

The Australian Government should fund the development and ongoing implementation of a detailed benchmarking framework for major infrastructure projects in Australia. This would substantially assist in the future planning and evaluation of projects, and is an essential factor in the much-cited pipeline of projects.

The benchmarking should, at a minimum, include information on tender costs and other procurement outcomes, completion times and final out-turn costs and levels of remuneration and industrial disputation.

The provision of data to support the benchmarking framework should be a requirement attaching to all Australian Government funding for major infrastructure projects. Mechanisms should also be developed to capture similar data from projects funded by other levels of government and consideration should be given to what information might be gathered from the private sector to enhance the quality of information provided by the benchmarking.

This ongoing benchmarking must be seen to be independent of both government and industry influence and also be seen as technically robust and credible.

INFORMATION REQUEST 8.2

The Commission seeks views on the best set of institutional arrangements to undertake its proposed benchmarking initiative, including roles that existing agencies might play (such as Infrastructure Australia, the Bureau of Infrastructure, Transport and Regional Economics, and the Australian Bureau of Statistics).

8.5 International comparisons of cost

A further source of information on possible cost movements are studies and surveys of international construction costs that include Australia.

Recent Australian studies

Several recent Australian studies, employing a mix of case studies, cost benchmarks and aggregate data, have also undertaken comparisons of major project construction costs here and internationally.

The Business Council of Australia (BCA) have published two reports in recent years (BCA 2012, 2013) that have argued that:

- major project infrastructure in Australia has become significantly more costly to construct
- Australia has become a relatively more costly destination for such construction compared to other similar locations.

Regarding international comparisons, the more recent BCA paper (based on Independent Project Analysis (2012)) pointed to large cost disparities for project construction between Australia and the US Gulf Coast which, it suggested, provides a roughly comparable location. This included costs that were 38 per cent higher for iron ore and coal developments; 50 per cent higher for large, complex processing projects; and 200 per cent higher for offshore oil and gas developments (BCA 2013, p. 14).

An earlier study by Evans and Peck (2011), produced for the BCA, looked at a small sample of 23 major Australian infrastructure projects completed in the previous ten years and with capital costs of \$500 million or greater. Projects came from infrastructure sectors including road, rail, ports, airports water, information

and communication technology. The main focus of the study was on the cost and time performance of these projects and, in this regard, the report found mixed performance by sector regarding time and cost overruns. The report also contained some rudimentary international comparisons, showing a relatively good performance regarding cost overruns in Australian road and rail projects (table 8.3).

Table 8.3 Cost overrun comparisons — Australia vs. International

<i>Project type</i>	<i>Australian benchmark</i>		<i>International benchmark</i>	
	No. of projects	Average cost overrun (%)	No. of projects	Average cost overrun (%)
Road	12	10	167	20.4
Rail	4	20	58	44.7

Source: Evans and Peck (2011, p. 18).

Finally, GHD Meyrick (2011) conducted a comprehensive study of infrastructure construction costs that used official data and compared costs in Australia with those in the US, UK, France and Canada. The report found that over the longer term construction costs exhibit mean-reverting behaviour, tending to drop back to trend when compared to CPI across time, despite some major episodes of falling or rising costs. It also found that observed cost trends, at least in the period up to publication in 2011, were broadly in line with those observed in the comparator countries.

Consideration of issues

Beyond providing very broad information on possible cost differentials, international comparisons of construction costs for major project infrastructure, particularly those based on limited sample sizes or case studies, suffer from a number of quite significant problems. The bespoke nature of many major projects makes finding comparisons of ‘like for like’ very difficult. Factors such as climate, geography, and differing industrial relations systems may also further compound comparability issues. Pricing is also problematic, even with the use of purchasing power parity or alternative indices (such as the Big Mac index) to correct for exchange rate differences.

International comparisons can also abstract from a much broader range of country specific features, including (for example) the cost of living, immigration policies, or societal standards regarding such things as the environment or safety standards. While some of these may obscure, or be caused by, inefficiencies or excessive risk aversion, others may be genuine reflections of shared views on issues of national significance.

In discussing such limitations, Edkins and Winch (1999, p. 45) state that:

Dealing with such apparently simple questions as ‘who is cheapest?’ and ‘who is better?’ is fraught with problems. Whether one measures input prices or output prices, real buildings or fictitious buildings, the problems are multiple and manifest.

In the course of its inquiry, and in concordance with this view, the Commission has also found that significant data limitations exist in regard to the cost of major projects within Australia. Current data limitations mean that sensible comparisons of similar projects across jurisdictions within Australia are, of themselves, difficult to produce in any comprehensive way.

This is not to suggest that work which attempts to quantify costs, or to create bases for comparisons of cost, are without merit. Methods such as reference class forecasting, for example, are worthy of further consideration, and explicitly require the construction of comparison indices across projects. This was also observed in a number of submissions. For example, de Valence stated in this context:

Better use of data from previous projects in the evaluation and definition stages of new projects would be a transformative innovation in procurement management. (sub. 16, p. 5)

The Commission is, however, of the view that, where such comparisons are made, they should be based wherever possible on adequate data and robust measurement methodologies.

DRAFT FINDING 8.2

Comparisons of major project construction costs between Australia and other countries suffer from a range of methodological and data problems that limit their use. Recommended improvements in data availability, together with further development of reference frameworks, should assist greatly in reducing such limitations.

8.6 Concluding comments

The available evidence on major infrastructure construction costs shows that there have been some recent significant increases in input costs, particularly labour and fuel costs. Land costs and bid design costs also appear to have contributed to a growing cost base.

International comparisons of costs between Australia and counterpart countries are largely inconclusive, but do not support some recent claims (such as those made in BCA 2013) of extremely large cost differentials.

INFORMATION REQUEST 8.3

The Commission seeks further and better evidence on construction cost differentials for major infrastructure projects, both within Australia and between Australia and comparable countries.

Draft

9 Productivity issues

Key points

Concerns about productivity levels and growth in the construction industry are common to many countries.

The available aggregate data points to positive but weak labour productivity growth within the Australian construction industry across the 2000s, with some stronger growth performance recently.

At the same time, the construction industry has seen multifactor productivity growth on par with, if not better than, the market sector.

The main driver of historically weak labour productivity growth appears to be relative low levels of capital deepening, capital investments that allow output from a given worker to increase from the use of better equipment. In contrast, capital productivity remains high.

There is some evidence that levels of productivity and efficiency in the Australian construction sector lag behind those of some comparator countries, such as the United Kingdom.

- However, innovation, research and development levels in Australia appear relatively high compared with other countries.

Other evidence, including from industry and firm level studies, and from a considerable number of submissions, point to unrealised productivity and efficiency gains in the sector.

- These include gains via improvements in project planning, firm level operating and managerial processes; prefabrication and design; use of technology and choice of technique; labour utilisation and workplace relations; and overarching regulatory and competition policy structures.
- In particular, innovative approaches to design and planning and the expanded use of prefabricated or precast elements were identified by many participants as having potential to promote productivity growth in the sector.

While some of these sources of potential productivity improvement may be amenable to government policy, others are largely matters best left to the industry and their clients to address.

The productivity performance of the construction sector has rightfully been the topic of much public debate. Given the need to improve infrastructure provision in Australia, it is crucial that reforms be targeted to improve both the level of

productivity in infrastructure construction and its growth rate. Related to these concerns is the more efficient use of existing infrastructure; that is, the productivity of the existing capital stock.

Concerns have been expressed regarding the apparent poor productivity performance of the industry, and its perceived lag in performance compared with a number of Australia's international peers (box 9.1). However, productivity, a measure of how well businesses use inputs to generate outputs, can be difficult to measure in service sectors such as construction where the output (that is, the completed infrastructure) can vary in quality over time and frequently lacks a market price. Further, assessments of productivity are also complicated by differences in what many conceive of as the construction sector, and how its performance is actually measured. For example, building and infrastructure design activities are captured by the ABS in a different sector, as is the offsite fabrication of many components in modern buildings and infrastructure which would have been previously built on site.

For any given level of inputs and input prices, higher productivity lowers costs. In this chapter, a picture of the productivity performance of the Australian construction sector is sketched, focusing where possible on infrastructure construction. Given the complexities involved, this chapter examines productivity through several lenses to help provide a fuller picture of construction production than that captured by aggregate statistics. The chapter considers:

- the macro and micro evidence on recent productivity performance in the construction sector, together with some international comparisons (section 9.1)
- some of the main challenges faced by the sector in improving productivity, and the implications for the role of government (section 9.2). (Industrial relations issues, which are an important part of the productivity debate, are discussed in detail in chapter 12.)

9.1 Recent Australian performance

In considering productivity performance, the Commission has examined both the level of productivity (both labour productivity and multifactor productivity) and the productivity growth rate within the Australian construction industry. To the extent that the Australian construction sector operates below what is known as the productivity frontier, there is a systemic level problem with productivity. This can only be addressed by above average productivity growth to move the sector towards the frontier. The frontier itself (usually) grows as new technologies are deployed,

Box 9.1 **Some participant's views on productivity in the construction sector**

David Chandler (sub. 63, p. 8) stated:

Most project procurement and delivery has however yet to address the need for urgent correction of the cost to productivity ratio. Costs, especially wages and salaries continue to be absorbed with little if any productivity improvement. The cost of projects being delivered across the nation is highly variable. Establishing productivity direction and measures is the first step in turning these burdens on project cost around.

Lean Construction Institute of Australia (sub. 103, p. 2) argued that:

The greatest single challenge facing the construction sector in Australia today is a widespread loss of productivity when compared to other sectors in our economy and to the construction sectors of competing economies.

University of New South Wales (sub. 44, p. 2) stated:

The industry should avoid the temptation to focus on wages and industrial relations. While industrial relations is an important ingredient in the productivity debate, it is one of many ... Good productivity is driven by an educated, skilled and engaged workforce, an efficient work environment, innovation, efficient procurement models and ultimately trust between industry stakeholders.

Lend Lease (sub. 46, p. 5) said:

... in our view the productivity debate needs to be significantly broadened to examine a range of potential sources of productivity improvement – including prefabrication and modularisation, more interactive procurement, better use of collaborative technology platforms; further industrial relations reform; and increasing the skill and expertise of the industry.

Master Builders Association (sub. 88, p. 3) submitted:

While increasing our infrastructure productivity will require action across a number of policy domains, an essential element must be meaningful labour market reforms, focusing on reinforcing the rule of law in critical sectors of the building and construction industry as a means of reducing construction costs and lifting labour productivity.

including new and more efficient ways of deploying and managing resources used in construction.

As with the previous chapter on costs, the Commission has drawn on a broad range of evidence when considering recent productivity performance and in attempting to establish the current level of innovation activity in the sector. This includes not only aggregate productivity statistics for Australia and other countries, but also less direct indicators, such as rates of international activity by Australian construction firms. A reliance on a broad range of evidence is valid given the limitations of aggregate data, including that the construction sector is spread across several ABS

industry classifications — Construction; Professional, Scientific and Technical Services; and Manufacturing.

Further, construction is a non-traded good and, as with other non-traded sectors, it is likely that a number of quality related improvements will not be measured in volume-based output measures thereby not being captured in productivity statistics. Where such improvements come at the cost of greater input use they may actually decrease measured productivity — for example, improved occupational health and safety outcomes may result in incrementally more labour hours and greater safety equipment but also save lives.

Macro evidence on productivity

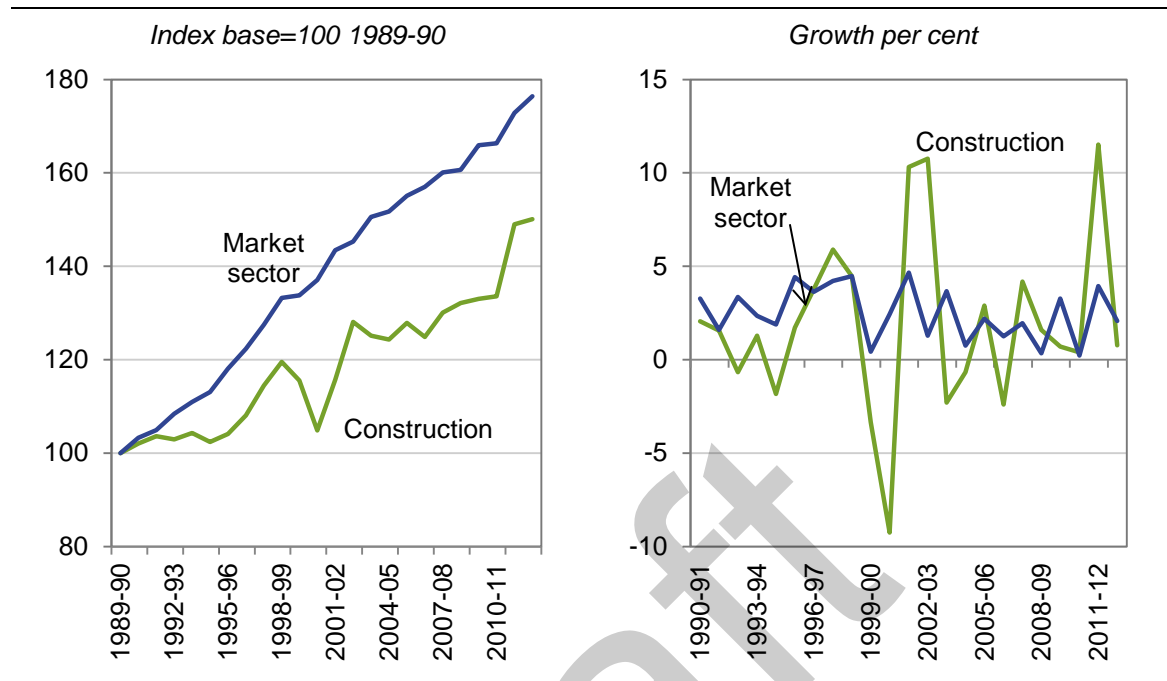
While the terms of reference for this inquiry directs the Commission to examine the infrastructure sector, most aggregate data encompasses all construction activities — residential, commercial and infrastructure. Each of these sub-sectors are different, producing different products, having different market structures, and facing different regulatory environments. Despite this, there are still a number of common elements which make an examination of aggregate productivity trends an important element in understanding the productivity performance of the infrastructure construction sector.

While productivity growth within the Australian construction sector has been mostly positive over the past two decades, it has generally lagged behind that of the market sector (the ‘all industries’ measure) for much of the recent past.⁴

Labour productivity in the construction sector has, in particular, consistently been below the market sector average for the period 1989-90 to 2011-12. While there have been periods of relatively similar growth, the gap in output per worker between the construction sector and the rest of the economy has grown (figure 9.1).

⁴ The market sector 12 comprises the following industries: Agriculture, forestry & fishing; Mining; Manufacturing; Electricity, gas, water & waste services; Construction; Wholesale trade; Retail trade; Accommodation & food services; Transport, postal & warehousing; Information, media & telecommunications; Financial & insurance services; and Arts & recreation services.

Figure 9.1 Labour productivity in the construction and market sectors
1989-90 to 2012-13

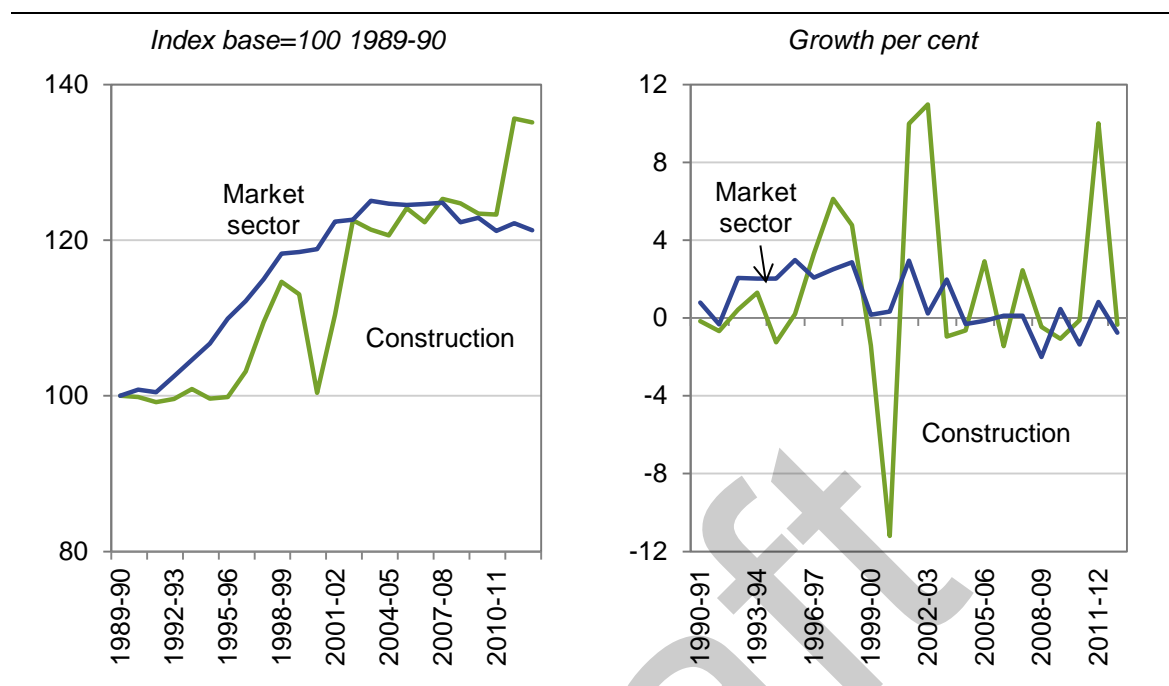


Source: ABS (*Estimates of Industry Multifactor Productivity*, Cat. no. 5260.0.55.002).

Labour productivity can be decomposed into two elements — capital deepening and multifactor productivity (MFP). The former represents capital investments that allow output from a given worker to increase from the use of better equipment. The latter represents technical change which is effectively doing things better than in the past.

The two elements have showed differing trends. Compared with the market sector, MFP performance for the industry has been relatively strong. Over the recent past, MFP has kept pace with the lacklustre market sector but has shown a significant improvement between 2010-11 and 2012-13 (figure 9.2). This suggests that technical change and innovation (explored further below) have been strong in the sector.

Figure 9.2 MFP in the construction and market sectors
1989-90 to 2012-13

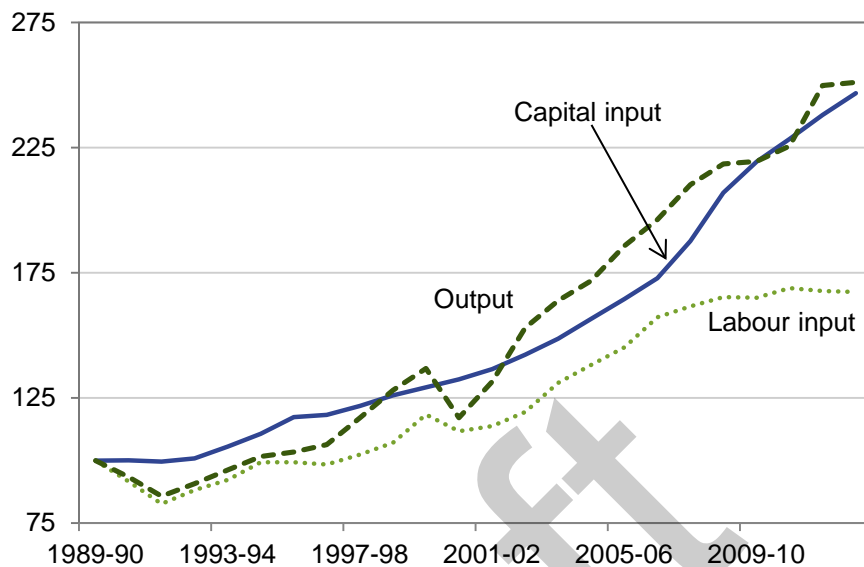


Source: ABS (*Estimates of Industry Multifactor Productivity*, Cat. no. 5260.0.55.002).

The MFP trends present a puzzle in terms of capital input use. In absolute terms, there has been a significant increase in capital inputs over much of the recent past (figure 9.3). This has occurred in line with the strong output growth of the sector. (Labour input use has also followed the trend of output growth as would be expected.)

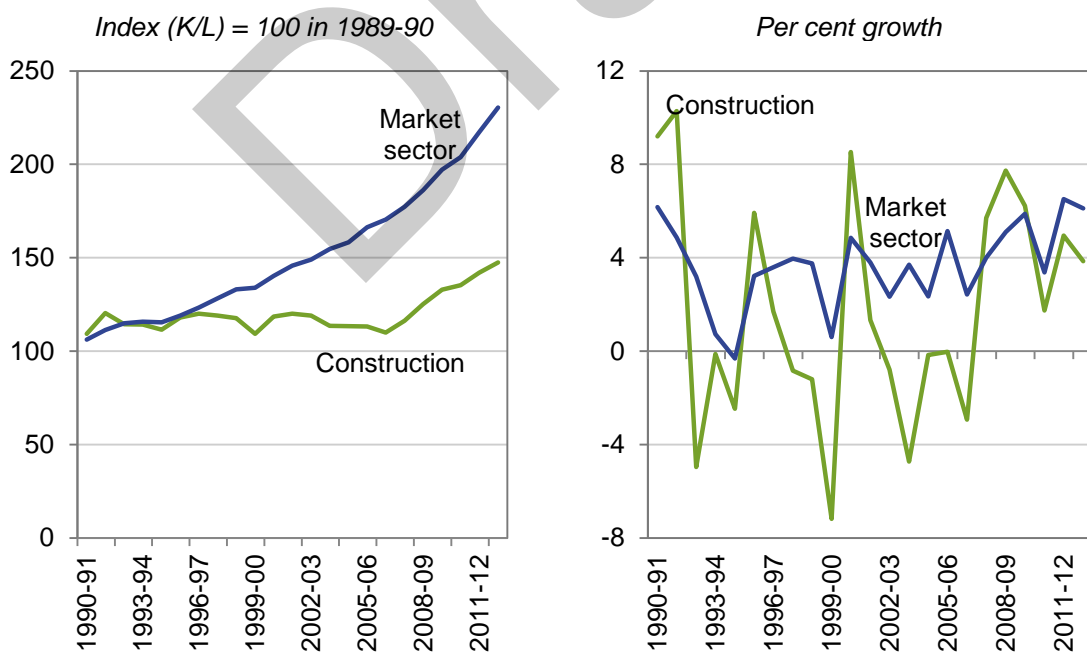
But while absolute capital input use has increased, capital deepening relative to the market sector has fallen (figure 9.4). However, as discussed in chapter 8, this has occurred at the same time as the costs of physical capital inputs have fallen — which might be expected to prompt greater capital deepening. Further, compared with the average for the market sector 12 industries, capital productivity has also been high in recent periods (table 9.1).

Figure 9.3 Input, output and productivity aggregates in construction
1989-90 Base Year = 100



Source: ABS (*Estimates of Industry Multifactor Productivity*, Cat. no. 5260.0.55.002).

Figure 9.4 Capital deepening in construction and the market sector
1989-90 to 2012-13



Source: ABS (*Estimates of Industry Multifactor Productivity*, Cat. no. 5260.0.55.002).

Table 9.1 **Comparison of construction and market sector trend growth rates**

Per cent

	1989-90 to 1993-94	1993-94 to 1998-99	1998-99 to 2003-04	2003-04 to 2007-08	2007-08 to 2012-13
MFP index					
Construction	0.2	2.6	1.1	0.8	1.5
Market sector	1.1	2.5	1.1	-0.1	-0.6
Labour productivity					
Construction	1.0	2.7	0.9	1.0	2.9
Market sector	2.6	3.7	2.5	1.5	1.9
Capital productivity index					
Construction	-2.3	2.2	1.6	0.4	-1.9
Market sector	-1.0	0.9	-0.5	-1.9	-3.3
Capital input					
Construction	1.3	3.6	3.3	5.8	5.5
Market sector	2.5	4.0	4.0	5.9	5.5
Hours worked					
Construction	-2.0	3.0	4.0	5.2	0.7
Market sector	-1.1	1.2	1.0	2.5	0.3
Value Added					
Construction	-0.9	5.7	4.9	6.2	3.6
Market sector	1.5	4.9	3.4	4.0	2.2

Source: ABS (*Estimates of Industry Multifactor Productivity*, Cat. no. 5260.0.55.002).

It is difficult to pin down the factors that lie behind the relatively low levels of capital deepening in the construction industry. Indeed, there could be many explanations, including muted incentives to invest in new capital equipment due to the variable nature of work in the industry, the large investments that are required; and long-lived assets (such as crane and other heavy equipment) creating investment cycles, issues related to the industrial environment and the scope for new equipment to be profitably used (Hirsch 2003), along with a possible move to the use of capital equipment offsite in activities such as prefabrication (and therefore it being captured in other industries by the ABS).

INFORMATION REQUEST 9.1

The Commission seeks further information on the possible causes of the relative low levels of capital deepening in the construction sector, and whether or not the trends in productivity identified for the sector apply to infrastructure construction activities and whether these trends are likely to be long-lasting.

Some regional variation is also evident

The productivity story also varies across Australian jurisdictions. Again, the detail of the statistics collected by the ABS makes it difficult to explore productivity in the infrastructure sector by state. However, some variations across states in construction productivity are apparent. Over the period 2005 to 2011:

- both Victoria and South Australia experienced declines in construction industry MFP, though there was an improvement nationally
- New South Wales and Queensland had strong MFP growth over the same period (table 9.2).

Table 9.2 Estimated average annual rates of MFP growth in the construction industry, by State and Territory
Per cent

	1990 to 1999	1999 to 2005	2005 to 2011
NSW	1.7	0.4	3.3
VIC	3.0	1.7	-1.2
QLD	2.0	-0.5	1.7
SA	1.1	1.6	-1.5
WA	0.8	0.6	0.5
TAS	-0.8	1.3	0.0
NT	-2.0	5.9	-6.6
ACT	6.3	-2.4	0.5
AUST	2.0	0.7	1.2

Source: Cunningham and Harb (2012, pp. 13–14).

International comparisons of aggregate performance

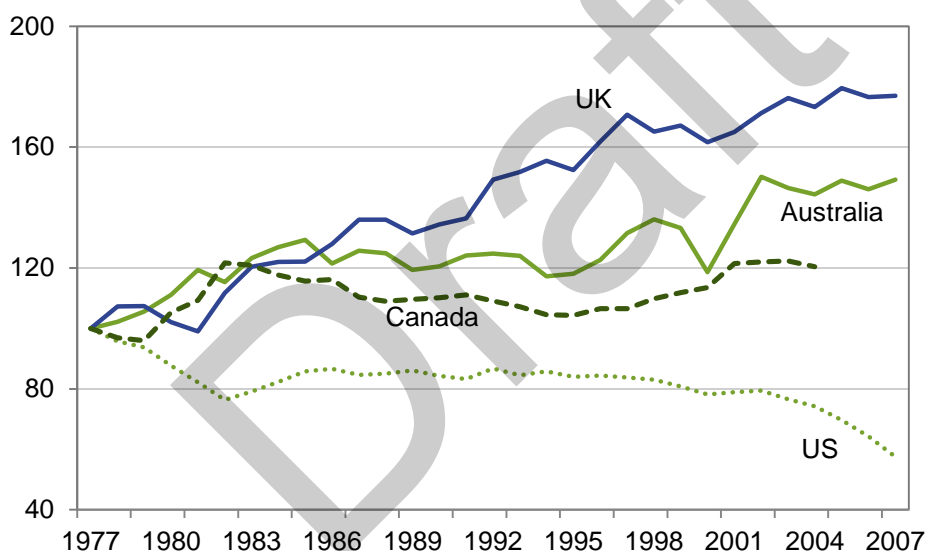
The international evidence on Australia's productivity performance in construction, relative to other countries, is quite mixed, and subject to varying levels of robustness. As with international comparisons of cost performance (discussed in chapter 8), caution is needed with regard to methods of comparison and in interpreting results.

A consideration of *trends* in productivity levels across countries suggests Australia is performing quite well. However it is not clear that the data are comparable. Looking at *relative performance*, which takes account of changes across time in the relative position of industries in terms of productivity across countries, reveals a different picture.

In regard to growth trends, on face value, Australia's construction labour productivity growth rates have eclipsed those of Canada and the United States, with the latter showing negative labour productivity growth over the 30 year period from 1977 (figures 9.5 and 9.6).⁵ However, Australia's performance relative to the United Kingdom has been comparatively poor.

Figure 9.5 **Labour productivity in construction**

Gross value added per hour worked, volume indices, 1977 = 100



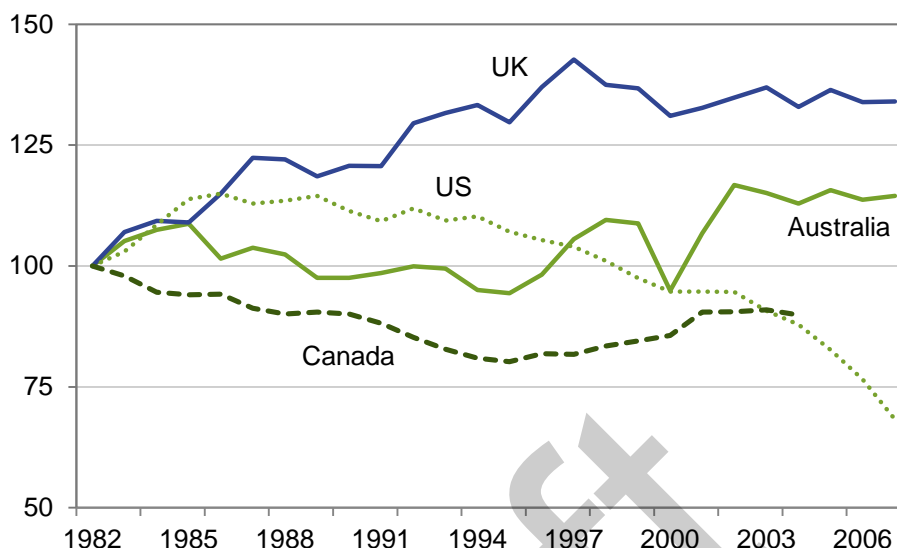
Source: EU KLEMS, November 2009 Release.

These results are hardly definitive. Long-run negative total factor productivity, as apparent for the United States, would usually be taken to mean that knowledge and technologies are moving backwards, a patently dubious proposition. That suggests there may be unmeasured quality increases, structural changes in the industry that mean that output has shifted to less productive activities, or growing regulatory or other impediments to efficient production. Nevertheless, it is uncertain whether any of these factors would be specific to the United States, suggesting that the relative performance may be better measured than the trends.

⁵ The negative labour productivity performance in the United States has been verified in other studies. Teicholz (2013) has provided a comprehensive analysis in this area and provided some explanations for the pattern.

Figure 9.6 Total factor productivity in construction

Total factor productivity (value added based) growth, 1982 = 100



Source: EU KLEMS, November 2009 Release.

There have been some recent attempts at comparisons of relative performance between Australia and other countries, but these can also be problematic. For example, using the EU KLEMS data, Young et al. (2008) sought to explore Australia's productivity gap compared with the United States. In doing so, the authors considered Australia's labour productivity performance for a number of industries, including construction. On face value, their results show a marked decline in the level of Australian construction sector productivity compared with the United States across the 1990s and through to the mid-2000s (table 9.3). This is not reconcilable with the EU KLEMS data as analysed above, which shows that Australian labour productivity growth rates in construction have grown while those in the United States have fallen (figure 9.5). These trends *should* mean that Australia's relative productivity performance compared with the United States would have *improved*.

The result obtained by Young et al. (2008) are likely to be due to the underlying methodology on which the paper was based, which clouds its interpretability. The method used appears to re-express the value of Australian production in US dollar terms using GDP purchasing power parities and then readjusts the value to quantity terms using the US price deflator. This means that the usual concept of labour productivity — quantity of value added from an hour worked — is confounded by several relative price effects. In that context, Young et al.'s paper should not be interpreted as indicating a decline in Australian physical productivities relative to the United States. The Commission considers that future work is required before

any conclusions could be drawn from this analysis in terms of comparative levels of productivity performance between countries.

Table 9.3 Industry labour productivity in Australia as a percentage of US industry productivity

<i>Industry^a</i>	<i>Industry structure by hours share</i>			<i>Australian productivity by industry sector relative to US</i>				
	1990	2000	2005	1990	2000	2005	Difference 1990–2000	Difference 2000–05
Mining	1.4	1.1	1.6	136.6	169.7	98.1	33.1	-71.6
Finance	4.6	3.9	3.9	61.9	86.3	96.2	24.4	9.9
Wholesale Trade	10.6	8.3	7.7	60.9	72.8	71.3	11.9	-1.5
Manufacturing	15.7	13.5	11.6	47.7	58.0	55.7	10.3	-2.3
Electricity, Gas and Water	1.3	0.8	1.0	68.2	71.0	52.2	2.8	-18.9
Retail Trade	9.5	9.1	10.1	80.5	82.6	79.3	2.1	-3.3
Accommodation	3.8	4.6	4.3	129.5	115.3	102.4	-14.1	-12.9
Construction	7.7	8.4	9.7	95.9	77.0	51.9	-18.9	-25.1
Communications	1.9	2.1	2.0	95.2	59.6	49.7	-35.6	-9.9

^a Industries chosen for comparison on the basis that data does not contain significant measurement or methodological issues.

Source: Young et al. (2008).

Australian case studies

Several studies have been undertaken that look at construction sector productivity in Australia, or at related aspects of performance, and are useful in providing further detail on recent firm and industry level productivity performance. These include Croce et al. (1999), Langston and Best (2001), Proverbs and Faniran (2001), Best and Langston (2005), Langston (2012), Master Builders Association (2012) and Loosemore (2014). While a large part of the discussion in these studies concerns construction in the broad, in some cases they include consideration of non-residential projects.

The recent study by Langston (2012), for example, compares 337 high rise projects completed between 2003 and 2012 in the five largest cities in both countries, with costs measured using a basket approach. Quality and efficiency were also measured using a number of methods. The paper found that:

... there is evidence that base costs in Australia have outstripped the United States, meaning that ‘real’ construction efficiency in Australia is relatively less. If Australia held an advantage in the past, then it seems that advantage might be disappearing. Notwithstanding the larger number of projects found in the United States (251)

compared to Australia (86), the top 10 US performers in terms of construction efficiency have higher scores than the top project found in Australia, and the reasons underpinning this clearly demand future project-level investigation. (Langston 2012, p. 2)

While not focused on larger infrastructure projects, the paper nevertheless considered construction of a size that means its results are relevant to the current inquiry. This is especially so because many of the factors that influence outcomes in the construction of the non-residential buildings being compared — logistical expertise, efficient site management, the use of technologies and industrial relations — are also likely to directly affect construction of social infrastructure (such as hospitals and prisons).

Other indicators of a proxy kind

As discussed above, productivity is made up of a number of elements. This suggests that while aggregate statistics relating to infrastructure construction activities are lacking, other partial measures may shed light on the productivity performance of the Australian industry. For example, levels of innovation (potentially spurred on from research and development activity) help drive MFP. Similarly, it would be expected that if Australia's construction sector is relatively productive, tradeable elements of the industry would be an exportable commodity.

Research and development in construction

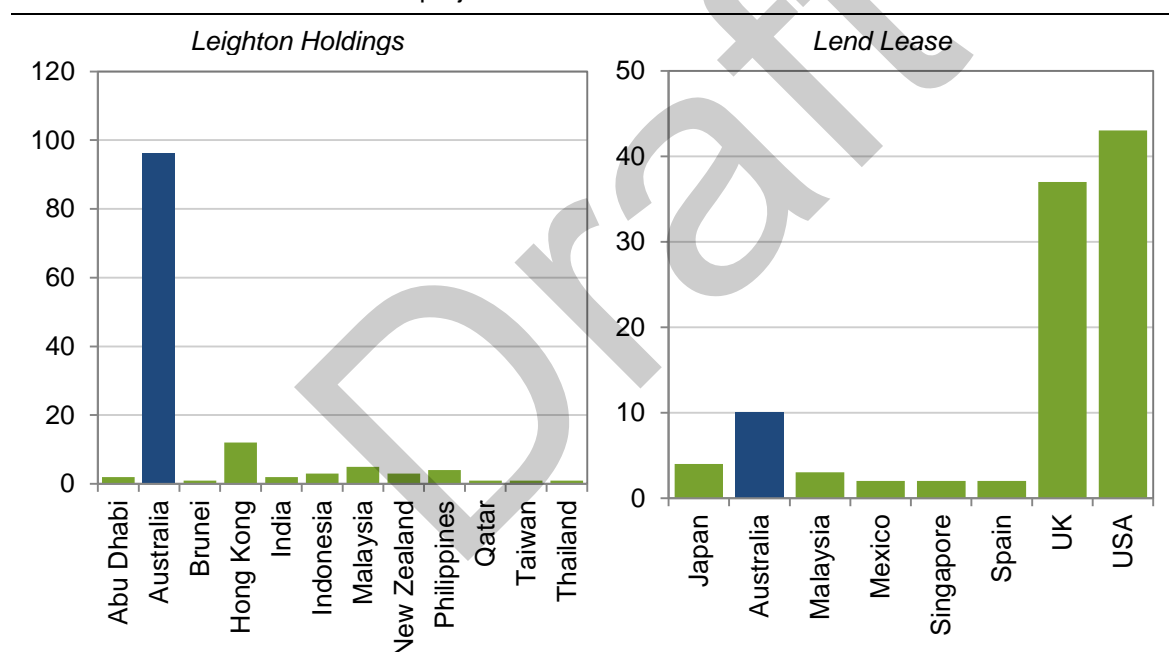
Australia's construction sector's MFP growth has exceeded the market sector over the past two decades. This may reflect several factors, such as improved diffusion of technology, increased management capabilities, reforms to workplace relations and to innovation. Over long periods, sustained MFP growth is more likely to reflect technological developments linked to the generation and adoption of new ideas. While only a proxy, research and development (R&D) intensities provide one measure of innovation. Available OECD measures of R&D intensity shows that the Australian construction industry compares well with other countries such as the United States and United Kingdom. Using a percentage of value added measure, Australia's construction industry had levels of R&D intensity that were well above the United Kingdom across the period 1999–2006, and which were also well above those in the United States for the period 2003–06.

Exports and international exposure of Australian constructors

A relatively productive domestic infrastructure construction industry should have practices that are marketable internationally. If this is the case, it would be expected that a number of Australian firms would also conduct operations overseas. Given the non-traded characteristics of the sector, much of what might be conceived of as ‘exports’ would be captured in Australian foreign direct investment abroad.

However, some proxies can be found. One useful area is international activity undertaken by Australian construction firms. Data on international activities by the large Australian players, Lend Lease and Leighton Holdings, point to significant international activity (figure 9.7).

Figure 9.7 Leighton Holdings and Lend Lease projects by country
Number of recent projects



Sources: Leighton Holdings (2014b); Lend Lease (2014a).

More broadly, during the course of its inquiry, the Commission was also made aware of the significant level of international involvement by Australian construction firms. This is at least suggestive of a sector that is well regarded internationally, and that is able to compete in overseas markets with other major international firms.

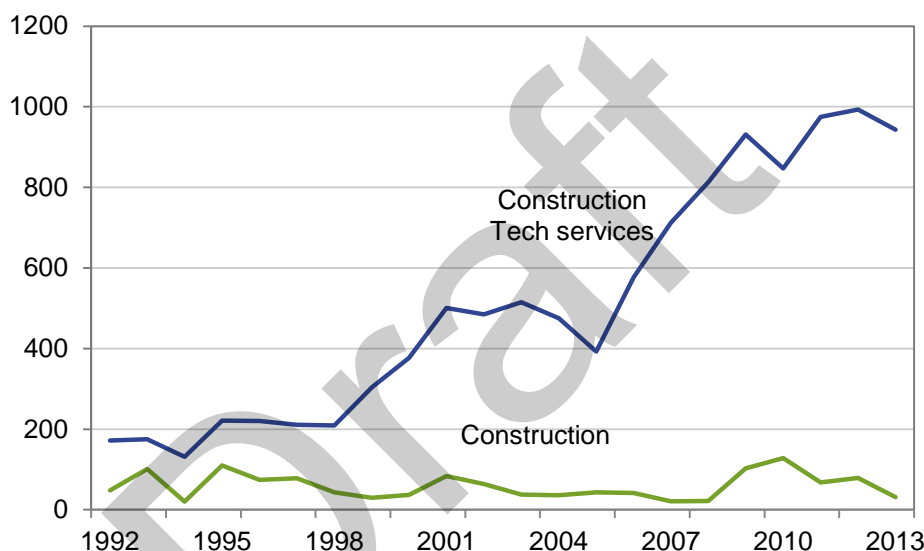
Other areas of the industry, such as architectural, engineering and other construction related technical services, also show an industry that is becoming more internationally focused. Examining aggregate export data shows that Architectural,

engineering and other technical services have increased their exports significantly during the 2000s. This points to overseas demand for Australian expertise (figure 9.8)⁶.

Export data also picks up the fact that measures of direct exports of many of the construction industry outputs, as defined by the ABS, are not feasible (for example, the work of trades). While some exports from the construction sector do occur, they are not significant and have remained relatively stable.

Figure 9.8 Exports of construction services

\$millions



Source: ABS (Australian System of National Accounts, Cat. no. 5204.0, table 5).

Interim summing up

Taken together, the multiple sources of evidence presented above tell a mixed story.

The aggregate Australian data on productivity in the construction sector points to a tepid recent performance record in regard to labour productivity, linked primarily to relatively low levels of capital deepening. On the other hand, MFP performance has been significantly better than admittedly poor economywide numbers. In an international setting, there is some evidence (as well as claims by a range of stakeholders), that Australia's performance relative to other countries *may* have slipped in the recent past, however this is difficult to establish with any certainty. Further, whilst onsite activities *may* have slipped behind the performance of some

⁶ This activity is not measured as part of construction sector productivity.

of our international peers, several elements of the industry have seen strong growth in exports, suggesting relative productivity performance has been stronger.

In discussing measures of productivity performance, several participants pointed out that aggregate evidence should be treated with caution when linking it to specific factors, and are subject to changes caused by broader economic forces. For example, the Australian Council of Trade Unions, in discussing recent changes in industrial relations, stated:

... there are far bigger economic forces at work affecting the rate of productivity growth, like the mining boom, the investment in electricity generation capacity, and droughts. (sub. 95, p. 5)

In a similar vein, a forthcoming article by Loosemore (2014, p. 9) argues that:

Past research has shown that deterministically attempting to prove a relationship between productivity and any single variable is fraught with problems because of the number of potentially intervening variables, many of which are unmeasurable.

It is also important to acknowledge the existence of measurement errors when trying to obtain aggregate productivity data for construction activities. These include:

- where input measures are used (such as summing input prices to estimate likely output prices), output, and therefore productivity growth, can be underestimated;
- in using output measures, it is common for there to be difficulties in finding robust output prices (such as the price per kilometre of road) and in finding comparable ‘outputs’ across projects;
- significant differences in productivity measures can result depending on whether hours-based or employment-based measures of labour input are used. (O’Grady and McCabe 2009)

Clarity about what each study in this area is attempting to assess, and how, is therefore critical when comparing results and making inferences across them (box 9.2).

Box 9.2 What is being measured?

In surveying international work on construction sector productivity, Best and Langston (2005, pp. 2–3) discuss the various definitions and points of focus that are commonly used:

Productivity, in a general context, may be defined as ‘the degree to which the power to make or provide goods or services having exchange value is utilised as measured by the output from the resources utilised’ (Davis 1951). In simple terms productivity is typically expressed as the number of units of output produced per worker (unit of labour input) or per day (unit of time input), or simply ‘output over input’. The complexity and diversity of construction projects makes the quantification of outputs very difficult, and for any comparison exercise the problem of finding completed projects (units of output) that are comparable is an added difficulty.

Efficiency and *effectiveness* are not the same, although both may be seen as part of *project success* (Takim and Akintoye 2002). Efficiency may be linked to management and organisation (measured by factors such as adherence to schedule, budget and specification) while effectiveness is measured by client/user satisfaction. Project success can have two distinct components: project management success and product success (Baccarini 1999). The first focuses on time, cost and quality outcomes, the second to project delivery that satisfies the client/user.

Performance is not the same as productivity and may include factors that have no direct relation to conventional meanings of productivity, such as contractor/customer relations. Loosemore and McGeorge (2002) suggest that performance has four parts: productivity, time, cost and quality. Xiao and Proverbs (2002a) attempt to measure construction contractor performance by a comprehensive set of measures of time, cost and quality performance, and relate performance in many instances to client perceptions of contractors’ performance.

Governments and site supervisors, then, are interested in *productivity* (at macro and micro levels); clients and their project managers focus on *success*, while firms like to gauge their *efficiency*, and may want to compare their efficiency to that of their competitors. Some combination of these parameters may be encapsulated in *performance*, and the term is often used in the literature, although not necessarily with any consistency.

Certainly, concerns about productivity in the construction sector are not confined to Australia. A recent report on international trends in construction productivity, for example, stated:

Labour productivity in the construction sector has been flat or has even been falling in many advanced economies over the past 20 years and has trailed productivity in the rest of these economies. Some of this under performance relates to more stringent quality standards. In addition, some upstream productivity gains by suppliers of raw material and prefabricated components are not reflected in construction productivity data. Even adjusting for these factors, our analysis shows that construction sector productivity growth has lagged behind that of other sectors. (McKinsey Global Institute 2013, p. 30)

INFORMATION REQUEST 9.2

The Commission seeks further evidence on productivity levels and trends in major project construction. It also seeks further examples or case studies from Australia and overseas that illustrate productivity improving changes in construction methods, technologies or organisational structures.

A further point emerging is the need for improved metrics in this area. The Commission notes that the Victorian Government has begun to research the development of a framework of project specific productivity metrics (box 9.3). Given that further data is needed to underpin comparisons of construction productivity, and to look in more detail at productivity drivers, including at the major project end, this initiative may go some way towards improving the information base in this area. The Victorian, New South Wales and Queensland building codes also require contractors to provide data on ex post project performance (chapter 12).

Box 9.3 Victoria's productivity metrics: a framework in development

Victoria is researching the development of a productivity metrics framework for measuring and tracking productivity metrics in the delivery of projects and promoting continuous improvement. The proposed productivity metrics framework will be developed as part of a project contracting strategy that will:

- have selected quantitative, empirical and objective productivity metrics for infrastructure and building projects;
- incorporate comparative metrics that will allow data to be benchmarked across a portfolio of projects;
- allow for the establishment over time of best practice productivity targets; and
- enables context assessments for a qualitative causal analysis of productivity outcomes.

The aim is for the framework to promote improved performance and pricing over time and allow for a contractor's track record of performance on selected productivity metrics to be transparent and used in a tender evaluation criteria for future projects. This research is not related to the proposed use of productivity metrics to support investment decision making to boost overall productivity in the economy. Rather it refers to benchmarking the performance in delivering individual projects.

Source: Victorian Government (sub. 81, p. 41).

Improvements in data collection and benchmarking (as discussed in chapter 8) would also be helpful in improving the understanding of productivity issues in the construction sector.

9.2 Main productivity challenges

While the aggregate evidence on productivity in Australian construction does not suggest a record of extremely poor outcomes, it does indicate room for improvement. In the course of its inquiry, the Commission was provided with various views about how productivity outcomes could be improved in the sector, and these are discussed in greater in this section.

A consistent theme in the areas for improvement raised by stakeholders was that a multi-tiered approach was needed, focussing in part on workplace relations, but also on broader policy settings and industry practices.

The most significant future productivity challenges within the industry identified by stakeholders included:

- project definition and procurement approaches
- firm level project management
- prefabrication
- design
- labour utilisation and workplace relations (discussed in chapter 12)
- incentives for innovation
- regulation and competition.

This list is also consistent with many past international and Australian studies, including those discussed earlier, and in many respects with broader work on drivers of productivity across a range of industries.

While some of the above factors may be amenable to government policy improvements, others are matters best left to the industry to address. The Commission has therefore made recommendations where the former applies, but is also mindful of the need for broader policy frameworks to contribute to, and not detract from, an environment of innovation and competition in the industry.

Project definition and procurement approaches

Procurement approaches and project definition have critical flow-on effects for construction productivity outcomes, a point emphasised in both stakeholder discussions held as part of this inquiry and in submissions.

As discussed further in chapter 11, time is an important element in terms of innovation and productivity outcomes. Poorer outcomes can result where clients rush to market with ill-conceived ideas, or place too many time pressures on potential bidders. The importance of project scoping and upfront due diligence has been highlighted in a number of submissions:

Poor project governance in Australia is a major reason why infrastructure projects fail to meet their timeframe, budget and service delivery objectives. Australian governments must improve the project procurement and transaction management processes to: reduce tender, construction and operational cost; increase schedule reliability; eliminate fees leakage; eliminate windfall operational profits, and promote innovation. (Industry Super Australia sub. 60, p. 24)

Effective governance is of paramount importance to ensure successful project delivery. The project steering committee or control board provides high level oversight of implementation and management of the project and ensures that both the project team and contractors are held accountable for effective delivery of the project. (Victorian Government sub. 81, p. 53)

In his submission, and in earlier research, de Valence identifies procurement methods as *the* primary driver or inhibitor of innovation and productivity improvement (sub. 16, de Valence (2010)). Consistent with recent procurement strategies of most Australian governments, he argued for a ‘horses for courses’ approach, where structures for purchasing, risk-sharing and delivery are determined by the nature of the project, and that the development of such structures is the responsibility of the client (sub. 16, p. 4). In looking at some of the general attributes of more effective past projects here and overseas (box 9.4), and drawing on earlier work in Infrastructure Australia (2008), he points to clarity of project scope, allowance for unforeseen changes, and collaborative and trust-based relationships as being especially important (sub. 16, p. 5). For such ‘horses for courses’ approaches to be effective, government clients must have the necessary expertise (or contract it in) in order to complete the required due diligence at the beginning of a project so that the most suitable procurement method can be selected.

Once contract types have been decided, the incentives that lie within them are also important for driving the productivity of individual projects. The incentive structures within contracts regarding time and cost overrun and innovation are particularly influential. In this context, the University of New South Wales discussed the low incentives provided by some contracts in these areas (sub. 44, p. 3).

There have been some recent attempts by government to improve project selection and decision-making practices, including the production of guidance material

(chapter 2). Together with possible improvements in procurement and delivery processes (chapter 11), these attempts may encourage future productivity growth.

Box 9.4 Heathrow Terminal 5

A prominent international example of a landmark or mega project where innovative approaches to construction and contracting were used is Terminal Number 5 at Heathrow airport in the United Kingdom. Despite some very significant operating system difficulties experienced on opening, and a very long planning approval stage, during the construction phase itself the project had many notable performance successes.

de Valence, drawing on a range of sources, describes several innovations put in place by the British Airports Authority (BAA) that contributed to this success:

In its role as the client BAA took on all the risk for the £4.3 billion project, under the unique T5 Agreement that the 60 first tier contractors signed. In total, 15,000 suppliers were involved. The overall project was divided into 147 sub-projects, with an integrated team led by BAA responsible for each one. Unlike the majority of megaprojects, T5 was delivered on time and on budget ((Hammond, Wolstenholme and Fugeman 2008).

To achieve its objectives BAA implemented a comprehensive strategy to change both its own capabilities and those of its main suppliers. Brady et al. (2007) looked at the role of BAA, how it applied lessons from previous projects, its interaction with the networks of firms involved and how their capabilities were developed. Consultants were sent by BAA into the major suppliers to identify ways and means to improve their efficiency and the Agreement included gain sharing when cost targets were bettered (Davies, Gann and Douglas 2009).

The key relevant point about T5 is that innovations in many forms were actively sought out and developed. These included product innovations in off-site fabrication such as the roof structure (Frankland and Hulme 2008), technological innovations such as the tunnelling process and equipment (Williams 2008), process innovations such as the two logistics centres (Potts, K. 2008), and management innovations such as the insurance provisions and incentives built into the T5 Agreement, Deakin and Koukiadaki (2009) detail the industrial relations aspects of the project.

Caldwell, Roehrich and Davies (2009) suggest that the risk associated with these large, complex projects can provide the motivation for clients to pursue and reward innovation by contractors and suppliers. ... By taking on and actively managing project risk, BAA was able to pursue a strategy of rewarding performance enhanced by innovations from all participants.

Sources: de Valence (2010); Brady et al. (2007); Brady and Davies (2010).

Firm level project management

Project management is defined broadly to include logistics, organisation and choice of skills and technologies on and off-site employed by the constructor to manage a project during the construction phase.

Evidence at the enterprise level suggests that these factors can be an important driver of construction sector productivity. One detailed international study of the productivity of constructing large buildings (box 9.5) pointed out that simple factors, such as the type of carpentry methods and supervisory practices, were likely to explain the significant differences in productivity levels between countries. While this case study relates to buildings, which form only a subset of construction activities in this inquiry, it still underlines the fact that project management practices at the firm level in countries with similar levels of economic development as Australia can have far-reaching productivity implications. It would be surprising if this were isolated to buildings.

Other research has demonstrated that choices of building technique, such as the improved use of formwork systems and reinforcement, can have a positive impact on productivity.

Given the large amounts of capital and labour involved in major projects, there is a premium on coordination of projects. Speedy access to materials and minimisation of repeat work are therefore critical to improved performance. Conversely, delays, including those that are often directly related to planning and logistics, are generally considered to be key sources of poor productivity performance (Olomolaiye, Jayawardane and Harris, 1998).

Project management was described by several participants as an area where significant improvements were required in Australia. For example, the University of New South Wales argued that:

Project management skills and frontline management skills need to be improved — particularly in communication, coordination, logistics and execution. (sub. 44, p. 4)

In part, it was argued that generational change in the construction industry had led to the loss of valuable management skills once older managers had retired from the industry.

Participants also pointed to fragmentation in the construction industry supply chain as a particular problem that could be greatly improved.

Box 9.5 European construction contractors: A productivity appraisal

An often cited study on international construction productivity was conducted in 1999 by Proverbs et al. This involved a questionnaire, together with plans for a standard seven storey concrete frame (from the ground slab up), being sent to construction planners in Britain (31), France (13) and Germany (10). Respondents were asked to provide planned man-hour estimates for the various operations involved in constructing the structure, as well as background information on working hours, choice of technology etc. Productivity data are presented in terms of man hours per tonne of reinforcement fixed, sqm of formwork erected, and cbm of concrete placed. The results were then subject to analysis of variance to provide a comparative analysis.

The results showed low productivity for the British firms as a group, translating into higher labour costs on average for the standard structure, despite lower British labour rates. Differences in mean productivity rates were apparent for the three basic processes of formwork erection, reinforcement fixing, and concrete placement for the three countries, together with the out-turn costs for the whole structure. This is calculated by applying published all-in national labour rates to the quantities for the standard building and the mean productivity rates.

	<i>Formwork Mean manhours/m²</i>	<i>Reinforcement Mean manhours/tonne</i>	<i>Concrete Mean manhours/m³</i>	<i>Mean Planned Completion Time in Weeks</i>	<i>Mean Total Labour Cost of Standard Building GBP</i>
Great Britain	1.61	20.41	2.47	22	158 061
France	0.87	27.65	1.54	13	108 974
Germany	1.07	17.17	1.47	18	195 633

Source: Proverbs et al. (1999, table 2, 4 and 6).

High variability (in terms of coefficient of variation around the mean for planned completion time for the whole project and for slab construction) was also found in the performance of British contractors compared with France and Germany. This meant that, while the best of the British firms were on a par with those on the continent, mean performances were dragged down by a long tail of poorly performing firms.

	<i>Planned Completion Times</i>	<i>Predicted Slab Formwork Productivity</i>	<i>Predicted Slab Concrete Productivity</i>	<i>Predicted Slab Reinforcement Productivity</i>
Great Britain	32%	53%	61%	90%
France	37%	27%	43%	30%
Germany	22%	36%	40%	24%

Source: Proverbs et al (1999, table 2 and 3).

In discussing these results, Edkins and Winch (1999, p. 13) state that possible sources of poorer performance in Britain may include higher supervisory ratios, reliance on traditional forms of carpentry, and reliance on sub-contracted labour.

Box 9.5 Cont.

They also consider possible sources of the large divergence in performance across British firms, and state:

... in a situation where the firms are (presumably) in direct competition, it is difficult to see how such wide variations in cost performance can persist. There are, in principle, three possibilities: some clients are paying over the odds for their concrete structures; some groups of workers are being paid much less for their time than others; or the top performers are using more capital-intensive continental methods, but the additional capital costs associated with them allow low-paying, low productivity firms to remain competitive. (p. 14)

The authors concluded that the most likely situation was a combination of all three factors.

Sources: Proverbs, Holt and Olomolaiye (1999), as discussed in Edkins and Winch (1999, pp. 12–14).

Prefabrication and design

The expanded use of prefabricated elements (such as curtain walls, modular elements, structural steel and precast concrete) and other off site techniques is seen by many construction industry commentators as having further potential to deliver significant productivity improvements.

In part, this is because off site techniques permit the use of a suite of information technologies that are more difficult to use on site, including design automation, numerical control machinery, data integration and management, instrumentation for quality control, enterprise resource management, automated data collection and materials tracking, and other advanced technologies that are broadly available in manufacturing (Eastman and Sacks 2008, p. 517). Offsite techniques also assist in reducing disruption on a site, as many elements of the construction are assembled elsewhere, and better planning of timing and delivery is also facilitated.

Design plays an important facilitative role in employing such techniques and, more broadly, is seen to be a key driver of enhanced productivity across the sector. The University of New South Wales submission, for example, stated:

Good design which links through to productivity and manufacturing and a well-managed design process is critical to productivity.(sub. 44, p. 5)

A large number of submissions and consulted stakeholders discussed Building Information Modelling (BIM) as a particularly promising form of assistive technology in regard to design, and also for the construction phase and facility operation. This technology is discussed in greater detail in chapter 11 and appendix C.

The broader role of innovation, competition and regulation

Some suggest that the construction industry lacks innovation compared with other industries. Certainly, R&D intensities in the construction industry are lower than in many other sectors (for example, manufacturing). The lower relative intensity may partly reflect that R&D and innovation is more likely to occur in upstream suppliers (such as technical services, pre-fabrication technologies and construction equipment) that are not counted as part of the industry. Despite this, the apparently relatively strong multifactor productivity performance of the industry discussed above suggests the story is not too bad. However, this does not suggest that no more can be done.

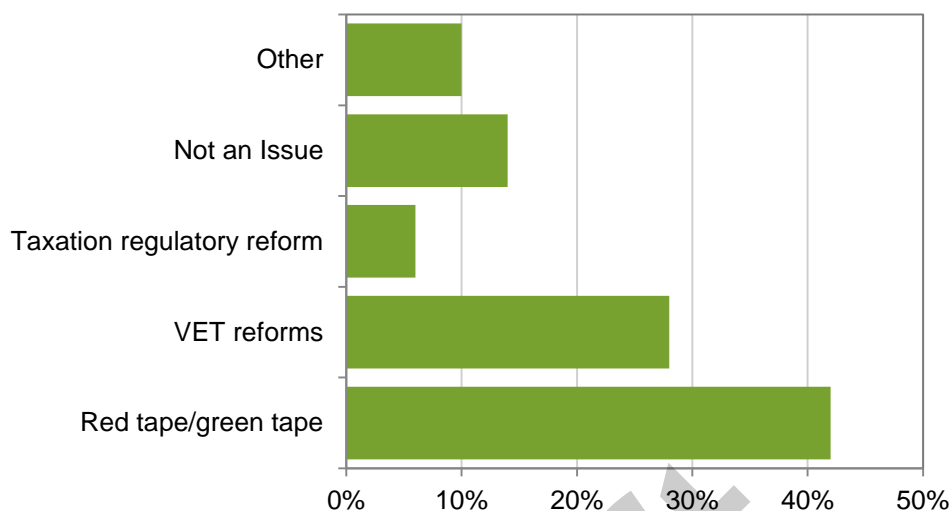
Some aspects of the industry lend themselves to greater innovation. For example, Tatum (1986, as quoted in de Valence 2010, p. 51) identified a number of features of the construction industry that could be considered as advantages in regard to innovation, including that:

- project teams are presented with high levels of necessity and challenge, which promotes innovation by forcing examination of new technologies for each project
- integration of engineering, design and construction can simplify the construction process and decrease cost
- the low capital investment typical of construction firms allows high flexibility for the adoption of new technologies
- a pool of technologically experienced personnel provides depth of knowledge
- strong emphasis on process limits barriers to imitation, because new processes can spread rapidly without patent restraints (but this may also discourage innovation)
- construction production processes do not create rigid restraints.

In the course of its inquiry, the Commission was made aware of significant innovations, and scope for further innovation, in the industry.

A common theme in submissions, and in past industry surveys (figure 9.9 and table 9.4), was that regulation in the sector, particularly as it affects costs, allowable methods and construction timeframes, can inhibit innovation. However, the different surveys have quite divergent measures of the importance of regulation, so it is important not to overdramatise the adverse impacts of regulations and standards. Moreover, the impacts of compliance burdens in construction on innovation may not be dissimilar to other industries.

Figure 9.9 Policy issues of concern for industry



Source: Construction & Property Services Industry Skills Council (CPSISC) stakeholder survey, as reported in PwC (2013, p. 6).

An important, if qualified, role for technology was stressed by many participants, and this is a point echoed in industry surveys (figure 9.10). For example, the University of New South Wales pointed to a need to:

Increase industry engagement with new technologies which have driven productivity improvements in other sectors. Technologies that offer particular promise to increase productivity include: ICTs to allow people to work more flexibly; Onsite mechanisation; Offsite fabrication; Materials management systems; Automated tracking and GPS; cameras and bar coding technologies; Mobile technologies; BIM and; Augmented reality. Many of these are used in engineering but less so in the building sector. (sub. 44, p. 7)

Several participants provided the qualifier that, while technological change is likely to be critical, new technologies need to be integrated with, and not work against, project management and planning.

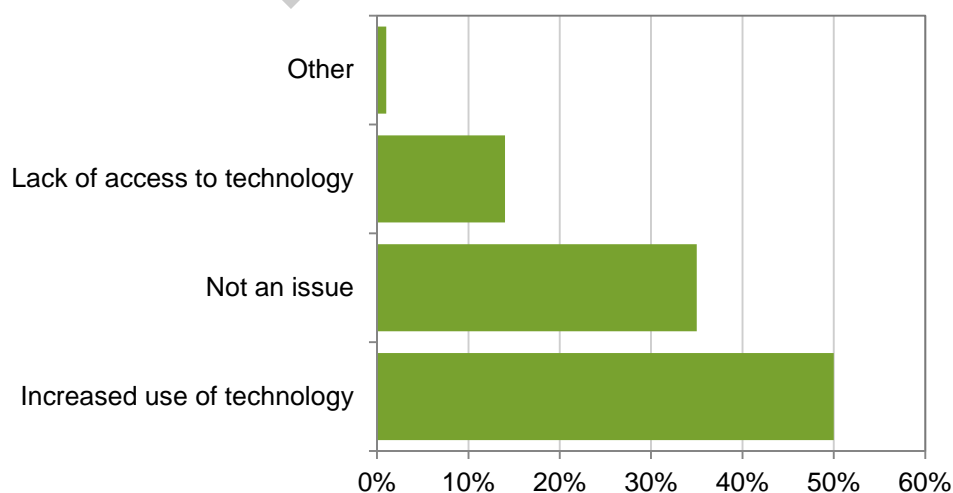
Broader competitive processes are also critical in facilitating the entry and exit of market players. For example, new entrants to the market, including from overseas, can bring with them important innovations, including new technologies, organisational and managerial innovations. (These issues are discussed in greater detail in chapter 10).

Table 9.4 Nominated barriers to innovation

	<i>Construction industry</i>		<i>All industries</i>	
	Government regulations and compliance	Adherence to standards	Government regulations and compliance	Adherence to standards
	%	%	%	%
Innovative businesses				
0–4 persons	15.2	5.7	15.4	5.2
5–19 persons	21.6	6.0	17.6	6.3
20–199 persons	6.6	4.4	17.5	7.7
200 or more persons	7.3	5.2	7.7	2.3
Total	17.0	5.7	16.5	5.9
Non-innovative businesses				
0–4 persons	10.8	5.6	10.8	3.0
5–19 persons	11.2	4.1	11.2	2.9
20–199 persons	6.8		7.8	0.3
200 or more persons	0.0	0.0	9.9	5.4
Total	10.8	5.2	10.8	2.9
All business types				
0–4 persons	11.7	5.6	12.2	3.7
5–19 persons	16.0	5.0	14.4	4.6
20–199 persons	6.7	3.4	13.8	4.9
200 or more persons	4.7	3.3	8.4	3.4
Total	12.5	5.4	13.0	4.1

Sources: ABS Cat. No. 8158.0, Innovation in Australian Business, 2010-11.

Figure 9.10 Technology concerns



Source: Construction & Property Services Industry Skills Council (CPSISC) stakeholder survey, as reported in PwC (2013, p. 7).

9.3 Concluding comments

There is little evidence to suggest that Australia's relative global productivity performance within construction should fall in the 'extremely poor' category. Instead, some evidence points to Australia outperforming comparator countries in several areas.

Nevertheless, as in all industries, improved productivity (when this also encompasses quality improvements) is the key method for reducing the costs of output to customers; improving business returns in the shorter run; and providing more infrastructure for a given spend. Most stakeholders considered that the industry could do better, and the Commission broadly concurs that the productivity performance in public infrastructure has an opportunity to significantly improve.

However, while governments can act to remove some of the barriers to productivity improvement, many of the decisions to enhance productivity are fundamentally commercial in nature, and should be driven by business. Few businesses contested this perspective. Measures to increase competitiveness in the industry, in conjunction with improved project selection and tendering arrangements will also assist in promoting productivity growth.

10 Competition and the structure of the infrastructure construction market

Key points

Competitive markets generally promote efficiency and help hold down costs and prices. These outcomes are less likely the more a market exhibits significant concentration together with high barriers to entry, highly differentiated products and other features that allow (or do not counter) the use of market power.

The infrastructure construction market exhibits a degree of concentration, especially in the 'large and complex' market segment. Although estimates vary, Leighton Holdings and Lend Lease Group companies together hold a significant market share. Some see these entities as akin to a duopoly, although the ACCC has not found cause to take action against either organisation for competition purposes.

Some aspects of the infrastructure construction market may act as barriers to entry, such as smaller firms lacking 'financial capacity' in bidding on larger projects, procurement practices and international firms finding it difficult to obtain Federal safety accreditation. However, these impediments are not insurmountable, and the market appears largely contestable.

The infrastructure construction market is segmented according to the type, value and location of projects. This reduces the number of potential bidders on any given project. However, there appear to be few barriers to additional firms entering most segments, and little information showing that there is concentration in segments that manifests in market power.

Governments, as the major buyers of public infrastructure, may be able to exercise countervailing power in setting and negotiating contracts and conditions. They can also address market power issues indirectly through the use of pro-competitive procurement policies.

At this stage, the Commission has not found any concrete evidence that the current structure of the infrastructure construction market diminishes competition in ways that would substantially inflate infrastructure costs. However, there remain several areas of uncertainty, and the Commission would welcome more input on these.

Contracts for public infrastructure projects are typically awarded through competitive tendering processes, in which the price along with indicators of capability, quality, reliability and other facets of the services offered by different construction companies are weighed and compared.

Depending on the size and complexity of the project, a contractor may provide a single service with its own equipment and labour (as is the case in many smaller road projects), act as a project manager that sub-contracts further and co-ordinates the delivery of the project, or partner with another firm or firms with complementary expertise in a joint venture or consortium. Recently, for example, the NSW government awarded a \$1.15 billion contract to a Thiess John Holland Dragados joint venture to provide two 15 kilometre tunnels as a part of the North West Rail Link (Transport for NSW 2014). The head contract partners will in turn engage several tiers of subcontractors to work on aspects of the project. The choice of sub-contractor will often depend on the price, quality, reliability and other aspects of the services they offer, relative to other suppliers.

The extent to which any particular infrastructure project is delivered at the lowest price possible (given its specification) will depend largely on the degree of competition at the various levels of the infrastructure construction market. Competition, or even just the threat of competition, limits the scope for suppliers to raise prices and obtain excessive profits, as they face being undercut by rivals and/or losing future work.

Whether the infrastructure construction sector is sufficiently competitive to adequately constrain costs and prices is contentious. In particular, some consider that the major Australian 'Tier 1' construction companies are able to operate as if akin to a duopoly. A further issue is whether constructors in particular geographic markets, or with particular specialisations, are able to exercise some market power. There is also a concern that agreements between some head contractors and unions may be restricting competition among subcontractors. But where some see closed shops, others see specialisation, scale efficiencies and competition.

This chapter examines the extent to which the infrastructure construction market is competitive, as well as some means that governments can use to increase competitive pressures where necessary. One way to test the level of competition is to examine whether prices appropriately reflect costs and whether profits are generally constrained to 'normal' levels. However, this is a data-intensive exercise that entails difficult judgments. Another way is to examine the structure of the relevant market to ascertain whether sufficient conditions for competitive outcomes are present. For example, the more a market exhibits significant concentration together with high barriers to entry, highly differentiated products and certain other features, the more susceptible it will be to monopolistic pricing. Given the short timeframe of the inquiry, the Commission has undertaken a high-level analysis using the latter approach.

To this end, the chapter discusses:

- whether there is undue concentration in the infrastructure construction market (section 10.1)
- whether there are barriers to entering the market, and measures governments can take to reduce them (section 10.2)
- the nature and potential effects of market segmentation (section 10.3)
- the potential for government as the major buyer of infrastructure to exert countervailing power (section 10.4)
- whether there are issues in key input markets — specifically those for, sub-contracting and working capital — that could affect competition and generate higher costs and prices (section 10.5).

10.1 Concentration in the infrastructure construction market

Leighton Holdings and Lend Lease Group are the two major constructors in the Australian infrastructure construction market, especially where large and complex projects are concerned. While there are numerous local and international firms in the (large project) construction sector, these corporations control several of the Australian Tier 1 constructors and collectively enjoy a significant market share. A number of inquiry participants suggested that these firms may be akin to a duopoly, which could lead to higher prices for clients (as well as higher profits for the firms). The companies themselves dismiss concerns about acting as duopolists (box 10.1).

How big are the ‘big two’?

There is a variety of estimates of Leighton and Lend Lease’s combined market share.

- Drawing on data from 2008-09, the Department of Infrastructure and Regional Development (sub. 64) estimated that together they account for around 75 per cent of the infrastructure construction market.
- Using data for 2005–2012, the Commission estimates that they have been involved in just over 60 per cent of major infrastructure projects (by value⁷). This figure represents an upper bound estimate of their combined market share, as it

⁷ Using data sourced from DAE (2013), the Commission estimated that, since 2005, there have been over \$55 billion dollars worth of major public infrastructure projects (where each of the contracts included in this analysis was worth over \$50 million).

includes the value of projects won as part of a joint venture or as one of many contractors on a large project.

- IBISWorld (Kelly 2013a, 2013b) estimated that, while Leighton and Lend Lease are the biggest private players, their combined market share in 2012-13 was less than 20 per cent of each of road and rail, and heavy industry and other non-building construction sub-markets.

Why are the IBISWorld market share estimates so much lower than the figures estimated by the Commission (and the Department of Infrastructure)? The estimates cover different time periods, and there are also differences in the delineation of the markets used in the analyses. The IBISWorld estimates are also complicated by the inclusion of statutory authorities — such as Roads and Maritime Services from NSW and the Roads Corporation from Victoria — as providers, rather than buyers of public infrastructure. This assumes that there is no contracting out of projects. In reality, these authorities frequently outsource work out to contractors. Since it can be reasonably assumed that Leighton and Lend Lease would have captured some of this work, these two players would probably have a combined market share higher than that estimated by IBISWorld.

In the Commission's view, while market shares are likely to change over time, it is likely that Leighton and Lend Lease's combined share of the total market for major public infrastructure will be significantly more than 20 per cent. Equally, as noted, the Commission's estimate of 60 per cent is likely to overstate the market share of the big two.

Even with this wide range of estimates, some caveats and complications need to be noted. Each of the above studies combines the market shares of the big two's subsidiaries (or divisions, or brands) as if they are part of the one business and do not seriously compete against other subsidiaries in their stable. Authentic competition among subsidiaries would greatly reduce effective concentration in the market. Conversely, to the extent that each of the subsidiaries or divisions specialise, and thus come to be more dominant in particular market sub-segments, the greater could be any divergence from competitive outcomes associated with a given 'global' share of the market. (In the only comment in submissions directed at the actual degree to which the big two's subsidiaries, divisions or brands have competed rather than specialised over recent years, the Independent Contractors Association stated that 'in 2012-13 both Leighton Holdings and Lend Lease eliminated the independence of their divisions and introduced central control over all tendering' (sub. 100, p. 18.)

Box 10.1 Some comments on the Leighton-Lend Lease 'duopoly'

In its submission, Salini Australia Pty Ltd contended that Leighton Holdings and Lend Lease dominate large scale public infrastructure construction in Australia, with few international contractors established here for any significant period, and other local Australian companies lacking the necessary size, scale and/or the will to bid for major public infrastructure projects with a value of over \$200 million. Salini argued:

A bias towards the 'Australian' duopoly in the construction of public infrastructure, despite maintenance of business practices driving up costs and against currently public policy (including enterprise bargaining agreements with unions), ensures a sustained increase in the cost of construction and reduction in the amount of public infrastructure able to be built.

This bias, combined with flaws in procurement systems (against international comparisons) 'lock in' higher prices and exclude international players notwithstanding their track record of delivering to cost and specification internationally (sub. 1, p. 1).

Austrade stated:

International constructors advise Austrade that Australian project teams typically have a predetermined number of bidders. Whilst this predictability is welcomed by business it generally means two to three shortlisted consortiums. This typically means one from Leighton, one from the Lend Lease and sometimes an international bid (sub. 74, p. 21).

And the Department of Infrastructure and Regional Development, drawing on assessment of market shares using data for 2008-09, submitted:

Most of the work done on large projects is undertaken by a small group of relatively large firms. These firms are also either subsidiaries of Leighton Holdings or Land Lease. Therefore, market share analysis on contracts awarded to the subsidiaries could imply control by just two firms (sub. 64, p. 27).

The Australian Constructors Association, which represents firms such as Leighton and Lend Lease, disagreed with the suggestion of market dominance:

[The ACA] ... does not accept any proposition along these lines and submits that international players of significance (often with a market capitalisation much larger than Australian based entities) have operated in Australia for decades and have remained in the country or withdrawn on the basis of their own commercial decisions as opposed to the existence of strong local brands either in the past or in terms of the recent existence of the Lend Lease and Leighton groups (sub. 72, p. 15).

The ACA argued that competition is fierce and its members:

... vigorously compete against other ACA members as well as other large local or international businesses for involvement in construction projects whether they are infrastructure, resources and mining or commercial in nature (sub. 72, p. 15).

Likewise, Lend Lease argued for a focus on competition in the market, rather than the size or market share of the contractors, and contended that '... [t]he Australian construction industry is highly competitive' (sub. 46, p. 6).

Consistent with this, the Department of Infrastructure and Regional Development reported that:

Unpublished research undertaken by the Department in previous years suggests project clients consider the market to be sufficiently competitive (sub. 64, p. 27).

The ACCC's investigations

The perception that Leighton Holdings and Lend Lease Group enjoy some market power may have grown out of recent mergers and takeovers (box 10.2). These have reduced the number of separately-owned entities in the sector.

Box 10.2 A brief history of Leighton and Lend Lease's mergers and acquisitions

Several operating companies or 'brands' operate under the banner of Leighton Holdings. Currently, these are Thiess, John Holland, Leighton Contractors, Leighton Properties, Leighton Asia, Leighton Welspun, Leighton Offshore and Habtoor Leighton Group. The first three of these are Leighton Group's major players in the domestic market for public infrastructure.

The process of acquiring companies with the capacity to contribute to major infrastructure projects began in 1983, when Thiess was brought into Leighton Holdings. The Group did not make its next acquisition until 2000, with the partial purchase of John Holland. In 2003, John Holland expanded through the acquisition of some of the contracts, resources and staff of Transfield Construction. Leighton's stake in John Holland was increased to 100% in 2007.

Lend Lease also has several operating entities, particularly with regard to project management and construction, but these are generally recognised as geographical divisions of the single Lend Lease brand. Lend Lease's expansion through acquisition largely rests on the purchase of Valemus Group in 2011. Valemus Group was previously comprised of Abigroup, Baulderstone and Conneq.

Source(s): Leighton Holdings (2014a), Lend Lease (2014b).

Where they may reduce competition, potential mergers can be analysed by the Australian Competition and Consumer Commission (ACCC), either informally before they occur, or, if the purchaser chooses to proceed without the ACCC's blessing, afterwards as a part of a formal process. For a merger or acquisition to be ratified, the ACCC must be satisfied that it will not result in a 'substantial lessening of competition'. In instances where competition may be lessened, a merger or acquisition may progress only with a clearance from the ACCC or an authorisation from the Australian Competition Tribunal.

In appraising the process of consolidation among contractors, the ACCC has not issued a single statement of issues or a public competition assessment since 1999.⁸

⁸ A statement of issues is a document published by the ACCC in merger reviews where the ACCC has come to a preliminary view that a proposed merger raises competition concerns that require further investigation. A public competition notice is a detailed summary of the ACCC's reasons and issues considered by the ACCC in a merger review.

This implies that the ACCC saw no evidence prior to the consolidation that the mergers and acquisitions would substantially lessen competition.

Much of Leighton Holdings' consolidation — including the merger with Thiess and the purchase of a majority stake in John Holland — occurred before the publication of the ACCC's Mergers Register, which captures mergers since 2002. The register does, however, capture John Holland's merger with Transfield Construction in 2003. Although it regarded the two firms as competitors offering similar services to similar clients, the ACCC concluded that there were enough competitors remaining in the market to constrain the conduct of the merged entity (ACCC 2014a).

In the case of the most recent acquisition — the purchase of the Valemus Group by Lend Lease — the ACCC considered that there was limited overlap between the activities of the two parties involved. While both were involved in other segments, Lend Lease and Valemus only competed in the 'supply of non-residential building construction services involving Tier 1 projects' (sub. 83, p. 2). Since they competed only to a limited degree, the ACCC considered that the subsuming of Valemus into Lend Lease could only have a limited impact on competition. As a result, it did not to oppose the acquisition.⁹

It should be noted that the ACCC does not investigate the market structure or comment on the competitiveness of an industry in the absence of a current or recently completed acquisition. However, the ACCC does retain the power to investigate and take legal action against misuses of market power and anticompetitive or cartel-like behaviour. This has resulted in two successful actions in the construction industry. The first action was taken in 1999 for cartel behaviour with regard to pre-mixed concrete in Queensland between 1989 and 1994 (ACCC 2014b). The second action was taken in 2011 with regard to 'cover pricing' in local and State government construction projects in Queensland between 2004 and 2007 (ACCC 2014c). Neither action involved Leighton or Lend Lease.

Summing up

Following various mergers and acquisitions, the Lend Lease Group and Leighton Holdings groups of companies command a significant share of the infrastructure construction market. On some estimates, their market shares would appear

⁹ The ACCC's decision on Lend Lease's purchase of Valemus suggests that there is a degree of market segmentation, which in turn implies that consolidation in the industry need not reduce competition. If the firms involved in a consolidation offer different services to different clients on a different scale, any merger or acquisition would simply add capacity in areas where the purchaser was previously lacking. Segmentation issues are discussed further in section 10.4.

sufficient to allow them to exercise market power to inflate prices and/or profits, were other aspects of the market environment to facilitate this.

However, the ACCC has not interfered with the mergers and acquisitions process, nor has it taken legal action against the companies for misusing market power, or for anticompetitive or cartel-like behaviour. This does not necessarily mean that ‘the big two’ are unable to exercise some market power. However, it also leaves open the possibility that other facets of the market (and/or the legal environment) act to constrain whatever market power they may have.

10.2 Barriers to entry

Even with heavy concentration in the market for infrastructure construction, relatively competitive outcomes might still be achieved if there were few material barriers to firms entering and exiting the market, such that infrastructure projects remain ‘contestable’. In these circumstances, existing suppliers would have incentives to maintain prices at close to efficient levels in order to retain market share and discourage potential competitors. If they were to inflate their prices sufficiently, purchasers would be open to new firms entering the market, and those new firms, recognising an opportunity, would have incentives to move into the market by undercutting the existing suppliers.

However, where barriers to new firms entering a market are high, existing firms have more space in which to raise prices before prompting a competitive response.

One of the simplest indicators of the strength of barriers to entry is the degree to which new entrants have entered the market. Although there are numerous international contractors contesting the Australian market (a considerable proportion from depressed European markets), they are yet to command a substantial share of the market. The Commission estimates that international contractors have been involved in just over 18 per cent of those infrastructure projects costing more than \$50 million.¹⁰ This suggests that that any barriers that exist are not necessarily insurmountable, at least for large foreign firms, although it does not exclude the possibility that there are still barriers that reduce the level of

¹⁰ This estimate includes projects undertaken as a part of joint ventures and consortia, such as the \$1.5 billion contract obtained by Acciona (Fair Work Ombudsman 2014) to develop the Northern Link tunnel in Brisbane (as a part of a consortium including BMD and an Italian firm, Ghella) and the \$1.15 billion contract for the Northwest Rail link tunnels in Sydney won by Dragados (as a part of a joint venture between Thiess and John Holland) (Transport for NSW 2014).

competition. Nor, of course, does it exclude the possibility that Australian firms also face barriers to entry.

The barriers to entry most applicable to infrastructure construction arise from ‘economies of scale’¹¹ and barriers created by government regulation or procurement practices. Potential barriers of these types that might arise in relation to the public infrastructure are discussed below. (Some may contend that the need for a workable relationship with unions can also act as a barrier to entry in some aspects of the construction sector. Issues relating to such relationships are discussed in chapter 12).

Balance sheet effects

‘Balance sheet’ effects are one form of economies of scale¹² that may arise in relation to infrastructure projects. Under most contractual arrangements, firms accept the risk associated with problems arising on the project (delays, input price changes and rework). Such problems place a financial burden on the firm. The ability to bear such risks becomes more important as projects become larger or more complex. Because the costs associated with high value or high-risk projects can be substantial, firms undertaking the contracts without the capacity to manage costly risks face insolvency. To the extent that they have relatively strong balance sheets, existing firms with greater market share should be relatively better placed to absorb large, but infrequent, costs.

The ability of larger firms to manage financial risks is typically acknowledged in pre-qualification requirements, including for example in the financial levels that form a key aspect of the Austroads national pre-qualification system.¹³ While there are other aspects of the scheme that relate to the contractor’s capacity to undertake different types of road and bridge construction projects, financial limits place a ceiling on the value of a contract the firm can bid upon. In appraising its financial capacity, the authority examines the contractor’s ‘business viability over both the

¹¹ Economies of scale arise when a firm that is already in the market has an advantage because of the scale of its operations. In order to compete, new firms must choose whether to produce on a large scale, or accept a cost disadvantage resulting from small-scale production.

¹² Although there also may be diseconomies of scale, particularly associated with the largest and most complex of projects, the Commission does not consider this to be a widespread issue.

¹³ The Austroads national pre-qualification scheme is a mechanism that allows contractors to register their credentials as bidders for road and bridge contracts, rather than continually re-apply through Expressions of Interest (EOI). It is administered by state and territory governments. Contractors who are prequalified in one authority can apply for recognition of their prequalification in other states and territories.

short and the long term' (box 10.3). The scheme essentially recognises that the 'financial capacity' of the contractor matters.

Box 10.3 The Austroads National Prequalification Scheme

Prequalification is a system in which contractors obtain pre-approval for certain type of projects. Because they are pre-approved, contractors' bids can be assessed relatively quickly. As a result, projects can get underway in a relatively timely manner.

The process of prequalification is generally used for relatively standard projects, such as road and bridge construction. In projects such as these, the Expression of Interest (EOI) process yields little further insight into a contractor's capacity than prequalification, but at considerably higher cost.

As in the EOI process, prequalification establishes a contractor's:

- experience
- technical capacity
- financial capacity.

A contractor's experience is assessed with regard to six criteria. These are project history, project management, relationship management, stakeholder engagement, utilisation of management systems and traffic management. Similarly, there are three relevant criteria in determining a contractor's technical capacity. These are experience, evidence of appropriate staff and availability of plant and equipment. The authority's combined assessment of a contractor's experience and technical capacity determines which types of projects they will be accredited for and to what level of complexity.

The contractor's financial level is determined as a multiple of the contractors working capital, where the working capital is defined as the difference between net assets and net liabilities. Because it is determined in absolute terms, even if two firms perform similarly on different scales, the larger firm will be accredited at a higher financial level. For example, if firm A's balance sheet shows \$100 million in assets compared to \$80 million in liabilities, while firm B retains \$10 million in assets relative to \$8 million in liabilities, firm A's financial level will be greater than that of firm B by a factor of 10.

There are five categories related to the construction of general roadworks (R1, R2, R3, R4 and R5). Bridgeworks has four categories (B1, B2, B3 and B4). Each level captures projects of a similar type, but, as the number increases, so does the complexity. There are also categories for specialist works such as machine-placed concrete paving (K1 and K2), machine-placed asphalt paving (A1 and A2), pre-tensioned concreting (C1 and C2) as well as steel fabrication (S) and protective treatment (T).

There are 13 levels for a firm's financial capacity. They range from F0.25, which indicates a firm is pre-qualified for projects of less than \$250 000 in value, to F150+ which indicates pre-qualification for projects of over \$150 million.

Source(s): Austroads (2013), VicRoads (2014).

As projects increase in value, the number of contractors permitted to bid for them declines. Over 300 firms have prequalification in excess of the F1 level, meaning that they have the financial capacity to undertake a project of up to \$1 million in value. In comparison, there are only 43 entities with a financial level of F150+, permitting them to bid on road and bridge projects in excess of \$150 million. This level falls to 25 if temporary joint ventures are excluded and subsidiaries are assumed to be divisions of a parent company. As a result, there are substantially more potential bidders for smaller value contracts, while ‘financial capacity’ acts as a barrier to contractors competing for higher value contracts.

Even so, given a large number of potential bidders still qualifying for larger projects, and the many international firms with significantly larger balance sheets than the major Australian firms, it is not clear to the Commission that this constitutes a barrier to entry that of itself would significantly diminish competition.

Procurement-related scale issues

As procurers of infrastructure, governments shape the conditions under which contractors can participate in tenders.

How they do this has the potential to advantage larger firms in some cases. For example, contractors — in particular smaller contractors — may be deterred from participating in tenders for public projects where they are required to post substantial performance bonds or take an equity stake (as in certain public-private partnerships (PPP) that incorporate the construction of the project). While such requirements — originally designed to mitigate risk and enforce probity in procurement — do not create economies of scale, they do reward them.

As discussed in section 10.4, the advantage that large scale firms might otherwise enjoy can be mitigated by altering procurement approaches. In particular, where the economies of scale appear to be a barrier to firms competing for projects, a potential solution may be to unbundle a project. Separating a large contract into smaller ones that can be shared amongst several contractors may lower the costs of bidding on a project and reduce the risk exposure of any single contractor (although it may create co-ordination costs for the procurer). This may go some way to addressing economies of scale as a barrier to smaller contractors competing for a project. (That said, as discussed in chapter 11, there is a range of other considerations that influence the optimal degree of bundling or unbundling of projects).

Federal safety accreditation

To work on most Commonwealth-funded infrastructure projects, head contractors must be accredited by the Federal Safety Commissioner (FSC).

There is a concern that the FSC requirements may deter (or delay) foreign construction firms from entering the Australian market. Austrade noted that:

... a number of international companies have advised Austrade the process is cumbersome and tends to eliminate the possibility for international firms (without recognised experience in Australia) to lead public project consortiums in Australia. This is regardless of the depth and breadth of their international business (sub. 74, p. 23).

There is also a concern that firms (whether foreign or local) that would undertake Commonwealth-funded projects only intermittently may be discouraged by the scheme.

However, as discussed in detail in chapter 14, while the Commission believes that there may be means of improving the FSC requirements, it is not clear that they represent an undue barrier to entry that significantly reduces the level of competition in the Australian market.

10.3 Segmentation in the infrastructure construction market

The infrastructure construction market is segmented in various ways, with projects varying according to size (or value), type and location.

- Market segmentation is implicit in the way prequalification for road and bridge projects is administered. Not only are firms graded according to their financial capacity, they are also graded according to the type and complexity of the projects they have delivered (see box 10.3). For example, smaller firms may be prequalified at a low financial level and in certain, specialised tasks, whereas a larger project manager may be prequalified at high levels for a variety of tasks.
- The ACCC also considers market segmentation in its examinations of proposed mergers. The ACCC categorises construction markets according to whether they are large or small, and according to the type of construction services — distinguishing between engineering construction and non-residential construction services.

-
- The market can also be segmented geographically because capital and/or labour may not be especially mobile. Hence, contractors often have preferred states or regions in which they are active.

This segmentation means that any major project offering will be met by only a proportion of the contractors in the broader market. This group will consist of generalist contractors, which have experience across a broad range of projects, and specialists — with the capacity to undertake projects both within the region and at the appropriate financial level. The upshot is that only a limited number of firms will be able to undertake *a specific* project, and the number of contractors that could potentially undertake *all* projects is further limited to a very few.

Depending on the extent of such segmentation, competition for some projects in some segments could in theory be quite limited, particularly if one constructor accounts for a significant share of work in the particular segment.

Analysis by the Commission of Leighton Holdings and Lend Lease's share of different 'type of project' segments of the infrastructure construction market reveals that they have a combined interest in approximately 57 per cent of road and bridge construction projects over \$50 million (by value). This is similar to their estimated market share of the total market for public infrastructure. However, the market shares in other segments differ more markedly, ranging from 46 per cent to 70 per cent for port and rail construction projects respectively. These figures indicate a moderate-to-strong degree of concentration in the different market segments.

It is not clear whether Leighton Holdings' and Lend Lease's concentration in particular segments compounds any lack of competition resulting from segmentation itself. Given that the only barriers to firms moving between segments is evidence of experience, technical capacity and 'financial capacity' (whether through prequalification or a more general EOI tender process), it seems likely that each of these segments remains contestable. Were excess returns to appear in a segment, this would provide incentives for more contractors to enter the segment, which should increase competition and drive down project costs.

That said, the data available to the Commission do not indicate whether Leighton Holdings and/or Lend Lease have a greater share of geographic or other types of segments or sub segments in the infrastructure construction market.

Nor, in the time available to prepare this draft report, has the Commission closely investigated whether other players have a significant share of particular segments. In this respect, the Commission has been guided by feedback from inquiry participants, which has focused on the perceived market power of the big two. However, it is possible that other entities may also exercise some dominance. For

example, the Commission understands that Brookfield Multiplex captures a significant share of social infrastructure work in Western Australia. It also seems theoretically possible that smaller operators, such as specialist engineering consultants or constructors in remote areas, might be able to exercise some dominance in some segments — for example, the ‘big two’ undertake very little harbour dredging. The Commission welcomes further comment on these matters.

10.4 Countervailing power of government

Where suppliers in an industry possess market power (as some consider to be the case with Leighton Holdings and Lend Lease), their ability to inflate prices to earn ‘above normal’ profits can be dampened where buyers are able to exercise countervailing power. Such power depends on a buyer’s capacity to ‘credibly bypass the supplier’ and exists when:

the specific characteristics of a buyer — such as its size, its commercial significance to suppliers or the manner in which it purchases from suppliers — provide the buyer with additional negotiating leverage (ACCC 2008).

In theory, governments, as the major buyers of infrastructure, have this opportunity, through their size and the prospect of repeated business. Contractors’ ongoing viability demands that they obtain not only contracts today but also a stream of contracts into the future. Governments can potentially use the threat of the withdrawal of future work to ensure good performance and pricing on current projects, provided that they can credibly have their projects undertaken by other contractors.

Governments also have the ability to modify the way in which they offer projects to the market. Given that the level of competition diminishes as project size increases, there may be competition benefits in splitting large projects into a series of smaller ones. This would permit firms with less ‘financial capacity’ to compete for projects, ensuring that there are more potential bidders.

This approach was advocated by Mr Bryan Nye, Chief Executive Officer of the Australasian Railway Association in evidence to a NSW Legislative Council examination of rail infrastructure costing in NSW. Mr Nye argued that many large rail projects could be split into smaller projects. As an example, Mr Nye cited:

a new \$3.4 billion rail project underway in Victoria, which if tendered in its entirety would only have attracted tenders from two contractors. However, the project was split into smaller packages with the result that around 12 companies are now involved in the project (GPSC3 2012).

This idea was ultimately endorsed by the Standing Committee. It recommended that:

... Transport for NSW review its tendering strategies to ensure that infrastructure projects are broken down into appropriate sized packages to increase competition between tenderers and lower barriers to provide opportunities for local businesses.

There are costs involved with splitting or un-bundling large infrastructure construction projects into smaller ones. These costs include the costs of multiple tender processes, project co-ordination and re-integration subsequent to completion. (As discussed in chapter 11, considerations relating to the optimal allocation of risk also bear on whether projects should be split (or aggregated).)

While governments in theory have some scope to countervail any market power of suppliers, to be effective it requires intent and sophistication. One difficulty governments face is that, even though they are at one level a single entity, different agencies are often engaged in procurement, often staffed by people with variable experience, and coordination can be complex. Moreover, agencies often face incentives to take risk-averse approaches to contract selection and project delivery, which may favour the main players with an established track record and relationship with an agency.

Further, with the advent of higher resource prices stimulating investment in privately funded mining projects, there has been increased competition for scarce engineering and project management resources (chapter 8). Because they can obtain contracts from alternative sources, the increase in potential clients effectively dilutes a contractor's reliance on public commissions.

These considerations may work to limit governments' ability to countervail any market power contractors possess.

10.5 Competition issues in input markets

As in the broader market for public infrastructure, the level of competition in input markets can also influence infrastructure costs. Submissions have pointed to a number of input markets where competition issues could arise, including those for sub-contractor's services, finance, labour and quarried construction materials. This section touches on concerns in the first two of these. Labour market issues are discussed in detail in chapter 12, while some issues around quarrying are discussed in chapter 14 (although, as discussed there, while there may be valid concerns about the effects of regulation on the supply of quarried materials, competition issues are peripheral to those problems).

Competition and subcontractors

Several submissions have commented on the actions of the major contractors in their dealings with subcontractors. McLeod Rail argued that there exists a tendency of major contractors to ‘screw the subbies’ (sub. 49, p. 4). The Independent Contractors Association agreed, arguing that:

... the head contractor’s profit is enhanced by pushing down the prices paid to the 2nd and 3rd tier contractors and forcing the subcontractors to wear risk and carry losses (sub. 100, p. 8).

Few doubt that the market for the services of subcontractors can be fierce or that major contractors will often¹⁴ seek the lowest price possible for the services they need. As in other markets, competition among subcontractors to supply higher tier businesses or other clients is a key to constraining costs and prices.

However, there is no requirement for a subcontractor to supply their expertise at any price. In the event that a subcontractor accepts a job quoted below the cost of their materials, labour and equipment, and a margin to cover the risks entailed, they would effectively be making a loss. Such a position would not be sustainable over the longer term. Indeed, were subcontractors to only ever be offered ‘below cost’ rates, the supply of subcontractors would be expected to fall, which in turn should see heightened competition (and higher rates offered) for the services of those remaining.

Thus, while competition among subcontractors in the infrastructure construction market can no doubt be fierce, that of itself does not warrant a specific policy response.

Policy concerns may arise if there are ‘sweet-heart’ deals between some unions and head contractors which embed jump-up clauses and generous wages and conditions to secure industrial harmony. There may also be agreement to discourage the use of subcontractors that employ non-union members from working on a project. While such agreements would increase the cost of the project to the head contractor, the suggestion is that these costs can be readily passed on. Indeed, the agreements may provide the contractors with a point of competitive advantage over rivals, as

¹⁴ A caveat is that higher tier contractors obtain benefits from maintaining good relationships, particularly with key subcontractors, and avoiding a situation in which a sub-contractor fails during a project or refuses to supply their services on subsequent projects. In this respect, McLeod Rail argued that, because of the current model of ‘adversarial contracting’, they ‘... do not really enjoy working for major Tier 1 contractors. We would far prefer to work for Tier 2 and smaller contractors, and for rail operators who value our service and the relationship they have with us’ (sub. 49, p. 4). McLeod Rail also stated that when confronted with a situation in which they were under-paid for a job, they ‘are unlikely to work for that contractor again’.

government clients put a high store on the ability of contractors to provide industrial harmony when assessing tender bids. This is discussed further in chapter 12.

Competition for working capital

As part of the prequalification and bidding process, a procurer (the ‘principal’) assesses contractors’ financial capability to meet their construction obligations throughout a project. While the principal will make progress payments during the construction of the project, the head constructor (and the multiple tiers of subcontractors on the project) must have access to finance for the time before payments are received. Some of this will be the retained funds of the business, but some will be obtained through access to funds from financial institutions.

It is important to distinguish the need for financing for this ‘vanilla’ type of contract arrangement from one in which the constructor is also involved as an equity partner in the project (as in some PPPs). The concerns about the latter have been addressed in detail in the first part of this inquiry report, but the main point to emphasise is that it is not necessary or common for the construction company to hold significant equity in public infrastructure projects. For the bulk of cases, the financing requirements of constructors are therefore short-term and relatively small, and aim to cover construction costs before payments from the principal.

Nevertheless, some participants have argued that access to such finance may be a hurdle for some second (and lower) tier contractors, whereas large established contractors, such as Lend Lease and Leighton Holdings, have mature links to the Australian financial sector.

For the largest projects, there may be a limited number of domestic lenders willing to finance operations. As each bidder contracts with distinct lenders, it may be difficult for more than a certain number of potential bidders to secure finance in the tendering phase (potentially precluding some construction companies from bidding at all). Alternatively, it may mean that some bidders could only obtain financing from less preferred lenders, with the higher financing costs entailed then being reflected in their bids.

There appear to be some mitigating factors that suggest that for many (but not necessarily all) projects, these financial issues may not constitute a significant barrier to effective competition:

- the required finance is short-term in nature and only has to cover the construction costs during specific phases of the project

-
- some of the project funding risks for the head contractors are distributed throughout the supply chain of lower tier contractors
 - many second tier contractors are still financially large and have access to funds
 - many foreign entrants are very large globally, with access to overseas capital
 - consortia of lower tier contractors can overcome some of the difficulties of accessing capital.

However, as noted elsewhere in this report, where it is economic, unbundling of larger projects into smaller ones would reduce the financing issues faced by smaller contractors in meeting building costs during a project. It is also possible that, subject to an initial assessment of financial viability and the inherent capacity of a bidder to attract finance, procurement processes could permit financing to be arranged after the preferred tenderer has been revealed. This would reduce any concerns that major contractors might lock in the most easily accessed sources of financing, which could potentially undermine competition.

Nevertheless, the prevalence of problems associated with financing construction costs during a build are unknown. Moreover, the majority of stakeholders have not identified this type of financing as a major obstacle to successful bidding (in contrast to the complex issues arising from *project* financing). In that context, it would be premature to make policy changes. More information would help make a judgment in this area.

INFORMATION REQUEST 10.1

The Commission seeks information on the degree to which construction businesses find it hard to access short-term finance to meet upfront construction costs of projects, the effects of this on competition (if any), and any policy measures that might be justified.

10.6 Concluding comments

Data on market shares suggests that there is a degree of concentration in the Australian infrastructure construction market. Although different measures yield varying estimates, the Leighton Holdings and Lend Lease Group companies together appear to command a significant share of the market. Assuming that these two groups do coordinate the tendering activities of the various companies, brands and divisions in their stables, this would satisfy a key precondition for the groups to exhibit at least a degree of market power.

However, there are several factors that may restrict the ability of constructors to use any market power they possess. Based on the high level analysis in this chapter, the infrastructure construction market appears to have few substantial barriers to entry and is by and large contestable. There is also a high level of concentration among buyers of public infrastructure — typically governments — which may offer some scope for them to exercise countervailing power. The ACCC, in its investigations, has not found cause to restrict the mergers or acquisitions undertaken over recent years by Leighton Holdings and Lend Lease Group, or to take legal action against them for competition purposes.

However, an absence of concrete evidence of any abuse of market power is not the same as concrete evidence of an absence of the use of market power. Moreover, segmentation in the infrastructure market could, in theory, facilitate less than competitive behaviour in some circumstances. What impact such aspects of the infrastructure construction market have had on competition and, in turn, on the costs of infrastructure is presently unclear.

INFORMATION REQUEST 10.2

Given the lack of definitive evidence on the presence (or lack thereof) and use of market power, the Commission seeks more information on competition issues, including between Tier 1 contractors and with regard to the ease of entry by other contractors.

DRAFT REPORT

This draft report is no longer open for consultation. For final outcomes of this project refer to the inquiry report.

Draft

11 Tendering and contracting

Key points

Government clients use a range of different contracts and tendering processes to procure public infrastructure based on the complexity and risk of individual projects. These processes seek to minimise the transaction costs imposed on bidders.

Nonetheless, bid costs remain high, primarily driven by the design requirements — design costs are reported to account for around 50 per cent of the total bid costs.

There is disagreement as to whether design requirements should lessen or increase — industry has pushed for both greater and lesser design input.

Despite this, there are some solutions to this impasse that could help reduce bid costs. All of the following proposals should be considered in an Australia-wide context, with the aim of creating nationally-consistent improvements to tendering practices rather than ad hoc jurisdictional changes.

- Governments should invest more in the initial concept design, but in doing so, provide opportunities for tenderers to contest the key standards of the design.
- Governments should look at contributing to bid costs in return for ownership of the design allowing them to ‘cherry-pick’ innovative ideas from unsuccessful tenderers whilst providing a return for innovative ideas.

Other avenues to lower bid costs also exist.

- Supporting documentation should remain a condition of the tender but only be required to be submitted by the preferred tenderer.
- Local content rules, while not binding or altering final costs, add to bid costs and may risk the selection of the best value-for-money bidder. The objectives that underpin them are also questionable. These rules should be abolished.
- Government clients already seek feedback on ways to improve their tendering arrangements, but scope exists for its more systematic use.

Government clients are already examining ways to ensure the selection process identifies the best value for money provider, but further scope exists.

- The scoring of Expressions of Interest should focus of expertise and not overly on *local* experience to ensure lower cost international suppliers are not ruled out.
- To provide for better costing and the identification on least ‘whole of life’ costs, governments should provide concept designs in a Building Information Modelling format when the project is of sufficient complexity.

Claims have been made that government clients have lost the necessary expertise to manage the delivery of infrastructure projects. However, at this point in time, the Commission has little evidence and is seeking further input.

The way in which government clients procure Australia's public infrastructure can play an important role in determining its costs. Aspects relating to what is done prior to the approach to market, the type of contracts let and subsequent risk allocation between parties, along with the ability of governments to subsequently manage the project are all critical ingredients of the story.

Contracts for public infrastructure projects are typically awarded through competitive tendering processes in which the price along with indicators of capability, quality, reliability and other facets of the services offered by different construction companies are weighed and compared. These processes are varied and depend on the project's complexity and risks involved (section 11.1).

Procurement practices have the potential to significantly influence the construction cost of the project. They determine not only the transaction costs involved in agreeing to what will be built and at what costs (the 'bid costs'), but also, perhaps more importantly from the taxpayers perspective, the ultimate turnout cost of the project. The cost of the bidding process and the processes used to determine the turnout cost of an infrastructure project is the focus of this chapter. The level of these costs will rest on whether procurement processes:

- are unnecessarily costly (increasing transactions costs) (section 11.2)
- elicit the best value for money bids from private sector constructors (section 11.3)
- provide incentives for cost minimisation throughout the construction phase of which government procurers have the necessary skills to operationalize (section 11.4).

11.1 Tendering and contracting arrangements used for major infrastructure projects

The tendering and contracting arrangements used to procure infrastructure projects in Australia are varied. Often major infrastructure projects are broken into a number of different 'packages' which represent different parts of the overall project. The breaking up of major projects considers the:

- availability of design resources (internal and external)
- need for specific expertise on critical design elements (such as signalling in railways)
- timeframe for the project (early site works may be required to expedite the build which may be separable from the construction)

-
- contracting market (number of potential tenders in the market, their size and ability to take on project risks, and their specific expertise) (GPSC3 2012, p. 37).

Packaging of projects is generally done to ensure competitive pressure exists during the tendering process and is discussed in greater detail in chapter 10.

Once project packages are chosen, the contracting strategy (which includes both the contract type employed and the tendering process used to obtain bids) defines how each of the packages are to be delivered. There are numerous contract types employed by Australian governments. While contract types can blur between categories, typical options include:

- construct only
- design and construct options that are characterised by an integrated approach to design and include a range of contract types which may be implemented under ‘guaranteed maximum price’ arrangements, including:¹⁵
 - design development and construct
 - design, novate and construct
 - design and construct
 - design, construct and maintain
- alliance contracts
- managing contractor arrangements.

The interaction of packaging and contract types means that a number of different market participants can be involved in any one project, each bearing different responsibilities and risks. For example, the Epping to Chatswood Rail Link in Sydney included 12 work packages and 6 different contract types (GPSC3 2012, p. 38).

The four broad contracting types, and their associated tendering arrangements are discussed briefly in the following sections. In this chapter arrangements that underpin public-private partnership (PPP) contracts are not explicitly discussed as the critical financing elements are discussed in chapter 7.

¹⁵ Guaranteed maximum price arrangements are designed to limit changes to the contract price or completion date by specifying a maximum price and completion date. The contractor bears the risks of any ambiguities in the tender documents by allowing no claims for variations from such ambiguities. Further, no cost adjustment for inflation is provided and extensions for time delays limited (for example by disallowing claims for bad weather or industrial disputes).

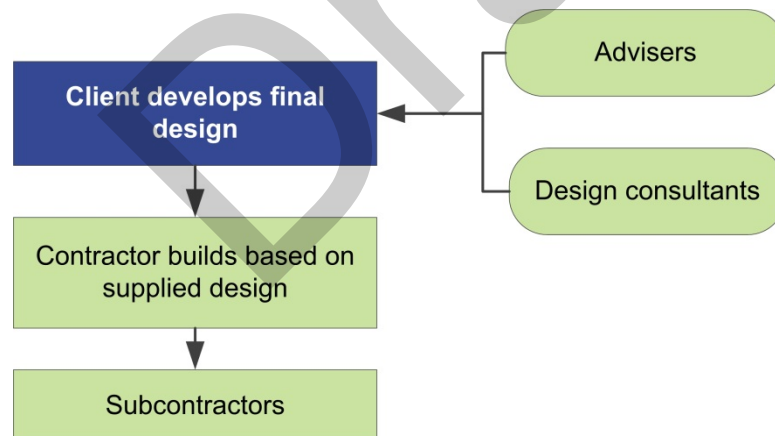
Each Australian jurisdiction has specific guidance on the use of specific contracting arrangements. This guidance material sets out the advantages and disadvantages of the approaches to help inform agencies of the trade-offs between risk allocation between parties and potential differentials in costs.

Construct only contracting arrangements

Construct only contracts (figure 11.1) are issued where the agency undertaking the work has completed most of the design work (this is often done by or in conjunction with consultants engaged by the agency but who do not form part of the constructors team). The contractor is usually required to have some input into the design to ensure that it is buildable.

In these contracts, risks associated with design faults are usually borne by the client (such as omissions and errors associated with the tender documentation that set out the majority of the design elements).¹⁶ The client is typically responsible for the costs associated with changes in its requirements as well as the costs associated with other circumstances such as unexpected adverse site conditions.

Figure 11.1 Management approach under construct only contracts



Source: Adapted from ProcurePoint (2008).

¹⁶ Contract conditions may seek to limit the exposure of a client to such errors through developing a schedule of importance in the contract documentation on which a contract price is agreed. This develops a hierarchy of contract documentation, and if an item is omitted from a lower order documents but specified in a higher order document, any rework due to the omission is the responsibility of the contractor.

Design and construct contracts (figure 11.2) typically take the form of the client providing a project brief, which specifies performance and quality requirement and may include a concept design. The contractor then engages its own designers to finalise the design. Potential contractors bid on both their developed design and a lump sum construction price.

- design development and construct — where the client provides a more detailed preliminary design which is further developed by the contractor
- design, novate and construct — where the client has the option to appoint the designers to complete the design who are not part of the successful tenderer's design team
- design, construct and maintain — includes additional maintenance requirements for a set number of years.

Typically clients do not bear the risks of any variation due to error or omissions in the agreed final design, but do face the full costs of any directed variation. Further, the risk of latent conditions (unforeseen issues in site conditions that would not be expected to be discovered by the client) is generally allocated to the contractor.

```
graph TD; A[Client develops initial design specifications] --> B{Final design agreed}; B --> C[Contractor builds based on agreed design]; C --> D[Subcontractors]; C --> E[Maintenance contractors]; F[Design consultants] -.-> B; G[Design consultants] -.-> C; H[Design consultants] -.-> E; I[Advisers] --> A; J[Design consultants] --> A; K[Design consultants] --> B; L[Design consultants] --> C; M[Design consultants] --> E];
```

The flowchart illustrates the design-build process. It begins with the client developing initial design specifications, which may involve input from advisers and design consultants. A final design is agreed upon, often with the use of consultants. The contractor then builds based on the agreed design, utilizing subcontractors and maintenance contractors. Design consultants are involved throughout the process, providing input at various stages.

PROCUREMENT

The level of design completed by government clients (and therefore the input requirements placed on tenderers) varies project to project. Design input from the client can range from little more than the site plan to a document of several hundred pages which sets out the precise specifications (Miller et al. 2009). In many instances, the level of design completed by clients is related to their expertise. For clients with specific knowledge of the idiosyncrasies in their sector, such as airport owners, upfront design levels may be significant (for example, the Commission was informed during consultations that most of the design work for Melbourne Airport's terminal upgrade was completed by the client given their knowledge of required passenger flows).

Design and construct contracts are the most prevalent type of contract used by both government and private clients. A recent examples is the Clem Jones Tunnel in Queensland.

Alliance contracting

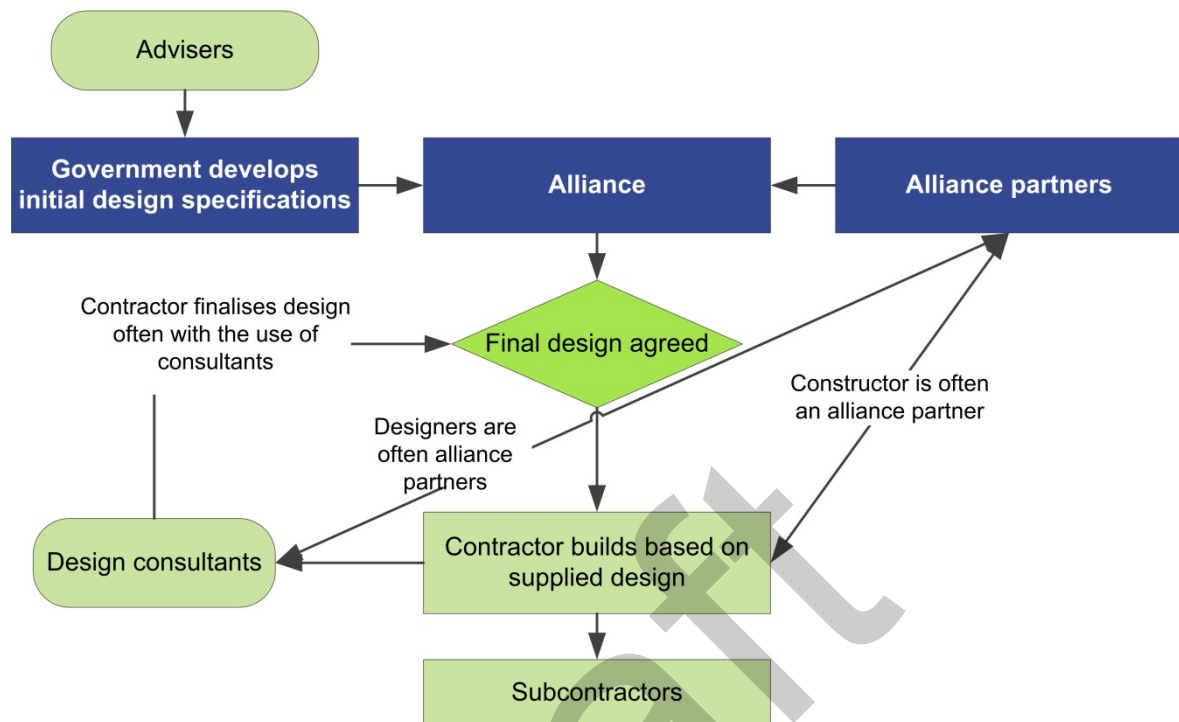
An alliance contract (figure 11.3) essentially turns a project into a joint venture. This contract type is often termed a 'relationship contract'. Under an alliance model, two or more entities agree to undertake the work cooperatively, making decisions jointly using intensive relationship facilitation. During tendering processes where alliancing is used, key personnel are often required to go through several workshops and role playing exercises to test how well different groups work together as these factors become extremely important to the successful operation of the contract. For this reason, alliance partners are often selected early in the process on non-price considerations.

Project risks, particularly in areas where there are significant uncertainties, are often shared along with any rewards from completing the project early or under budget.

Alliance partners typically include the client, designers, consultants, management service providers, suppliers and the construction contractors. However, not all parties involved in the project need to be alliance partners, and instead can be engaged through more conventional contracting arrangements.

Alliances are often considered to be of greatest value where the purchaser government or agency has had limited experience with the risks for the project (for example, where the infrastructure building is not routine as in some rail sectors such as recently in Victoria and for the desalination plants in South Australia and Queensland). A recent example of an alliance contract was Victoria's South Morang Rail Extension which incorporated the constructors, the government and the existing infrastructure operator whose activities were to be affected by the project.

Figure 11.3 Management approach under alliance contracts



Source: Adapted from ProcurePoint (2008).

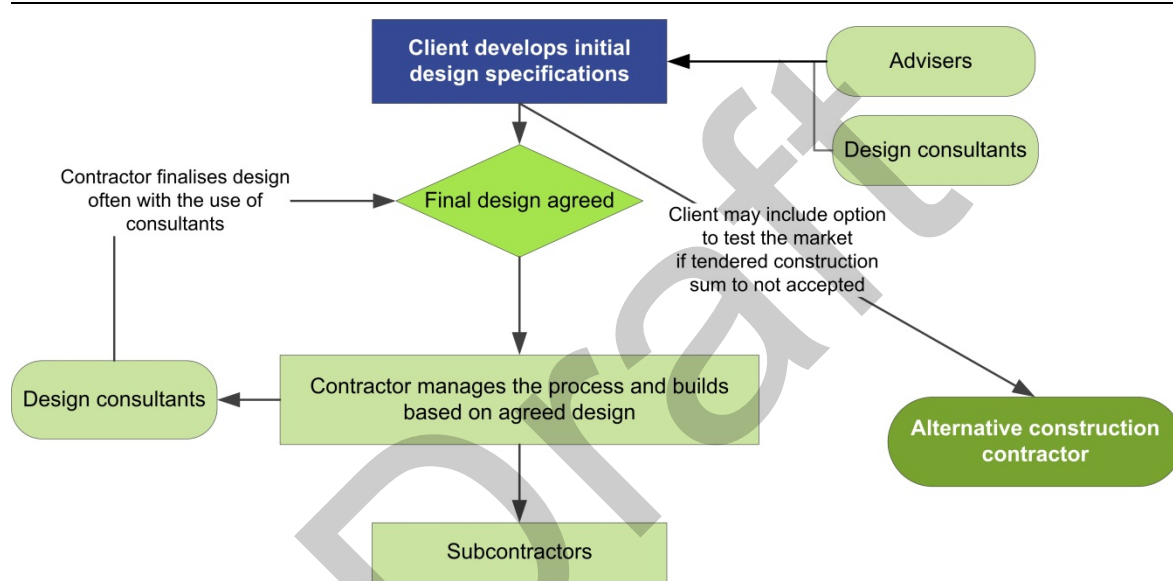
However, a recent study by the Victorian Department of Treasury and Finance (Vic DTF 2009) suggested that overall, alliance contracts had increased both the risks taken on by clients and the contract cost compared with more traditional contracting methods (Victorian Government, sub. 81, p. 40). In response, an Inter-Jurisdictional Alliancing Steering Committee published the National Alliance Contracting Policy and Guidelines in July 2011 that has resulted in a waning in enthusiasm for the model (Victorian Government, sub. 81, p. 41). Some governments have also begun to shift away from Alliance contracting arrangements as they feel compromised in being able to give directions to constructors. But some in the industry see the shift away from alliancing as a step backwards (Lean Construction, sub 103) and expect it to lead to more adversarial client-contractor relationships resulting in more costly and less timely infrastructure delivery (Menno Hennevel, sub. 62).

It is still the case, however, that if neither party can convincingly price one or more of the project's risks, and neither is willing to absorb responsibility without compensation, then alliance contracting is potentially the only feasible pathway to complete the project. An example of this was the contracts let for the dredging of the Port Phillip Channels in Victoria. In this context, it should be noted that the option to abandon the project, depending on the scope of the risks to be taken on and their potential costs, may be preferable and should always remain open.

Managing contractor arrangements

Under a managing contractor arrangement (figure 11.4), the contractor will undertake a significant part of the project management role usually undertaken by the client. This may involve the contractor obtaining development approvals, undertaking onsite investigations and any required stakeholder engagement. The contractor will also finalise the design and develop the program for construction, commissioning and maintenance.

Figure 11.4 **Management approach under managing contractor arrangements**



Source: Adapted from ProcurePoint (2008).

Successful contractors are selected on the basis of a tendered management fee and an assessment of non-price criteria surrounding their past management performance. The tender document will also set out the target construction cost for the project.

The contractor is usually paid for the actual costs incurred by the consultants and service providers used in developing the program of work under an 'open book' arrangement plus the tendered management fee.

There are usually a number of additional requirements in place to ensure competitive pressures are maintained during the various phases of the contract. The contractor is required to assess the build cost of the project and submit a 'guaranteed construction sum' (GCS) for agreement or to confirm it can be built within the target construction cost range. Many managing contractor contracts will

include an option for the client to test the market at this stage on the basis of completed designs or if the client elects not to select the GCS.

If the GCS is accepted, the contractor will complete the works and generally take on any design risks as with design and construct contracts. Clients are responsible for costs of any directed variations.

Under the open book arrangements, the contractor is paid the actual costs of materials used during the construction, subcontracts and consultancy fees plus its management fee. Contractors are usually given the incentive to manage the costs of a project and are entitled to a share of cost savings (based on the GCS), usually around 50 per cent.

Managing contractor arrangements often also include a number of other incentive arrangements. Aspects such as time savings and the achievement of disruption targets can also be included. Indeed, these contract types are generally selected on the basis of being able to include such incentive payments.

Managing contractor (and alliance) arrangements are likely to be beneficial where bids under traditional forms of delivery are likely to include allowances for very low probability risks (in essence, traditional contracting will provide for ‘too much’ insurance against risks being purchased); or which cannot be priced by either party.

An example of a managing contractor procurement model was the recently delivered Fiona Stanley Hospital in Western Australia. Despite being subject to significant changes in scope prior to the engagement of the contractor Brookfield Multiplex (which increased costs substantially), the project was delivered on time and on budget (Office of the Auditor General Western Australia 2012).

Early contractor involvement

The early contractor involvement model is a blend of the managing contractor and design and construct procurement models. Under early contractor involvement, a contractor is brought in early to work with the client in the initial scoping stages of a project. The contractor works with the client to develop design and cost models for the project. This has the advantage of allowing the client and contractor to better allocate project risks plus ensure ‘buildability’ of initial designs (Department of Infrastructure and Transport 2012a).

Like managing contractor arrangements, the contractor would typically be required to submit a bid on the risk profile of the project which the client could accept or instead go to market under a more traditional design and construct arrangement.

The tendering process — from pre-qualification to successful tenderer

Tendering processes should be designed with bid costs in mind. When greater input is required from the contractor, such as under design and construct arrangements, the tendering process seeks to limit the number of potential bidders prior to the identification of the potential construction costs. Where bid costs are likely to be lower, such as under construct only arrangements, governments are more likely to use ‘open tender’ arrangements and encourage as many constructors as possible to submit bids on the full construction cost of a project.

Prior to the start of the tendering process beginning, pre-qualification systems are in place in a number of infrastructure sectors (for example, much of the work for roads is tendered directly to pre-qualified businesses). However, for most major ‘bespoke’ infrastructure projects, pre-qualification systems are not used. Governments have established pre-qualification systems to limit the ability to tender to only those businesses that have been assessed as being capable to complete the specific type and value of work that is being sought. This is done in order to reduce tender costs for all parties.

The pre-qualification process assesses whether a contractor can viably deliver projects of a certain type and size. Assessments are generally made on the past record of a business along with their financial and technical capabilities. In some instances, pre-qualification schemes encourage contractors to commit to continuous improvement practices (ProcurePoint 2013). Pre-qualification is generally awarded within different project size scales.

The pre-qualification system is most advanced in the roads sector (possibly due to the greater reliance on construct only contracts and the large volume of individual projects). In this sector, a national system exists — the Austroads National Prequalification System (Austroads 2013). This scheme is administered by each state and territory government but is done so under an agreed set of pre-qualification limits and allows for mutual recognition between state-based systems. In other sectors pre-qualification is generally utilised on a state-by-state basis.

Some jurisdictions have sought to centralise pre-qualification in order to limit duplication between different client departments within the one jurisdiction. Victoria, for example is in the process of centralising pre-qualification for all building and construction:

Victoria is centralising its whole of government pre-qualification scheme for building and construction industry consultants and contractors (the Construction Supplier Register) within the Department of Treasury and Finance. This will enable streamlined

assessment and auditing of contractors for pre-qualification and for compliance with the Guidelines on projects. (Victorian Government sub. 81, p. 36)

Noting that for particular projects, tendering arrangements are likely to vary given specific characteristics of the construction job, the ‘typical’ tendering process for construct only and contracts requiring design inputs (representative of design and construct, alliance and managing contractor arrangements) is discussed below.

Tendering on construct only contracts

Tendering on construct only contracts generally make use of pre-qualification systems. In these instances, governments will tender directly using ‘request for tender’ documentation that sets out the design of the project. The requests for tenders are limited in the sense that only those with the relevant pre-qualification can submit a bid.

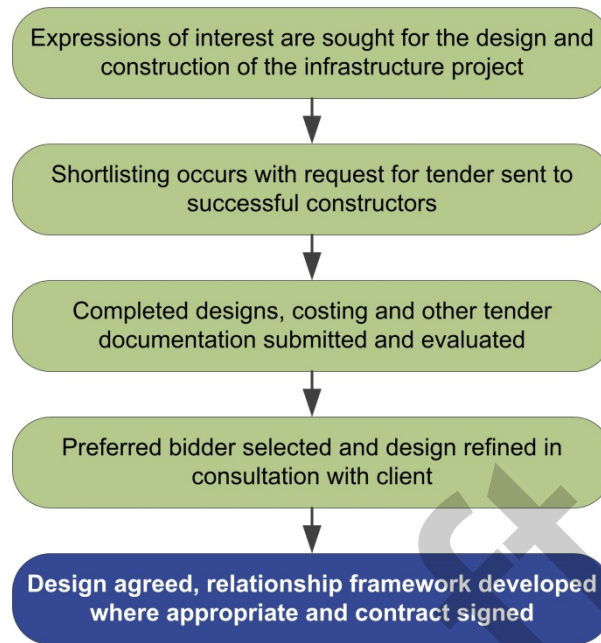
Under these arrangements, there are limited requirements placed on contractors with respect to design input apart from the necessary due diligence to ensure the project is buildable and will comply with building and planning regulations. These requirements, however, may turn out to be significant if the design provided by government client is poorly developed.

Tendering on contracts requiring significant design input

Tendering on design and construct contracts, including alliance contracts, requires more input into the process from both the client and tenderer. A stylised representation of a typical tender process under these arrangements is depicted in figure 11.5.

If pre-qualification is not used (or in some instances, even if pre-qualification is part of the process), an Expression of Interest (EOI) is first sought from market participants prior to the request for tender. The EOI stage is used to limit the number of tenderers who submit possible designs. This limits both duplication in design effort along with the burden placed on clients in assessing a large volume of proposed designs. It also reduces the workload on tenderers who do not make it to the request for tender stage and who would otherwise be required to submit a full tender in order to express an interest in building the project.

Figure 11.5 A stylised tendering process where design input is required



The EOI process typical requires tenderers to submit a range of information and plans relating to past performance, workplace management issues and initial approach to the build.

Tenderers are then shortlisted based on the non-price elements outlined in the EOI. The shortlisted businesses are then sent a request for tender which sets out what the client is seeking — generally a potential design, the build cost and any supporting documentation.

Under alliance contracting arrangements, the request for tender stage would also require tenderers to undergo a number of other assessments that are used to examine how well the client and potential partners will work together. These assessments are used to determine the potential effectiveness of the intensive relationships framework that underpin the alliance contract.

Tenderers have a set timeframe in which to submit their response to the request for tender. Once this material is assessed, a preferred tenderer is selected. The preferred tenderer's design is then further developed in consultation with the client. Once this (and the relationship framework under an alliance contract) has been agreed, contracts are signed.

11.2 Are government tendering arrangements too onerous?

The process and associated costs of the tendering arrangements used by government clients in the procurement of public infrastructure are frequently raised as a concern for industry. For example, as raised by Lend Lease:

Excessive tender deliverables sought within tight timeframe and then post tender further/additional information and clarifications requested that requires extensive resource commitment. The cost imposition to the industry is considerable given that all tenderers are taken on the journey over a prolonged period and that in a field of three tenders, two sets of costs are sunk. (sub. 46, p. 39)

Similar sentiments were also expressed by Ai Group:

The excessive requirements placed on construction companies by government for public infrastructure projects have long been a burden on business and lead to unnecessary costs. (sub. 47, p. 24)

It is argued that such costs can inflate the costs of infrastructure provision and potentially limit the number of participants in any tender process as firms have to risk a substantial investment in the design of projects they may never build. In this section, the main sources of costs associated with tendering (the ‘compliance costs’) and some potential areas of improvement are discussed. In effect bid costs are a transaction cost — they create a wedge between what the client (government pays) and what the contractor receives. Ideally this transaction cost should be at the minimum efficient level otherwise some gains from trade will be lost.

What are the major costs in the tendering process

Most industry participants have noted that tendering cost in Australia are high. For example, Wal King the former CEO of Leighton Holdings stated:

Procurement is very expensive with huge costs of tendering. For example, a project like EastLink in Melbourne would cost a consortium some \$20 million to bid. Airport Link is costing about \$30 million per bid. (King 2007, p. 3)

Other evidence supports this view. Although dated, a 2006 survey conducted by Blake Dawson Waldron Lawyers for the Australian Constructors Association suggested that bid costs were rising and accounting for a more significant share of the total project cost:

Overall, one third of respondents note that their bid costs are less than 1% of the project value. However, 10% of respondents estimate their bid costs at between 3% to 5% of the overall project works. Of considerable concern, 18% of those involved in projects valued at over \$500 million place their bid costs at between 3% to 5% of the project

value. In terms of hard currency, this represents a significant cash investment by each bidder, in the order of between \$15 to \$25 million, simply for the chance of winning a project. (2006, pp. 17–18)

Similar bidding cost shares of between 3 and 5 per cent were found by Ernst & Young (2011) for road and rail projects in 2011.

Tendering costs in Australia are also reportedly high by international standards. The Infrastructure Finance Working Group suggested that:

Bid costs in Australia have been found to be between 25 to 45 per cent higher than in Canada, which is considered a comparable overseas market. One of the main reasons for this is differences in information requirements. Procurement processes require fully costed solutions supported by detailed information on design, construction, maintenance and financing. (IFWG 2012, p. 23)

Similarly, Austrade reported that feedback from international firms attempting to gain work in Australia is that bidding costs are significantly higher than elsewhere:

Without exception, international constructors advise Austrade that tendering in Australia is expensive with a number of these constructors claiming Australia is the most expensive jurisdiction to tender in globally. Austrade has been advised by those same companies that this is in part (but far from fully) explained by the relatively large size of Australian contracts awarded.

For example, a European company (with operations in over 20 countries and that is undertaking work in Australia currently) advised Austrade in 2013 that Australian bid costs are double the second most expensive country they operate in. (sub. 74, p. 13)

However, Lend Lease has stated that there are significant similarities between the *processes* used in Australia and those used overseas:

There are a lot of similarities in the overall procurement process with those overseas however the biggest difference impacting the outcomes is the size (and consistency) of the pipeline in Australia e.g. comparing to somewhere like the UK. (sub. 46, p. 39)

In Australia, the major cost involved in tendering for infrastructure projects relates to the design component.

The Commission was informed that design costs alone comprise around 50 per cent of the total tender costs. During the resources construction boom, given the competition for scarce resources, design costs increased significantly, further inflating bidding costs. However, the recent slowing of resources investment activities (see chapter 8) has seen some of these pressures begin to dissipate which has the potential to reduce future bidding costs.

The remaining half of the bidding costs is made up of both the on-costs of the constructor's staff involvement in the process, along with the costs associated with

preparing and submitting the other documentation requirements. For a contractor that has been sent a request for tender, documentation relating to a number of non-design issues is also required, including plans relating to:

- workplace relations management
- health and safety management
- schedule of compliance with various state or national codes of practice
- industry participation plans (Vic DTF 2013c).

Other plans are also often required, which include:

- project management plan
- construction plan
- community engagement plan
- enterprise training plan
- environmental plan
- earthworks plan
- Indigenous participation plan
- traffic management and safety plan (McCloy, B., Principal Evans & Peck, pers. comm., 20 January 2014).

These documents are required by governments to ensure that the contract will be executed to as per the clients wishes. They are often project specific and are required to be updated for each bid. Government clients are not unique in this respect. Some private clients are also interested in additional plans (beyond design and those required on regulatory grounds), particular those relating to safety, workplace relations and environmental management. For both public and private sector clients, good safety performance is important as any incidents reflect badly on their own brand. Such risks are consequently hard to effectively contract-out, as the ultimate damage will fall on the client.

Good workplace relations is also important in ensuring a build runs on time, even if the risks and costs of industrial disputes are transferred to the constructor in the contract. This risk can also be hard to contract-out. The client (or its agent) will always be exposed to calls to intervene (by project proponents if not the contractors themselves) should industrial harmony breakdown.

This suggests that there are some areas where the client will need to retain significant awareness of the contractor's risk management approaches regardless of

the black letter of the contract and hence indicates its importance to the selection of a preferred tenderer.

The Department of Infrastructure and Regional Development found that these requirements add significantly to the bid costs:

Industry has indicated a view that tendering for public infrastructure works has a high cost, particularly due to the depth of information required at the Expressions of Interest phase, whilst also indicating that there is a lack of appropriate lead time into the bidding process. (sub. 64, p. 23)

This additional material has been claimed by many industry participants to be unnecessary for constructors to cost the project and has the potential to detract from the process of selecting the best value for money bid:

With the prequalification of tenderers through the panel process, the focus of the tender should be on attaining the best value for money and innovative Design and Construct proposals from the prequalified field. (McCloy, B., Principal Evans & Peck, pers. comm., 20 January 2014)

Similar claims were put to Austrade by the international firms it has had dealings with (sub. 74, p. 14).

Further, these plans are often also required for pre-qualification purposes, raising concerns over the duplication of material. There also appears to be no consideration given to whether similar plans had been submitted during earlier tender processes.

Is there scope for tendering costs to be reduced?

Design costs are a major factor explaining high bid costs in Australia. However, there is generally disagreement as to whether design requirements placed on tenderers should be reduced or increased, with industry putting forward both that greater design input would be beneficial and that greater design specification could help contain costs. For example, Lend Lease stated:

Lend Lease suggests that legislative frameworks governing procurement be opened up to encourage the selection of members of project teams before the scope of design is settled ... (sub. 46, p. 38)

Current arrangements, Lend Lease argued, reduced the scope for design innovation:

The rigidity (and well defined nature) of the process requires sufficient detail to be developed by the client so that suppliers are always meeting the scope of the project. This stifles innovation and assumes that the client has developed an optimal starting point in terms of project brief and design ... (sub. 46, p. 39)

Counter to this, Salini Australia stated:

... projects are poorly developed by government agencies prior to tender. It is worldwide practice that most of the design is developed by the Employer prior to tender, leaving verification and assessment of possible improvement to the tender stage, which is far less expensive for the bidders. The number, detail and quality of the design required to be submitted with the tender exceeds what would ordinarily be produced by the Contractor to support a Design and Construct Lump Sum proposal. (sub. 1, p. 5)

As reported by Austrade, Salini's position was supported by other international construction companies:

Austrade notes that some of the lodged submissions to the Productivity Commission advise high tender costs are exacerbated by poorly developed projects by government agencies prior to tender. This view is supported by a number of international players including by senior executive of a North American company who advised Austrade in 2012 that there is a preference by project directors in Australia to push design onto each bidding consortium. In their view a more cost effective option is to provide a base set of designs and ask consortiums to bid on these and/or make suggested improvements to the design rather than transfer a significant share of the initial design risk onto bidders. The current approach, in their view, elevated design costs in Australian tender processes. (sub. 74, p. 14)

Better developed designs also provide for better project costing, reducing the risks of variations (a risk generally borne by the constructor and thus priced into the bid).

Some solutions to this impasse appear to exist and include:

- the initial design specifications, including active consideration by government clients prior to going to market of whether the project offers scope for innovation or whether there is a preference for certainty
- contributions by government to the design costs of tenderers
- changes to the timing of tender information provision
- reducing the information requirements.

Initial levels of design on which tenders are based

A number of reviews relating to infrastructure costs and tendering arrangements have examined whether or not governments should complete more of the design work upfront prior to tender.

Opponents of greater design by governments also argue that in doing so, governments can unintentionally limit innovation and inflate costs if they get initial design specification wrong (Lend Lease, sub. 46, for example). Given this, it is argued that less design work be completed prior to tendering, as even though this

would impose greater costs on industry, there is greater scope for overall lower cost construction and maintenance.

However, if governments were to go to tender with less detailed design specifications for any given project there are also likely to be greater uncertainties relating to the potential net benefits of the project. In particular, over time governments have been procuring infrastructure that is of a greater quality than in the past — designed to last longer, have greater public amenity (or minimise the impact it has on amenity) and be designed for dual use (such as incorporating bus or bike lanes on new roads). All these factors should be assessed when developing the business case for any new infrastructure investment (see chapter 2 for a discussion on decision making). Ideally, marginal quality improvements should be assessed against the additional costs incurred. This would necessitate greater levels of design prior to tender.

Governments should also consider whether or not a specific project offers scope for design innovation. In areas where there are potentially many different design possibilities, seeking greater design input from tenderers is likely to yield greater benefits compared to situations where design possibilities are limited. This suggests that for some projects there is a limit to how much design should be completed upfront.

But even in the case where there are a range of design possibilities, greater levels of design specification need not limit the ability of tenderers to develop innovative ideas. Tenderers could be invited to challenge the initial design specifications if they believe a cheaper alternative existed that would still satisfy the governments quality objectives (as assessed and determined during the cost-benefit analysis). This would require governments to not only set out their design specifications but also the objectives they are seeking to achieve which underpin them. This issue is discussed further below.

DRAFT RECOMMENDATION 11.1

Governments should invest more in the initial concept design specifications to help reduce bid costs, but in doing so, provide opportunities for tenderers to contest the specifications of the design.

Ai Group, amongst others, supported greater design input by governments as a means to reduce tendering costs:

Ai Group continues to support the recommendations we made in 1990 that governments better define the project concept work before putting projects out to tender by engaging and paying a company to perform the design work, rather than

requiring tenderers to perform it. This would ensure only those companies that could meet the projects requirements would tender. (sub. 47, p. 24)

If implemented, it is also unlikely that governments would bear *additional* risks associated with design faults (for a given project specification) if traditional risk allocation approaches are maintained. (That is, a government may still specify its requirements for the project as before, but provide a more detailed design that could, so the tenderer choose and verify, meet some aspects of those specifications — it would still remain the duty of the winning tenderer to ensure the design is buildable and accept any risks associated with rework or redesign should it not meet the agreed specifications.) It may also generate some savings in project costs as bidders would be better placed to assess and therefore price project risks removing any additional margin added to deal with the greater uncertainty created by poorly developed concept designs. Governments would still bear the costs associated with changes to the scope of the project or the risks that their specification is unworkable (a risk that may be reduced if such specification become contestable).

There are other of advantages to this approach. In some instances, greater design specifications would also negate the need for shortlisting a limited number of tenderers through an EOI process. Ai Group (sub. 47, p. 24) suggest that shortlisting would automatically occur as only those capable of building such a project would tender for the work. Shortlisting more than a small number of bidders (typically three to four) would also ensure a more competitive bidding process. This would enable opportunities to use open tender arrangement for major infrastructure projects — arrangements that are commonly used in Europe (Salini sub. 1). However, such opportunities are likely to be limited by the resources of the client, which for larger projects, are unlikely to be large enough to deal with the demands of a large number of shortlisted tenderers (nor would it likely be efficient to devote such resources expand the number of bidders in all situations).

However, for this approach to be viable, governments would either need the necessary in-house skills to develop projects, or the resources to purchase such skills from the market by making use of consultants. The ability of government departments to do this during the decision-making phase has been questioned by a number of inquiry participants (chapter 2).

Implementing greater design by governments is also likely to require some changes to the decision-making process used to select some infrastructure projects. Participants have suggested that timeframes are already too tight and lead to adverse cost outcomes:

Unrealistic time constraints are the cause of failure in many projects. The adverse consequences of late project commencement and unrealistic project timelines cascade

through projects creating a reactive project environment and reducing the time to properly plan, innovate and collaborate. When time is squeezed, people are forced to revert to conservative and historical ways of doing things. Problems become magnified as contractors are forced to do the same down the supply chain. (University of New South Wales, sub. 44, p. 4)

With both better planning and better upfront design, government clients should be more able to set reasonable tendering and project timeframes as they will have a greater understanding of the work required and risks involved. Roads Australia has suggested that such an approach could yield gains:

In the experience of our private sector members, a far more rigorous approach by government to the preparation, communication and transparency of procurement processes can deliver real and significant cost efficiencies. (sub. 66, p. 4)

Issues exist around the political nature of the decision making and the timeframes over which it occurs — chapter 2. Sponsoring government departments would need both the necessary time and resources to further develop and assess any infrastructure project.

Contributions to tender costs in return for ownership of designs

Governments look to incorporate design input into tender arrangements to take advantage of the expertise and potential for innovation from experienced private sector constructors and designers. Doing so provides greater scope for governments to access a wider pool of expertise and therefore opens up greater potential for innovative and lower cost designs to be found.

However, as discussed above, requiring design input comes at considerable cost to tenderers. And, as only one tenderer is successful, the process means there is some duplication of effort. As individual contractors do not win all tenders, some of the costs imposed during the process for both successful and unsuccessful bids will be recouped in higher costs for the projects they do win.

Requiring design inputs also creates some opportunity costs for governments. Even though one bid may represent the lowest cost or generate the greatest net value and therefore be selected, unsuccessful bids may contain ideas and innovations which could further improve the successful design.

A number of participants have suggested that one means to overcome this issue, and to reduce the costs imposed on tenderers, is for governments to contribute to the design costs in return for ownership of the designs. Governments effectively purchase the designs from unsuccessful tenderers from which any innovative ideas can be ‘cherry picked’ and incorporated into the final design.

This approach would have several advantages:

- it would provide strong incentives for tenderers to put forward innovative designs and identify any errors or omissions present in the initial tender documentation¹⁷
- if coupled with tender arrangements that allowed tenderers to contest quality-related project specification, a greater number of alternative approaches to achieving a desired outcome may be identified
- it would provide a return on the investment made in bidding on government work and may increase the number of tenderers and thereby increase competition for work.

Government contributing to tendering costs has broad support from a number of industry participants — for example, the Australian Constructors Association (sub. 72), Ai Group (sub. 47) and Lend Lease (sub. 46).

It is important that such contributions do not simply represent a subsidy paid to bidders. Contributions to bid costs need to also provide benefits to the client, either from design innovation or increased competitive tension during the process. If it is unlikely that a project lends itself to the development of innovated ideas that would be beneficial to the client then contributions to bid costs should not be made. It is also important that initial designs and site investigations such as those related to geotechnical engineering (and issue discussed later in relation to risk) are sufficiently developed so that government clients are not paying each tenderer for the same information that would have been more cheaply discovered by the client in the first instance.

But not all participants agreed that contributions to bid costs should be rendered in turn for ownership of the tendered designs. There has been some concern raised over ownership of intellectual property under such arrangements.

However, these types of tendering arrangements have been used in recent infrastructure projects which suggests issues surrounding ownership of intellectual property are not insurmountable. Victoria's Linking Melbourne Authority has developed a request for tender for the East-West link project where the Authority has agreed to contribute one-third of the tender costs in return for ownership of the

¹⁷ During consultations the Commission was informed that contractors are often reluctant to make the client aware of errors in the initial design specification discovered in the preparation of bids (including instances where initial site investigations have errors in their results). It was suggested that such disclosure may not be rewarded and instead could be used by the client to modify the design of a competitor's successful bid which did not identify the error.

submitted designs (Wiggins 2013). The Australian Contractors Association, however, believed the payments for this project were too low:

While the Victorian Government is to be commended for trialling the reimbursement of some of the external costs of constructors in bidding for large projects, the actual amounts likely to be reimbursed compared to the real cost of bidding are far apart. (sub. 72, p. 16)

A similar approach to that taken for the East-West link in Victoria has also been applied to tenders submitted for the Operations, Trains and Systems contract (the PPP contract) of the North West Rail Link in New South Wales (North West Rail Link 2012b). Contributions are capped at \$10 million. Victoria has also used this strategy for the alliance contracts of its Regional Rail Link project (sub. 81, p. 37).

In terms of implementation, some additional criteria would need to be placed on tenderers in order for them to receive payment. Further additional upfront work would also be required of the client in order to determine whether contributions to bid costs would also be a net benefit. This would include:

- a minimum tender documentation compliance requirement such that only those businesses genuinely competing for the project and allocating appropriate resources would be eligible
- restricting contributions to the design elements of the bid and governments would need transparency of those costs thereby requiring an ‘open book’ tender approach
- an understanding by government clients of the potential design costs imposed on tenderers before going to market in order to set an appropriate maximum contribution and to assess the veracity of the costs presented under the open book arrangements.

DRAFT RECOMMENDATION 11.2

When tendering for major infrastructure work under design and construct arrangements, governments should consider contributing to the design costs of tenderers on the condition that governments own the design, where a thorough prior assessment has demonstrated that design innovation is both worth seeking and likely to be received.

Fast track to preferred tenderer

Some participants to this inquiry have advocated a ‘fast track’ to preferred tenderer for the construction contract as a means to contain bid costs. Such a process would seek to select one preferred tenderer quickly prior to the development of any

detailed design work for the project. This would eliminate any duplication of work between rival tenderers and ensure that for most projects, only the successful bidder would be required to invest in developing a detailed design (reducing the overall costs of the process).

However, issues with maintaining competitive pressures and in support of a sound level of probity may arise under such an arrangement. Proponents of this approach suggest that as the client still has the right to not accept the final bid from the preferred tenderer, and return to the market, competitive pressure is maintained. But under such a scenario, financial and time costs are imposed on the client in re-issuing the request for tender documentation and the subsequent time involved in eventually selecting a successful tenderer. This suggests that clients may have some reluctance to go back to the market. As a result, some of the competitive pressure under a fast track arrangement may be lost. It may also limit any potential design innovation that is provided when multiple businesses are vying for the work. However, an informed client which has done the necessary due diligence on design and possible construction costs is likely to be well placed to assess the tendered costs, thereby making the threat of a return to market credible.

The success or otherwise of such a model will be tested as government clients experiment with the early contractor involvement approach. Further, such a model may lead to benefits in the procurement approach applied to PPPs (discussed in chapter 7). However, where design and construct contracts have been chosen as the preferred procurement model, given the possible limitations of the fast track process and with considerations of possible reductions to the bid design costs from more developed designs and client contributions it is unlikely that such an approach would yield *net* benefits.

The timing of tender information provision

There is merit in changing the timing of when information is provided by tenderers to help reduce overall bidding costs. As discussed above, the initial EOI process and request for tender require a number of additional documents to be submitted. Many of these, it is argued by industry, are not required to cost the project and therefore may not be required in the initial stages of the tender.

Instead, much of this information could instead become a condition of the tender but only be required to be submitted by the preferred tenderer. For example, documentation relating community engagement, training, earthworks, traffic management, industry participation could be submitted by the preferred tender alone.

The delaying of information provision to the preferred tenderer stage would have the advantage of reducing bid costs for all players. Governments would also maintain the right to select an alternative supplier if the initial preferred tenderer did not satisfy the requirements. However, such an outcome is unlikely as most Tier 1 contractors have significant experience in delivering against the conditions imposed by government contracts (and in many instances have already submitted such information as part of pre-qualification). Further, such firms would be seeking work in the future and so would be unwilling to damage their reputation by moving to a preferred tenderer stage based on price but being unable to satisfy the remaining contract provisions forcing the client to return to market.

DRAFT RECOMMENDATION 11.3

Government clients should alter the timing of information provision in the tendering process for infrastructure projects so that non-design management plans are only required of the preferred tenderer. The obligation to produce documents upon becoming a preferred tenderer should remain a condition of the initial request for tender.

Reviews are also important

Seeking feedback on procurement practices has the potential to inform government on areas where improvements can be made. Throughout consultations, the Commission was informed that many government departments involved in infrastructure procurement sought feedback on the processes used to refine their future approach. For example, Roads and Maritime Service in New South Wales has recently sought to reduce the number of documents required to be submitted during the tender process (McCloy, B., Principal Evans & Peck, pers. comm. 20 January 2014).

Along with seeking feedback on particular procurement processes, there has been significant work done across governments to develop better procurement models. As put by the Department of Infrastructure and Regional Development:

... there is a need for governments to continually review procurement and project management approaches to ensure that they are consistent and robust. Whilst the Commonwealth does not have a major role in direct procurement of transport infrastructure, through the IWG [COAG Infrastructure Working Group], it has led the coordination on a number of policies designed to improve governments' management of projects:

- the publication of National PPP Guidelines and National Alliance Contracting Guidelines, and the support of Traditional Contracting Guidelines (as outlined above);

-
- development of Best Practice Cost Estimation for Publically Funded Road and Rail (currently under review); and
 - the publication of Best Practice Case Studies in Infrastructure Planning and Delivery. (sub. 64, p. 27)

Nevertheless, there is scope for reviews of procurement processes to be more systematic, thorough and nationally coordinated so that agencies and jurisdictions can learn from innovations discovered ‘over the fence’ and over time.

Improved data collection, as recommended in chapter 8 (draft recommendation 8.2) provides an opportunity to collect information that would allow governments to more systematically review individual procurement processes to see if they can be made more efficient for all parties.

11.3 Do tendering arrangements elicit least cost bids?

It is important that tendering processes both create the right incentives for tenderers to submit least cost bids, and that those managing the process are able to identify the least cost bid in selecting a contractor. Several aspects of the tendering arrangements can influence both of these, including the:

- attitudes and practices of those assessing bids — will determine which businesses are shortlisted and which are not and may inadvertently rule out a more efficient provider
- use of new technologies — accuracy of costings can be improved through both imposing higher standards on information provision or through the use of new technologies such as Building Information Modelling (BIM) tools
- imposition of project-specific quality standards — will directly affect the cost of building infrastructure and if rigidly applied may limit the scope for innovation and/or the potential for lower cost solutions to be found
- imposition of ‘local content rules’ — can lock tenderers into certain suppliers or impose additional compliance costs
- ability of the process to maintain competitive pressure — moves to reduce the number of tenderers too soon over concerns about bidding costs may inadvertently remove competitive tension from the tender process
- provision of information on risk — the under provision of information on risk (or incorrect information) can inhibit a tenderer’s ability to accurately price risks and as an insurance measure may create incentives to ‘bid high’.

Attitudes and practices of those assessing bids

The way in which government clients assess EOIs and bids can play an important role in a least cost bid being selected. It can also influence the total costs imposed by the tender process. Some industry participants have argued that there is a certain ‘conservatism bias’ in the assessment of EOIs and bids which creates a bias towards incumbent contractors. As suggested by Salini Australia:

A bias towards the ‘Australian’ duopoly in the construction of public infrastructure, despite maintenance of business practices driving up costs and against currently public policy (including enterprise bargaining agreements with unions), ensures a sustained increase in the cost of construction and reduction in the amount of public infrastructure able to be built. (sub. 1, p. 1)

Austrade has reported similar claims:

... A number of international constructors have made similar claims to Austrade. For example, an Asian domiciled constructor advised Austrade it was confident it could have delivered a previously contracted tunnelling project in Australia for less than half the cost that was tendered by the winning consortium but believe they were not awarded the contract because of lack of a local partner. (sub. 74, p. 18)

Governments are interested in ensuring probity through tender processes and many have established policy documents to help ensure fairness. For example, the Victorian Code of Practice for the Building and Construction Industry requires government clients to evaluate tenders based on predetermined (and published in the tender document) criteria.

Evaluation criteria must be specified in the tender documents and should include as appropriate:

- financial capacity;
- organisation capacity;
- performance capability;
- resource availability;
- health and safety management; and
- price. (Victorian Department of Infrastructure 1999, p. 24)

Through these processes, some governments have sought to overcome any local bias in assessments. This appears to have been successful, with Austrade reporting:

A number of international constructors have also advised Austrade that they consider there has been positive political will at a federal government level that recognises and values their global capabilities. These same companies advise the challenge though is ensuring this recognition is replicated at a ‘Project Assessment Team’ level as currently

this is not the case and the majority of projects are awarded and run at a state level. (sub. 74, p. 18)

However, there is a risk that if poorly designed, probity rules may create a local bias. This could occur if rules create barriers to new entrants seeking information about ways to navigate the procurement process as in providing such information, a government client may perceive it could be in breach of its probity rules.

Governments have previously identified that tender evaluation is an area where performance could be improved. COAG's Infrastructure Working Group, through the Victorian Department of Treasury and Finance reviewed practices surrounding traditional contracting in 2012 (Department of Infrastructure and Transport 2012b, p. 28). The review did not raise concerns over any selection bias that may occur within government departments when assessing tenders. Instead, recommendations to flow from the review suggested that past contract performance by tenderers be formally considered in any evaluation to align practices by government clients to those in the private sector (Department of Infrastructure and Transport 2012c, 2013, p. 16).

Taking into account past performance of any given contractor in delivering a project as a means to shorten the tender process (and reduce costs) raises several issues.

- Probity — there is a concern that probity may not be maintained through such a process as it limits the opportunity for other market participants to be involved.
- Requires additional information — the government client needs to have good information on past performance of the proposed tenderers. They also need information on the possible build costs of the project they are seeking to deliver to see that the bids are within the expected and reasonable range of costs.

One possible solution to the probity issue is the greater use of codes of practice such as Victoria's Code of Practice for the Building and Construction Industry (Victorian Department of Infrastructure 1999) which set obligations on the businesses that deliver projects on behalf of government clients. Victoria, for example, currently uses such arrangements to aid in the management of industrial relations issues — both the specifics of the code and the issues it seeks to address are discussed in detail in chapter 12. The scope of codes of practice could be extended to place certain probity related obligations on potential suppliers — such as an obligation to not be involved in potentially corrupt activities. In doing so, governments need to ensure that probity requirements are reasonable and do not result in barriers to an effective and efficient tender outcome.

Selecting contractors early based on past performance could be trialled under the early contractor involvement procurement models. The contractor selected to be

involved early in the process could be chosen on the basis of past performance in the absence of traditional market testing. As with the early contractor involvement model, a right to return to market if the proposal begins to look too costly could be embedded in the contract. However, for this to be adequately assessed, government clients would need up-to-date information of the likely costs of the project they are seeking to deliver. This would require better data collection as discussed in chapter 8.

DRAFT RECOMMENDATION 11.4

The ‘early contractor involvement model’ should be trialled to test the costs and benefits of applying past contract performance by tenderers as a means of constructor selection, consistent with the practices of some private sector clients.

The use of new technologies to improve ‘whole of life’ project costing

The ability of any tender process to elicit least-cost bids will rest in part on the quality of information provided to (and required of) tenders. For any project, there are both the initial construction costs to consider along with the future and ongoing maintenance costs. Ideally, clients would be procuring the least ‘whole of life’ cost for any piece of infrastructure. Further, both clients and constructors would also seek to minimise the costs of any design errors which require rework or even rebuild activity in order to minimise delays and costs (design fault risk generally rests with the constructor).

Traditionally, however, it has been difficult to incorporate both construction and ongoing costs into any assessment of a given design for an infrastructure project. Further, traditional design work makes the identification of clashes between various construction components difficult — this is particularly important for infrastructure which requires multiple services to operate within a particular space such as occurs in hospitals and other complex buildings.

This has led to the development of three dimensional models of building design known as building information modelling or BIM. Broadly, BIM has been described as a database that provides digital information about the design, fabrication, construction, project management, logistics, materials and energy consumption of a building (ACG 2010).

Proponents of BIM have suggested it has a number of significant benefits, including:

- improved information sharing

-
- time and cost savings
 - improved quality
 - greater transparency in decision making (ACG 2010).

BIM has the potential to be applied to various stage of a building's (or piece of infrastructure's) life cycle (appendix C). As such, it can generate benefits beyond the tender process if applied from the initial design stage (Air Conditioning & Mechanical Contractors' Association of Australia, sub. 19; Autodesk, sub. 24; aiaa, sub. 25)).

BIM has most potential for complex construction projects. The key feature of BIM is that it provides a platform to explore the structure of objects and their relationship to each other. It also provides a means to incorporate scheduling of activities during the build phase (termed '4D' BIM) and allow for costing through the inclusion of cost data (termed '5D' BIM).

BIM can allow for any conflicts in various design elements to be discovered prior to them occurring, reducing rework or rebuild costs. It also provides a means for constructors to better schedule their construction activities, helping to find ways to minimise site costs. It has been suggested that between 60 to 90 per cent of project variations are the result of poor design documentation (CRC for Construction Innovation 2007). Further, it has been reported that between 20 and 30 per cent of the construction cost of complex buildings is made up of costs resulting from coordination errors, incorrect materials and labour inefficiencies (generated by poor scheduling of activities) (Brown 2008; Construction Users Roundtable 2004; Autodesk, sub. 24, p. 1). BIM has been argued to be a tool to reduce these and has been demonstrated to lead to savings in other markets (Centre for Integrated Facility Engineering 2007; appendix C). However, for such benefits to be realised, industry users would require the necessary project management skills to implement the schedules generated — an area where the skill set of principal contractors have been questioned (see Loosemore 2014).

The information provided by BIM also allows any potential tenderer to put forward more accurate costings for infrastructure projects. With the inclusion of both operations and facilities management and decommissioning into BIM, 'whole-of-life' costs can be considered at the tender stage. This would allow for the least whole-of-life cost tender to be selected, or at least consideration given to any tradeoff between upfront capital costs and potentially lower life costs.

Given the benefits that can stem from the use of BIM, some government clients have mandated its use for building and infrastructure works. In the UK, the Government has mandated the use of BIM for all projects by 2016 (UK Cabinet

Office 2011). To facilitate this, the Government has played a co-ordination role in the development of standards. Singapore has also mandated the use of BIM (Autodesk, sub. 24, p. 5).

However, given the benefits of BIM can be captured by market participants, there appears little justification for government involvement in the absence of major impediments to its adoption. As with all new technologies, some impediments to adoption exist. In the BIM context, these relate to:

- a lack of BIM object libraries
- a lack model building protocols
- legal and insurance impediments
- a lack of standards for information sharing
- skill gaps
- adoption costs (ACG 2010, p. 40).

It is expected that these impediments would be overcome by the market if sufficient benefits existed in adopting the new technologies — its use in other markets without a regulatory mandate such as the United States and Hong Kong suggest these are not insurmountable.

But some have argued that the widespread adoption of BIM has been impeded by market failures and therefore a role for government may be warranted (ACG 2010). In particular, it has been suggested that:

- externalities exist — significant benefits accrue to third parties from the development of aspects such as object libraries and building protocols, however, the costs borne by any one firm in the development of these is greater than the income they can capture from any one project
- information asymmetries — firms do not invest in BIM because there is no evidence of the benefits and there is no evidence of the benefits because there is not widespread adoption of BIM (ACG 2006, p. 41).

Given the use of BIM internationally, it is unlikely that information asymmetries exist. To overcome the former, there could be scope for government involvement. In the UK, for example, the UK Cabinet Office co-ordinated the development of standards and other protocols (relating to legal and insurance matters and contracting with BIM) (Building Information Modelling (BIM) Task Group 2014; UK Cabinet Office 2011).

While claims of market failure may be questionable given its adoption by many industry participants already (for example, Lend Lease sub.46) and its use in markets without mandate, this may not exclude a role for government. Governments are a major client, and would be expected to share in some of the efficiency gains from the adoption of BIM in a competitive market. Therefore, as a client, it is likely to be in their interests to facilitate a more rapid adoption of BIM.

BIM has most potential for complex construction projects that have a number of different design elements. Its usefulness and potential cost savings may be limited in the delivery of smaller less complex infrastructure projects (such as those related to road repair or upgrade). Mandating BIM for all government contracts may therefore impose a number of unnecessary costs on industry.

As an alternative, governments as clients could seek tenders on designs (more advanced than current as discussed above) which are set out in BIM format where a sufficient degree of complexity exists (a notion supported by industry participants such as Lend Lease sub. 46). To do so would require governments to be involved in the development of any necessary object libraries and building protocols. A collaborative approach to developing a consistent set of these across governments and industry as has been done in the UK could assist with this.

Releasing concept designs in BIM format would encourage the rapid adoption of the technology by industry, potentially generating savings in both bid costs and overall construction costs.

DRAFT RECOMMENDATION 11.5

For complex infrastructure projects, government clients should provide concept designs using Building Information Modelling (BIM) to help lower bid costs, and require tender designs to be submitted using BIM to reduce overall costs. Governments should give serious consideration to where in their better practice guides they may specify the use of BIM.

Project specific standards

Design requirements relating to the longevity and user amenity of public infrastructure projects have been increasing over time. Some have referred to the creased stringency in these requirements as ‘gold-plating’. However, such a term is misleading as through these requirements governments are essentially purchasing different *quality* infrastructure compared to what they purchased in the past. Irrespective, such design requirement ultimately affect the costs of infrastructure projects. An example provided by the BCA suggests that they are significant:

Changing design life and user amenity standards in Australia can also increase the cost of delivering major infrastructure projects. For example, it is estimated that the cost of the Brisbane Airport Link tunnels may have been 5–10 per cent less if they were constructed to design and amenity standards which applied 25 years ago.

For a tunnel such as Airport Link, the design life issue can manifest itself in increased requirements for waterproofing, permanent support systems, corrosion protection, fire resistance, flood proofing, material specifications, etc.

User amenity and safety now adds new requirements such as lifts in escape tunnels, smoke ducts, heightened air quality limits, breakdown lanes, security, traffic management and emergency systems including fire controls. The safety systems demanded by the government for Airport Link tunnels are at the extreme top end by world standards. (BCA 2013, p. 34)

But such an example ignores any potential benefits from the new requirements and the community's willingness to pay for quality improvements. Governments are not only purchasing the type of infrastructure, but also its quality. Ideally, trade-offs between the cost of quality improvements and the resulting benefits should occur during the decision making process in the cost-benefit analysis. To do so, development of the business case should incorporate a greater amount of early design work in order for initial costings to be determined (this would also have other advantages in terms of reducing bid costs as discussed above).

There are also other costs associated with greater specification:

... While detailed specifications hold contractors to a standard and prevent them from innovating in an uncontrolled manner, over-specifying up-front reduces the scope for innovation. Governments and clients should consider the merits of traditional specification-based procurement versus outcomes-based KPIs around client service needs. This could provide more space for constructors to innovate in developing 'best value' solutions which deliver better long-term outcomes for governments, society and the industry. (University of New South Wales, sub. 44, p. 6)

Given both costs and benefits flow from greater specification, one solution to the apparent impasse is to view project specific standards as flexible. Benefits will flow from improved decision making in initial project scoping (discussed in chapter 2), but other avenues exist during the tendering phase to examine ways to achieve set objectives at lower cost (ultimately varying the standard but achieving the same outcome quality) or provide governments with more information about the cost of their imposed quality standards.

To achieve this, governments could make the design standards contestable during the tender phase.

To do so, they would be required to publish the desired outcomes they are seeking to achieve from the established project-specific standards. This would allow

tenderers to seek innovative lower cost approaches to meeting the quality objectives of governments without being forced to design and build to standards that industry in some instances considers overly costly compared to suitable alternatives (an area where potential savings exist as suggested by SKM, sub. 108, p. 4). If coupled with the purchase of designs through the bid process then incentives should align to create innovation in this area.

However, as with considerations of contributions to bid costs, government clients would need to consider the nature of the project and where it is likely that innovation will lead to benefits for the client and ultimately the end-user.

DRAFT RECOMMENDATION 11.6

Within the request for tender, government clients should provide opportunities for tenderers to contest the key standards of the design where they have previously assessed scope exists for innovation to occur.

Local content rules

Australian governments (state and federal) have variously sought to encourage businesses who are successful in winning infrastructure projects to source inputs from local suppliers. In 2001, all Australian Industry Ministers signed on to the *Australian Industry Participation National Framework*. The framework saw governments commit to incorporating the following principles into their industry development policies:

... full, fair and reasonable opportunity, free of interstate preferences, regional development, competitive neutrality, value for money, transparency of process, policy consistency and consistent with Australia's international obligations. (Department of Industry 2013a)

The broad rationales underpinning such programs relate to the development of 'world's best practice' through capability building, providing opportunities for Australian firms to access global supply chains and claims surrounding reducing the information search costs for those who win government construction contracts in finding input suppliers. Programs within the national framework were further developed under the 2012 *Strengthening Australian Industry Participation* policy initiative.

Industry participation programs come in two parts.

- First are requirements placed on potential government contractors relating to setting out plans detailing how they intend to make use of local small and

medium sized input suppliers if they were to be successful. Programs do not specifically require tenderers to source inputs from local suppliers.¹⁸

- Second is a government maintained database of Australian industry capabilities for various different types of projects — the Industry Capability Network (Department of Industry 2013b). At the Australian Government level, the database is maintained by Industry Capability Network Limited which employs technical consultants who are able to match buyers of goods and services with capable Australian suppliers.

At the Australian Government level, there is a specific program related to public sector infrastructure projects — the Supplier Access to Major Projects program (Department of Industry 2013c). This program also applies to major projects worth more than \$500 million delivered by the private sector (DIISRTE 2013). The program claims to save:

... companies time and money. It provides funds for the state-based Industry Capability Network (ICN) to work with project developers to identify supply opportunities for capable and competitive Australian companies. SAMP [Supplier Access to Major Projects program] seeks to increase opportunities for Australian industry, especially small and medium enterprises (SMEs) to participate in major projects and increase access to global supply markets for major projects. (Department of Industry 2013c)

Since 1997, \$17 million has been allocated under 158 grants to Australian businesses. These grants are claimed to have allowed Australian businesses to win contracts valued at more than \$11.5 billion that *could* have been awarded to overseas competitors (Department of Industry 2013c).

Despite activity in this area by all levels of government, there appears to be limited economic rationale for the existence of such policies. Further, as a means of promoting innovation and the adoption of better practices, such policies would seem a rather indirect way of achieving this. Indeed, most governments have more direct policies targeted at research and development in order to promote innovation. While it could be argued that some rationale exists in governments providing assistance to small and medium sized businesses in overcoming any information barriers that may exist which inhibit them contracting with large contractors, the same cannot be said for imposing such requirements on the contractors themselves.

Contractors for major infrastructure projects have an incentive to minimise their costs. If a lower cost small to medium sized input supplier can reliably provide

¹⁸ New South Wales's previous local content scheme, the *Local Jobs First* scheme, was more restrictive in terms of its requirements. However, under this scheme construction activity were exempted (NSW Government 2010, p. 4) and so it is unlikely to have influenced construction costs in that state.

inputs during the construction of a piece of infrastructure, it would be in the interests of the contractor to make use of this supplier. The presence of the government maintained database and related services under the Industry Capability Network would reduce any search costs for contractors, and there would naturally exist an incentives for them to seek lower cost suppliers in order for them to secure work. Any requirement around detailing a plan which sets out a local procurement approach imposed on tenderers would therefore seem redundant.

There is also limited evidence to suggest that the plans imposed on businesses through the tender process are effective. Instead, they are likely to represent an additional compliance burden on tenderers. As put by the Business Council of Australia:

Recent policy changes requiring Australian Industry Participation Plans, ... , for all private projects should be scrapped and the creation of the Australian Industry Participation Authority abandoned. This policy imposes unnecessary red tape and a costly compliance obligation on investors when there are just as effective non-regulatory mechanisms that can be used to grow opportunities for Australian industry participation in major investments. (sub. 39, p. 14)

Indeed, the Decision Regulation Impact Statement for the *Strengthening Australian Industry Participation* policy suggested the preparation of such plans for a major project could cost somewhere between \$50 000 and \$150 000 (DIISRTE 2013, p. 39). (Interestingly, the ‘do nothing’ option was not considered in the Decision Regulation Impact Statement.)

Ultimately, local content rules in procurement policies do not appear to bind or add significantly to the final turnout costs of infrastructure projects. However, they may risk government not selecting the least cost bid on non-cost grounds. In any event, their objectives are questionable and the nuisance costs created suggest they should be abolished. Governments, if they wish, could instead let contractors on major projects know about the Industry Capability Network (fulfilling the information role) without imposing any further requirements during the tender process. If lower cost alternatives exist, then contractors will select from the list. It is unlikely filling out the paperwork has any additional benefits.

DRAFT RECOMMENDATION 11.7

Australian, State and Territory Governments should remove the requirement for local content plans, such as the Australian Industry Participation plans, from tenders for all projects.

Maintaining competitive pressure

The competitiveness of individual constructors in the Australian market will rest heavily on the market structure — issues which are discussed in chapter 10. However, the tendering process, in particular the shortlisting arrangements, can also play a role. The shortlisting arrangements will also influence the overall bid costs imposed for a given project.

There is a general belief that there is a trade-off between stricter shortlisting to reduce the imposts of the tendering process and the likely competitiveness of the bids received. Governments have traditionally sought to shortlist three to six contractors (or consortia) for major projects in order to encourage competition (Victorian Government, sub. 81, p. 36).

However, the Australian Constructors Association has argued for stricter shortlisting by governments during the EOI stage to limit the number of contractors (or consortia) who receive a request for tender to two:

... the ACA [Australian Constructors Association] submits that governments would receive better value for taxpayer dollars by determining a final shortlist of no more than two entities as this would generate real competition between the final two proponents while also providing the opportunity for a wider range of bidders to compete in early rounds of the process without having to expend vast amounts on initial bid costs. (sub. 72, p. 17)

The Association argue that (p. 17):

- as tenderers would have an equal chance in winning, the process would guarantee ‘significant effort’ in the development of project teams and designs in the request for tender stage — improving the quality of design, innovation and the potential for the best value for money and timely project to be delivered
- tenderers would have greater scope to secure better financing for their project as the available pool of financiers is greater (not so spread across a larger number of players)
- it would reduce the overall (across Australia and for both private and public sectors) costs imposed by tender processes
- clients would be able to better work with shortlisted tenderers in developing their designs to the required specifications as their limited resources would not be spread across a greater number of teams.

On the other side of the debate, some have suggested that even the current practice of shortlisting around three contractors significantly reduces competition, creates

barriers to entry and in the end increases the tendered build costs. As put by Salini Australia:

... shortlisting often leads to exclusion of companies meeting all the necessary criteria but are excluded from being able to offer innovation and competition in the process, as they are removed from the process at this stage just because they exceed the predetermined number of tenderers allowed to bid.

The shortlisting process itself generally leads to two or three companies being invited to participate in the final stage of a tender. In practice, Australian duopoly is always both shortlisted for obvious reasons including their strong capabilities and proven experience, as well as consolidated lobbying at all levels.

This leaves room for, at best, one other player to participate in a tender when and if such an opportunity is made available. (sub. 1, p. 2)

Ultimately, Salini Australia claims that despite low barriers to entry, competitive pressure on constructors is limited due to the shortlisting process used in procurement:

As it stands, the Australian market is not a real open market despite claims to the contrary: while anyone can establish a subsidiary or a branch office in Australia, get prequalified and participate in Expressions of Interest, this is as far as it goes in most of the cases regardless of the capability and experience of the company. (sub. 1, p. 3)

The tradeoff between bid costs and shortlisting is likely to be helped by greater design input from government clients and other changes to aspects of the tender process discussed earlier. With such measures, governments should have scope to encourage a greater number of bidders and reduce bid costs.

Risk: levels and ability to price

As discussed in chapter 3, risks should be allocated to those best placed to manage them and respond to them. Ideally, risks should be allocated to those who can mitigate them at least cost and for those that cannot be mitigated, to the party best able to absorb the specified risks.

Many industry participants have suggested that the risks transferred to constructors under design and construct contracts are increasing costs.

However, it is unclear whether or not risk allocation is inefficient. While reducing the levels of risks borne by constructors may reduce the fixed contract price under such contracts, it may not reduce the overall costs of the project. Risks would instead be borne by governments which would come at some cost. Given concerns over the project management and construction expertise remaining in many

government procuring agencies (discussed later), it is arguable that governments may not be well placed to take on additional risks.

Irrespective, governments do use a suite of contracts dependant on the risk of the project — therefore allowing for differing arrangements for less and more risky projects. Further, significant work has been undertaken in assessing the appropriate use of differing contracting arrangements at both the intergovernmental level (Department of Infrastructure, sub. 64) and within jurisdictions. The issue of risk allocation, therefore, may be best determined through learning from past processes and the systematic use of reviews (discussed in above).

Governments have also sought other means to ensure that the risk transferred to the market is not too great so as to limit the ability of industry to supply the required infrastructure. For large projects, governments are increasingly consulting with industry over the way a project may be packaged (in terms of breakdown of work and size of contracts). This is done to ensure competition by:

- reducing overall project complexity — if the work is too large or complex, there may only be one or two suppliers able to complete the entire package of work
- reducing the level of risk transferred to any one market participant — again, only a small number of suppliers may be able to take on the risk related to an entire project.

The cost threshold for ‘large projects’ to which this would apply should be assessed on a case-by-case basis by the procurer.

An example where consultation on project packaging has occurred is Sydney’s North West Rail Link (North West Rail Link 2012a, p. 10). Appropriate packaging, determined through market investigations, provides both a means to overcome concerns with the current market structure (discussed further in chapter 10) and to avoid excessive risk transfer to suppliers.

DRAFT RECOMMENDATION 11.8

For larger and more complex projects, government clients should pre-test the market to gain insights into possible savings from packaging the project into smaller components, reducing the level of risk borne by any one contractor, and promoting greater competition by relatively smaller construction companies.

An allied issue that could create unnecessary cost pressures relates to the information provided during the tender process that is used to price specific project risks (Consult Australia, sub. 23). If insufficient or incorrect information relating to project risk is provided tenderers may not be able to correctly price this risk and subsequently do so by adding a margin for the uncertainty involved (which is likely

to not reflect the true risk of the project). Systematic errors by government clients have meant that tenderers are required to undertake their own investigations to better ascertain the risks involved, generating inefficiencies due to the duplication of work. As raised by Lend Lease:

... the lack of and general quality of information provided by Principals at Tender goes directly to how Contractors assess and price risk. Principals must do more to provide accurate and robust information for Contractors to assess at tender. The results of not doing so are that the Contractor is forced to undertake its own investigations (which are not always possible); inconvenient to Principals and with four tenders pricing the works the costs to the market are four times that of the Principal undertaking the works. (sub. 46, pp. 38–9)

In such situations, each tenderer will also likely price in significant risk contingencies to their bids due to the uncertainties involved. Further, by not undertaking sufficient site investigations, government clients create information asymmetries against themselves as they are not a position to assess the veracity of the contingencies within the bids. Better site investigation, and a consultative approach through the tender process to avoid any further duplication in effort, can lead to significant savings in the contract price and ultimately the construction costs of infrastructure projects (box 11.1).

Better and more complete project plans (formed by more informed government clients as recommended in chapter 2), coupled with greater design input is likely to allow tenderers to better assess the risks of any given project. Further, government clients should seek to undertake the necessary due diligence on site conditions, such as any geotechnical works, which would otherwise be duplicated by each tenderer and thereby create unnecessary costs. Through this better planning, governments should also seek to provide more information on the actual risk responsibilities as set out in the final contract to tenderers earlier on in the process.

DRAFT RECOMMENDATION 11.9

Government clients should invest more in understanding the site risks for infrastructure projects and update the information provided to tenderers during the request for tender stage in consultation with potential contractors. In order to achieve this, government clients should not rush to market.

Box 11.1 Upfront investigations by the client are important

Undertaking detailed site investigations can lead to cost savings for both the client and contractor. Without detailed site investigations, each tender will be forced to undertake their own site investigations, leading to a duplication of activity. With compressed tender timeframes, these investigations are unlikely to be as detailed as would be required to make appropriate assessments of the likely risks involved with any given project. Therefore, tenderers will add a significant risk contingency to the bid price.

In such situations, as clients have not done sufficient investigations of their own, they will not be well placed to assess the risk contingencies as part of the bid and are likely to end up paying significant 'insurance premiums' which could have been avoided.

The Commission was provided an example of an instance where the client undertook detailed site investigations and saved significantly on risk contingencies paid to the successful tenderer. The process involved the site investigations being undertaken well in advance of the tender process, allowing potential contractors access to the information and sufficient time to initially price the risks involved.

Once the tender process progressed past the EOI stage, the client sought advice on whether the site investigations were sufficient for each tenderer to understand and price the risks involved. Each tenderer sought further information. The client then undertook further site investigations (instead of leaving it to each tenderer) based on the requests. Compared to past projects, the client reported that significant reductions in allowance for site risks formed part of the bids.

11.4 Do contracts provide incentives for cost minimisation throughout the build?

Once the successful tenderer has been identified, the operation of the contract will be important in determining the final costs of the project. Within contracts there are a number of provisions which are included to provide incentives for contractors to continually seek out options that will minimise the cost of the build. These can be broadly categorised into two:

- the allocation of who bears the risk of errors or events that can lead to higher costs and delays — risks are associated with mistakes in the design, weather, changes of mind, industrial action, and uncertain events (for example, unexpected discoveries in the geomorphology of an area or unexpected discoveries of artefacts such as fossils)
- incentive payments — rewards (or penalties, occasionally through the loss of bonds or liquidated damages) associated with delivering the project in a shorter timeframe, below bid costs or with less disruption to surrounding activities than anticipated.

There are numerous reports surrounding cost overruns from infrastructure projects. Some notable examples include the Epping to Chatswood rail line in Sydney, Melbourne's transport smartcard system (myki), and the National Broadband Network — the latter has an revised capital cost of \$55.9 billion above the \$37.4 billion in the original corporate plan (Evans and Peck 2011; NBN Co 2013, p. 35).

Internationally, Flyvbjerg (2009) suggests that cost overruns in the order of 50 to 100 per cent of budgeted costs are far from uncommon.

However, reports of cost escalation are usually based on the difference between budgeted costs at time of project announcement and the final cost at delivery. They therefore include any cost increases that result because of better project definition through the due diligence process and changes in the scope of projects. As such, they do not capture what occurs post contract signing — that is, how well the contracts are managed and whether some perform better than others.

Narrowing to project delivery, Auditor General reports prepared by some governments on infrastructure projects paint a different story to that of overall project cost overruns. In Western Australia, for example, for the top 20 non-residential capital works projects undertaken around 2012 representing \$6.2 billion in spending, 90 per cent of the cost variation of projects occurred during the evaluation phase (Office of the Auditor General Western Australia 2012, p. 22). That is, the major cost variation occurred between when the project was initially announced at an expected cost, to the point where more detailed investigations had been done in order to establish a business case for the project.

This highlights the importance of decision making arrangements as discussed in chapter 2.

The incentives and effects of risk allocation within contracts

Contracts allocate risks. This is important in providing incentives for contractors to minimise any unexpected costs that might arise during construction. However, at the same time, placing too much risk on contractors may be counterproductive if they are not well placed to manage that risk; or to price it, or bear it should the risk be realised. It can also promote an adversarial relationship between the client and constructor which can, in worst case situation, lead to costly litigation and disputes (Regan 2012).

The risk allocation under differing contracting arrangements vary considerably. In general, most design risk (errors or omissions in the design that lead to rework or

rebuild) under design and construct and construct only contracts is transferred to the constructor, with risks of changes in works scope the responsibility of the client. Alliance contracting arrangements are used where greater uncertainty exists and a collaborative approach is needed to determine who bears the risks, and how they are dealt with, when adverse circumstances arise.

Conceptually, it appears that in terms of risk sharing, contracts *prima facie* create the right incentives for cost minimisation for both parties. Contractors have an incentive to avoid variations due to errors/industrial issues and clients have to pay for changes of mind so bear the full cost of doing so. The cost of poorly investigated site risks generally rests with the client so incentives *should be* created for better due diligence up front. This is borne out from Western Australia's experience:

... projects can be, and often are, effectively controlled once realistic scope, cost and time parameters have been defined. (Office of the Auditor General Western Australia 2012, p. 6)

However, while at an conceptual level it would appear that effective arrangements are in place, evidence presented to the Commission throughout the inquiry suggest some areas warrant a closer look.

Contract type and post tender cost overruns

It is difficult to ascertain whether different forms of contract perform better than others. The choice of contract and project risk (and thus potential for cost overruns for any given set of management expertise) are interrelated. Where risks and uncertainties are higher, more complex contracting arrangements such as alliance models have been used. In areas where projects can be clearly defined, construct only contracts are more commonly used. For the area in between, there are a raft of different design and construct arrangements along with collaborative contracts.

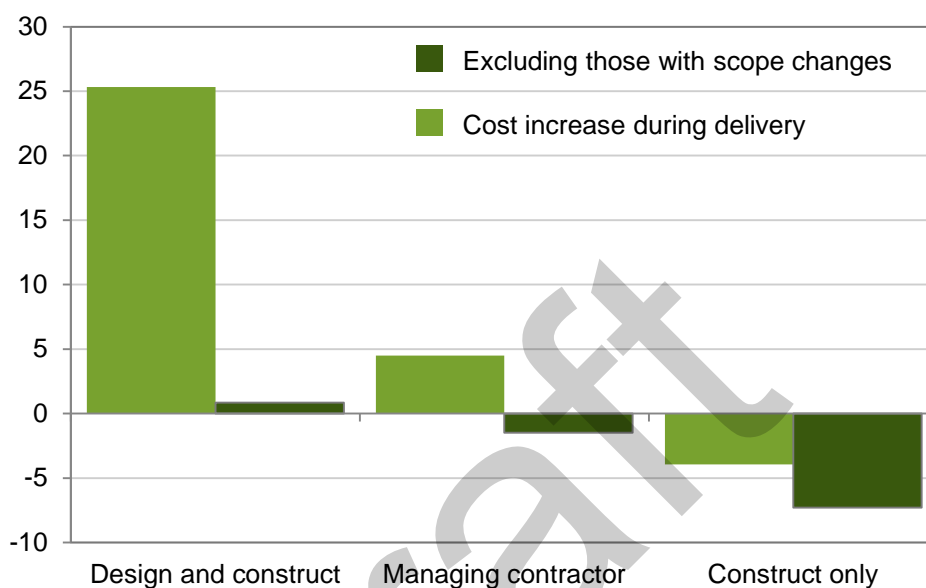
Available information suggests that contract type does not influence the potential for cost overruns. Information from the Western Australian audit of its major 20 infrastructure projects (Office of the Auditor General Western Australia 2012) show no clear relationship between contract type and cost overruns. Indeed, when changes in scope by the client are taken into account, all contract types perform similarly well or similarly badly (figure 11.6).

Similar results have been found for Victorian and other government infrastructure projects. In a benchmarking study of the delivery phase of infrastructure projects delivered by Major Projects Victoria and to those in the private sector and by other

state governments, Duffield and Xu (2010, p. 8) found that there was no statistical differences in contract outcomes due to contract type.¹⁹

Figure 11.6 Average cost increases during delivery for major projects in Western Australia by contract type

Per cent of expected cost at end of project definition phase



^a Costs where applicable for the 20 top non-residential public works construction projects evaluated by the Office of the Auditor General Western Australia.

Data source: Office of the Auditor General Western Australia (2012, pp. 34–73).

Ability of the client to assess claims

The effectiveness of the incentives to efficiently manage the risks allocated by a contract will be dependent on how well the clients can manage the project. Issues such as the ability to assess variation claims made by the contractor (and to identify scope changes on behalf of the constructor) are important. The Office of the Infrastructure Coordinator has claimed that the ability of governments to manage projects is poor:

Governments have not had a good track record of enforcing the risk allocation of design and construct contracts. Much of the necessary commercial expertise does not currently exist in the public sector to analyse and negotiate complex infrastructure transactions. Indeed, as highlighted by the Caravel Group, project governance team members often do not have the skills and capabilities to perform their roles. (sub. 78, p. 15)

¹⁹ The study examined traditional contracts (construct only and design and construct), alliance contracts and PPP delivery.

Similarly, a review of Major Projects Victoria by the Victorian Auditor-General found some areas of concern:

MPV [Major Projects Victoria] has a generally sound project management framework in place, which adopts most of the principles of better practice project management. However, MPV is not consistently applying the framework, or better practice principles, across its projects. ...

MPV does not have effective project oversight mechanisms in place that enable it to quality assure project management practices and learn from projects, and it does not have a sound understanding of the status of its projects at an organisational level. (Victorian Auditor-General 2012, pp. x–xi)

Others have also raised concerns (for example, Central NSW Councils, sub. 37, p. 6). In a survey of Engineers in 2010, the Australian National Engineering Taskforce (comprised of industry participants),²⁰ found concerns over the ability of government clients to effectively manage infrastructure projects. Examples from survey respondents stated:

Respondent 610:

As a government department, we moved from having a large in-house engineering workforce, to outsourcing most functions. We are now largely an administrative/management agency. However with that outsourcing we lost a lot of institutional knowledge and capability. We struggle to remain an informed client and are desperately trying to build technical expertise in key areas that cannot be met through the private sector. The current situation is inadequate to meet current demands, let alone provide a sustainable model to meet future demands. The organisation has not successfully tackled the issue of attraction and retention of engineers and allied technical personnel. ...

Respondent 510:

Technical expertise ... the organisation is no longer an informed purchaser. My employer does not value my technical skills and capabilities. My employer (a State Government agency) is now an uninformed purchaser of engineering goods and services ... this results in poor quality roads and bridges ... which then impacts on road safety. (ANET 2010, pp. 4–5)

The lack of management expertise by government clients has the potential to lead to gaming behaviour amongst contractors. A number of claims have been made surrounding the resulting behaviour of market participants. Some have claimed that contractors have deliberately ‘gamed’ the inability of government clients to enforce the risk allocation of a contract. McLeod Rail, for example, observed:

²⁰ The Australian National Engineering Taskforce is a coalition of Professionals Australia (previously known as APESMA), Engineers Australia, Consult Australia, the Deans of Engineering and the Academy of Technological Sciences and Engineering.

The Commissions' background paper refers to major project proponents underbidding, and poor contractual structures. In my observation, this is commonplace, but the adversarial approach of major Australian contractors is two-fold:

- Underbid the work, have opaque terms and conditions – then hit the client with as many variations as possible – one Tier 1 contractor allegedly has a whole team permanently assigned to manufacturing contractual disputes ... (sub. 49, p. 4)

If this were to hold, it would be expected that significant cost overruns would occur during the delivery phase of infrastructure projects. However, evidence on this is mixed.

Some studies have pointed to the presence of cost overruns during delivery phases. For projects managed under traditional contracting arrangements, Infrastructure Partnerships Australia (2007) found that between the contract signing and final turnout, government run infrastructure projects were on average around 15 per cent over contract price. The larger the project, the larger the cost overrun:

... while small value Traditional procurement projects tended to come in under-budget, higher value projects were generally completed over-budget and often by a significant margin. (IPA 2007, p. 22)

Other reports provide counter evidence. As discussed above, in Western Australia there is little evidence to support that significant cost overruns occur during project delivery — except in the case where government clients change the scope of the project. Some case study evidence also points to the enforcement of risk allocation within contracts by government clients. The Tasmanian Government, for example, successfully defended a design related variation in its Hagley and Westbury bypass project (Tasmanian Auditor-General 2009) (box 11.2). However, this came at significant cost.

Box 11.2 Tasmanian Hagley and Westbury bypass project

In 1998, the Tasmanian Department of Infrastructure, Energy and Resources appointed Leighton Contractors to design, construct and maintain (for 10 years) 13 kilometres of new highway at a cost of \$24.6 million. The contract specified for a section of highway to be cut-in.

Leighton's winning concept drawings included the cut-in requirement, however, the detailed designs had this section of road above ground. When the Tasmanian Government become aware that the road was being above ground, they contacted Leighton and requested the road be built in accordance with the initial specifications. Leighton subsequently claimed this constituted a variation and argued for an extension of time and payment for additional costs.

The case went to court and subsequently become Tasmania's longest running civil court case. The State eventually won the case.

Source: Tasmanian Auditor-General (2009, pp. 26–27).

However, the presence of cost overruns may not suggest that government clients are relative poor project managers compared to their peers. Work conducted by the University of Melbourne for Major Projects Victoria (Duffield and Xu 2010; Duffield 2009) suggest that government clients manage projects with similar performance to private sector clients. For projects conducted between 2006 and 2010, government clients were able to achieve better outcomes, in terms of lower cost and time overruns, than those seen in the private sector (table 11.1). Further, for the interstate projects examined, the average cost overruns were found to be (statistically) significantly lower than the outcomes from private sector projects. Cost overruns were defined as the difference between the cost at contract signing versus the final cost (therefore not including any change in budgeted costs from inception to tender), and time overruns based on differences between the completion date at contract signing and actual completion date.

Despite these findings, the Victorian Auditor-General (2012) found that for almost all projects for which Major Projects Victoria supplied data during its audit, cost overruns were experienced during the delivery phase. For the 14 projects examined, cost overruns averaged close to 14 per cent. The distribution of projects based on the criteria in table 11.1 also differed (figure 11.7). Victorian Auditor-General also queried the accuracy of the data supplied by Major Projects Victoria to the University of Melbourne on which they based their analysis. Based on the figures supplied to the Victorian Auditor-General, the distribution of project outcomes is worse than that observed for the private sector in the Duffield and Xu (2010) study.

Table 11.1 Delivery performance of government and privately managed projects

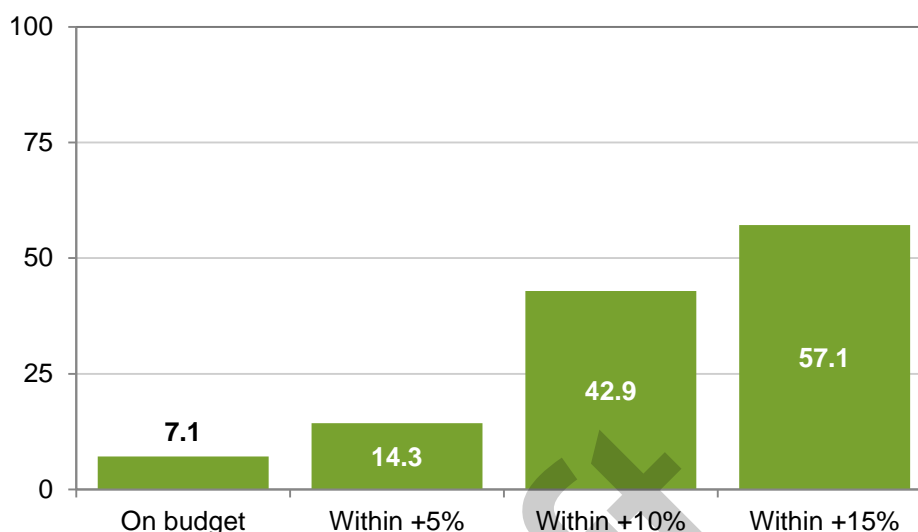
Per cent of project sample completed within criteria

<i>Criteria</i>	<i>Victoria</i>	<i>Other state</i>	<i>Private</i>
<i>Budget performance</i>			
Within original contract sum	26.9	48.1	17.1
Within +5% of original contract sum	46.2	70.4	48.6
Within +10% of original contract sum	57.7	81.5	65.7
Within +15% of original contract sum	73.1	85.2	77.1
<i>Time performance</i>			
Within original contract time	63.3	75.0	31.3
Within +5% of original contract time	73.3	79.2	56.3
Within +10% of original contract time	76.7	83.3	68.8
Within +15% of original contract time	80.0	83.3	68.8

^a For projects conducted between 2006 and 2010. The sample for budget performance consisted of 26 Victorian, 27 other state and 35 private projects. The sample for time performance consisted of 30 Victorian, 24 other state and 16 private projects.

Source: Duffield and Xu (2010, p. 12).

Figure 11.7 Cost overruns for projects delivered by Major Projects Victoria
Per cent of projects examined (cumulative)



^a Based on the analysis of 14 projects conducted between 2000 and 2009.

Data source: Victorian Auditor-General (2012, pp. 38–9).

Attempts to assess whether the infrastructure was delivered at least cost through comparisons of cost overruns, however, are not possible. It is unclear why the projects examined in the Duffield and Xu (2010) study managed by private sector clients were less likely to achieve the costs set out in the contract. It is possible that the differences are explained by differences in risk sharing arrangements. Private sector clients may be more willing to take on certain risks associated with design errors or materials costs and therefore be more likely to face cost increases throughout the delivery phase stemming from variations. As such, the final cost of a similar project procured by a government or a private client could be the same irrespective of one having no ‘cost overrun’ compared to the other.

Time overruns are also common for both public and private sector clients. As for costs, evidence on the relative performance of each is mixed. The Duffield and Xu (2010) suggests that government clients generally perform better than their private sector counterparts (table 11.1). However, as with the cost data, at least for Victoria, investigations by the Victorian Auditor-General (2012) cast some shadows over the accuracy of the data used in making these assessments.

INFORMATION REQUEST 11.1

The Commission seeks evidence on the skills of public sector clients to manage contracts for major infrastructure projects. Is there evidence that a relative lack of skills has led to systematic cost overruns during the delivery phase? How does this compare to the performance of private sector clients?

Governments have already taken steps to learn from past mistakes and develop best practice approaches to ensure least-cost delivery of infrastructure projects. The Department of Infrastructure and Transport in 2012 released a best practice guide for infrastructure planning and delivery for governments (Department of Infrastructure and Transport 2012a). This guide highlighted that best practice approaches could be found across different contracting approaches and governments.

Scope for greater use of special purpose agencies

The establishment of specialised agencies to procure and manage the delivery of infrastructure projects provides one means to overcome concerns over a lack of public sector procurement and project management skills. Such agencies also provide a means to retain such skills.

Some state governments have already established such bodies for either general or more specialised infrastructure procurement. Existing examples include the Linking Melbourne Authority, Major Projects Victoria and Queensland's Local Government Infrastructure Services (LGIS) (box 11.3). In some cases, the established body is the client, in others, the agencies provides advice and administrative support including project management.

Box 11.3 Queensland's Local Government Infrastructure Services

Queensland's Local Government Infrastructure Services (LGIS) began operation in 2005. It brings together expertise from Queensland Treasury Corporation and the Local Government Association of Queensland.

Established as an infrastructure services company, it seeks to help local governments (and the state if needed) in developing, procuring (through advice and tender administration) and managing the delivery of infrastructure. Its capacity is sufficient to work across local government boundaries and assist councils to procure infrastructure at a systematically lower cost.

Source: LGIS (2014).

Such agencies pool procurement from either a number of different government client types (such as Major Projects Victoria and the LGIS), or deliver an ongoing stream of similar infrastructure development (such as the Linking Melbourne Authority), they provide an opportunity for knowledge and expertise to be accumulated.

But there are also other means. Government clients could instead set up specialist transient agencies which 'bring-in' required skills for particular projects. An example of this is North West Rail Link which has been established to oversee the

project development and procurement of Sydney's rail extension. Victoria has also done something similar with the Regional Rail Link.

The relative merits of both approaches are worth further exploration. As such models already exist, the collection of data for benchmarking purposes (draft recommendation 8.2), plus the addition of information on procurement (draft recommendation 11.4) should provide governments with information as to assess the effectiveness of such approaches.

While such agencies have the potential to improve the skill base of government clients in procuring public infrastructure (de Valence, sub. 16), it is likely that any benefits would not materialise unless these agencies are provided with sufficient time to properly scope and procure infrastructure investments. Pressure to 'rush to market' after an announcement could simply lead to the repetition of past mistakes.

INFORMATION REQUEST 11.2

The Commission seeks evidence on the potential benefits of creating special-purpose agencies in each jurisdiction to conduct infrastructure procurement on behalf of government clients that do not frequently procure infrastructure or where combined purchases across a range of government might lead to savings.

Incentive payments

Government clients often include incentive payments within their contracts to encourage contractors to seek innovations throughout the build that lower costs, shorten delivery time frames or reduce the disruption caused by the work (generally measures as improvements against key performance indicators). These allow contractors to share in any savings made and, as they represent additional profits for the contractor, can significantly influence returns and therefore provide strong incentives for better performance. When in place, such contracts generally require an 'open book' approach to actual costs, where the contractor provides data on the actual costs incurred over which an agreed premium is paid.

Incentives payments are seen to compliment penalties that exist in most contracts related to non-performance, usually in the form of liquidated damages. Penalties seek to ensure that the agreed contract performance is met, but they do not provide an incentive for constructors to better that performance beyond any ability to reduce their own delivery costs.

The use of incentive payments, however, has been raised as an unnecessary component of a contract. For example a report into contracting found industry concerns in this regard:

Incentives and bonuses do not change contractor behaviour. Clients manufacture incentives and bonuses to feel more comfortable that they can influence delivery. If we are providing a client our top people with the aim of producing a top quality project for a fair price, then I don't know why clients need to offer 'incentives or bonuses' to get a great outcome. UK Contractor, October 2012.

The Industry has changed over the years. We work to the highest professional standards and with integrity. Clients do not need to provide us with incentives to deliver on our contractual obligations in full and to the quality and performance levels specified and promised in our tender response. Instead of incentives, Clients should ask bidders to nominate a percentage of their margin to put at risk for non-performance. We certainly would be happy to do this. Australian Contractor, April 2013. (Department of Infrastructure and Transport 2013, p. 11)

It has been suggested that incentive payments should only be used where extraordinary performance is required. Repeat relationships which characterise this market would also support the idea that such payment are unnecessary and may even be counterproductive in terms of the trust relationship between the two parties.

However, those in support of incentive payments suggest that they represent a means for contracts to encourage better performance. When used in conjunction with relationship contracts (such as alliance and managing contractor arrangements), incentive payments based on a sharing of any savings from reduced costs and/or timeframes can, from a theoretical perspective, provide:

... mechanisms for sharing the benefits of innovation and new technology. In collaborative contracting, the risk and reward sharing formula encourages full disclosure, innovation and a joint approach to resolving problems at the least cost. (Regan 2012, p. 63)

As with the choice of different forms of contracting, it is likely that the use of incentive payments should be decided upon on a case-by-case basis, depending on the risks and complexity of a project.

INFORMATION REQUEST 11.3

The Commission seeks evidence on the appropriateness and effectiveness of the application of incentive payments within infrastructure contracts.

12 Industrial relations

Key points

The industrial relations environment in construction has long been seen as problematic, with greater than average levels of disputes, concerns about excessive union control of work sites, unlawful conduct and expedient deals between head contractors and unions to buy industrial relations peace.

However:

- most stakeholders did not raise industrial relations issues as a major source of cost pressures, though most argued for the re-creation of the Australian Building and Construction Commission to address unlawful conduct by unions and others in the industry. Industrial relations issues appeared to be much greater in building than civil construction, as also revealed by the record of penalties imposed on unions
- days lost per employee are higher in construction than in most other industries, but are still very low by historical standards
- unionisation continues to fall
- the timing of higher productivity growth rates in the construction industry at the *aggregate* level do not appear to coincide strongly with the tougher industrial relations regimes that commenced with the establishment of the Building Industry Taskforce
- labour earnings growth seems more likely to reflect labour shortages than growing union bargaining power.

Nevertheless, a significant sample of enterprise bargaining agreements reveals inexplicable variations in terms and conditions, potentially excessive powers for some union officials and constraints on workplace flexibility that are inimical to productivity.

Similarly, cases prosecuted by the Australian Building and Construction Commission and Fair Work Building and Construction reveal widespread unlawful conduct and adverse industrial relations cultures.

The adoption of building code guidelines that can disqualify contractors from tendering for public infrastructure projects if they have engaged in prior unlawful conduct or mismanaged their industrial relations is likely to significantly improve the workplace relations environment, reduce industrial disputes and avoid excessively generous enterprise bargaining agreements. This would also apply to 'sweetheart' deals between unions and head contractors.

There are grounds to experiment with greater penalties for unlawful conduct.

Minimising any barriers to entry to second tier construction businesses would undermine the capacity for overt or covert sweetheart deals by other head contractors.

The industrial relations (IR) environment in construction has a long and unfortunate history of unlawful behaviour by employers and unions, poor work practices, adversarial relationships, excessive control of aspects of project sites by union officials, and the use of occupational health and safety obligations as a vehicle for disruption and undue leverage. A succession of reviews from the 1990s to the present suggests that the problems are endemic and persistent, though varying in their severity and prevalence across what is a diverse sector.

The peculiar problems besetting IR in construction arise from more than an unfortunate history and culture, but also the market structure of the industry. Head contractors with small workforces orchestrate the IR environment on project sites, even though they have no long-run relationship with the bulk of workers on those sites.

This chapter is concerned with the degree to which the conduct of employers, employees, unions and others in workplaces has affected costs and productivity. It aims to identify any systemic flaws of the IR system as it relates to construction, and the measures that could correct these. The chapter considers both Australian Government and state and territory arrangements.

IR outcomes reflect not only the laws and institutions comprising the IR system but also the competencies and ‘cultures’ of the various bargaining parties. Many stakeholders told the Commission that, at the project level, workplace relations were often a reflection of the attitudes and capabilities of the people negotiating with each other as much as a consequence of IR law and institutions. Accordingly, to the extent possible, this chapter considers variations in behaviours across different jurisdictions, construction project types and unions.

This chapter’s scope does not extend to consideration of the functioning of the IR system as a whole, except in so far as it relates directly to the costs and cost structures of the relevant parts of the construction industry. Nor does this chapter undertake a forensic ‘line by line’ analysis of the potential statutory powers of any new construction industry IR regulator, given that this has been the subject of one completed review and is being further scrutinised by the Senate Education and Employment References Committee (with a reporting date in March 2014).

Moreover, the preoccupation of this chapter is on public infrastructure projects and not on IR issues in commercial or residential building construction. However, data inadequacies sometimes make it difficult to disentangle IR issues affecting different segments of the industry. In addition, the segments often use common inputs, such as cement contractors and quarries, and involve common employers and unions. The behaviour of parties in one part of the industry may also be relevant for

bargaining arrangements and behaviour in other parts of the industry given that power demonstrated by parties in one project provides signals about the behaviours they could adopt in other projects.

The chapter considers these issues by examining:

- the scope of IR (section 12.1)
- the main features of IR arrangements in the construction industry (section 12.2). These arrangements can strongly influence the conduct of negotiating parties. Most recently, a decision by the Federal Court of Australia²¹ has increased the capacity for governments to use building code guidelines to shape the IR environment for projects in which the government is a contracting party. There is also a process in train to re-establish the ABCC
- the framework for understanding the role of IR in costs and productivity in the construction industry, including the degree to which the characteristics of the construction industry lead reasonably to an industry-specific approach (sections 12.3 and 12.4)
- the micro impacts — the practices adopted by the various parties in their dealing with each other, and how these may affect costs and productivity at the project level (section 12.5)
- the evidence of the aggregate industrywide impacts of the IR regime on wages, costs and productivity (section 12.6)
- the scope to improve the IR environment for the construction of infrastructure (section 12.7).

12.1 What is industrial relations?

There are many definitions and ways of conceptualising IR (or, its associated terms, ‘labour relations’ and ‘workplace relations’). In this report, the Commission defines it as a system — a complex array of laws, regulations, conduct, norms, actors and institutions. This system determines the relative pecuniary and non-pecuniary returns of the various actors, and their roles, power and behaviour in the workplace.

IR issues need not, and ideally should not, be combative. For example, employers and unions may negotiate better employee conditions in exchange for productivity benefits and flexibility, sharing in the rewards of innovation and new work practices.

²¹ *State of Victoria v Construction, Forestry, Mining and Energy Union* [2013] FCAFC 160.

However, in the policy arena, the issue of IR and its reform most commonly arises where the outcomes or conduct are perceived as unlawful, unfair, unsafe or inefficient. In that instance, different dispute resolution processes, regulations, laws, institutions, enforcement arrangements and education may act to restore balance.

12.2 Industrial relations in the Australian construction sector

A history of profound concern

The impact of the IR environment on the cost, productivity and performance of the construction industry has long been perceived as important. Persistent IR problems in the industry contributed to the creation in the mid-2000s of unique statutory provisions and institutional arrangements to govern IR in the industry (box 12.1).

In 1982, the National Construction Industry Conference argued that IR problems were a major issue facing the industry (IC 1991, p. 67). Participants in the Industry Commission's 1991 inquiry into construction costs considered that the IR system was an important driver of costs at that time (IC 1991), as did the 1992 Gyles Royal Commission into productivity in the building industry in New South Wales (Gyles 1992).

While the IR environment had changed by the late 1990s, the concerns had not evaporated. The Productivity Commission's 1999 review of major building projects still found inefficient work practices and impediments to innovation (PC 1999). The 2003 Cole Royal Commission was more severe in its judgment. It identified weak IR management by businesses, inadequate attention to occupational health and safety issues, poor work practices, and unlawful union behaviours in the construction industry. Among other consequences, it considered that these increased costs and reduced productivity.

The Cole report gave impetus to industry-specific regulatory arrangements (box 12.1 and Williams and McGarrity 2008). Since late 2002, the IR arrangements of the industry have been oversighted by three successive specialist regulatory agencies — the Building Industry Taskforce (BIT), the Australian Building and Construction Commission (ABCC) and Fair Work Building and Construction (FWBC) — each with investigative and regulatory powers greater than those available in the generic IR system.

The Wilcox report in 2009 considered that poor work practices and industrial unlawfulness had persisted in the industry, particularly in some states.

Box 12.1 The key recent milestones in IR policy for the construction industry

2001–2003: Cole Royal Commission

The Cole Royal Commission into the Building and Construction Industry was established in August 2001 and tabled its final report in March 2003. The Royal Commission found that the building and construction industry was characterised by a widespread disregard for the law, outlining over 100 types of unlawful and inappropriate conduct. The Commission also found that existing regulatory bodies had insufficient powers and resources to enforce the law.

2002–2005: Building Industry Taskforce (BIT)

Following the preliminary report of the Royal Commission, the taskforce was established on 1 October 2002 as an interim body to enforce the law in the industry prior to the establishment of the national agency envisaged by the Cole Report. In March 2004, the Interim Taskforce became a permanent taskforce, operating until the establishment of the Office of the Australian Building and Construction Commissioner in October 2005. It possessed significant investigative and regulatory powers.

2005–2012: Office of the Australian Building and Construction Commissioner

The *Building and Construction Industry Improvement Act 2005* (Cth) (BCII Act) established the Australian Building and Construction Commission (ABCC) as an independent statutory authority. The ABCC commenced operations on 1 October 2005, and similar powers to its predecessor.

2009: The Wilcox Report

The Australian Government requested Justice Murray Wilcox to design a replacement for the ABCC. The Wilcox Report made recommendations on the structure and powers of the new specialist body. It was submitted to the Australian Government on 31 March 2009 and released publicly on 3 April 2009.

2009: The Fair Work Act 2009 (Cth) (FWA)

From 1 July 2009, the FWA replaced the *Workplace Relations Act 1996* (Cth). The FWA is the principal extant legislation for workplace relations laws in Australia and includes rules on the terms and conditions of employment, rights and responsibilities of employees and employers, and compliance and enforcement rules. The FWA combined the government agencies that administered the workplace relations system into two new regulatory bodies, the Fair Work Commission (FWC) and the Fair Work Ombudsman (FWO).

2012: Fair Work Building and Construction (FWBC)

From 1 June 2012, another specialist regulator, FWBC, replaced the ABCC as the building industry regulator. It had generally weaker powers.

The *Building and Construction Industry (Improving Productivity) Bill 2013*, presently before Parliament would, if enacted, re-establish the former ABCC.

The Australian Government announced a Royal Commission into Trade Union Governance and Corruption in February 2014.

Source: FWBC (2014a).

Business group submissions made to the Senate Education and Employment Legislation Committee in late 2013 alleged that work practices and industrial unrest were still problematic in the industry, and that these had raised costs and lowered productivity. They considered that the situation had worsened following the replacement of the ABCC with a weaker regulator, FWBC. Submissions to this inquiry have made similar observations (sections 12.5 and 12.6).

In February 2014, the Australian Government announced a Royal Commission into trade union governance and corruption generally, but with specific concerns raised about ‘recent allegations of corrupt behaviour, unlawful kickbacks and standover tactics in the construction industry’.²² The Royal Commission will also consider unlawful conduct by employers.

Some groups, particularly the union movement, have questioned the degree to which poor work practices and industrial unrest have been prevalent, their impacts on costs and productivity, and the justification for IR arrangements specific to the construction industry. Unions, political parties, academics and others have also contested the nature and reach of the construction IR regime and its regulator (O’Neill 2003).

Moreover, to put the issues in context, unlawful conduct and poor practices in the construction industry are not peculiar to conduct by unions, but can also consist of conduct by public officials and businesses outside the IR system, such as collusion, bribery, sham contracting, and billing for unperformed work. Nor are the issues of corruption, with or without union involvement, peculiar to Australia. For example, a recent investigation in the United Kingdom found that one third of construction professionals had been offered a bribe (CIOB 2013, p. 15). In Canada, there is currently a public inquiry into corruption in the Quebec construction industry (The Commission of Inquiry on the Awarding and Management of Public Contracts in the Construction Industry). The United States has a long history of corruption in the construction industry, with vestiges of these problems surviving in certain union racketeering cases before the courts (Fairbanks 2014). The effects of such corruption in the construction industry are uncertain. But it is the nature of the sector in Australia and elsewhere, particularly the large amounts of money at stake from winning tenders and from forming relationships between disparate parties in the industry, that attract criminal elements.

²² Joint Press Release by the Prime Minister, Minister for Employment and the Attorney-General, 10 February 2014.

IR arrangements for the construction industry at the Australian Government level

Since the mid-1990s, IR arrangements in the construction industry have diverged from those applying to most other industries, though the degree of their divergence has fluctuated over time (AIG and Australian Constructors Association 2013).²³

Fair Work Building and Construction and the laws it enforces

The institution for enforcing Commonwealth workplace relations legislation in the building and construction industry is the Fair Work Building Industry Inspectorate, known as Fair Work Building and Construction (FWBC). Its roles relate only to ‘building work’, but this refers to buildings and to other civil engineering, such as rail, road, and airport and port infrastructure, including their maintenance (but excluding mines and single dwellings).²⁴ FWBC is an independent statutory authority and was established in mid-2012, replacing the previous construction-specific regulator, the ABCC. FWBC has significant resources, employing around 150 staff and with an annual budget of around \$30 million.

In addition to its roles in occupational health and safety and its information provision functions, FWBC has extensive powers to investigate compliance with workplace legislative instruments, principally the *Fair Work Act 2009* (Cth) (the FWA), the *Building Code 2013* (Cth) and the *Independent Contractors Act 2006* (Cth). For example, it can investigate sham contracting, the use of phoenix companies and unlawful industrial disputes and associated conduct. The FWBC has incomplete jurisdiction over Western Australia since its government has not referred its IR powers to the Commonwealth. In practical terms, this makes little difference as all corporations and their employees are covered.

FWBC can take matters to court or refer them to other enforcement agencies. Its own enforcement powers relate only to civil matters (as did the ABCC). Up until February 2014, the ABCC/FWBC had formally referred 21 matters to the State or Federal Police.

Data on FWBC’s investigations and court actions suggest that it has commonly found breaches by employers as well as employees (or their nominated agents). In

²³ With previous exceptions being legislation in relation to the coal industry and airline pilots (EWR&ERC 2004, p. xv).

²⁴ Putting aside the transitional Act used to dissolve the ABCC and to create the FWBC, the functions of the FWBC are set out in the *Fair Work (Building Industry) Act 2012* (Cth) (FWBIA).

2012-13, out of just over 1100 investigations, its four main areas of investigation related to recovering employees' wages and entitlements (31 per cent), freedom of association (13 per cent), coercion (13 per cent) and unprotected industrial action (12 per cent). Most investigations have not resulted in actions before the courts. In 2012-13, there were 13 cases before the courts under the FWA, which involved unlawful industrial action (4), wages and entitlements (4), coercion (3), sham contracting (1) and adverse action (1) (FWBC 2013a, pp. 29, 38–39).

The shift from the ABCC to the FWBC was associated with the greater alignment of the workplace arrangements for the construction industry with those of other industries, although some unique features were retained. The re-orientation followed the 2009 Wilcox review (Wilcox 2009). The shift reduced the powers of the regulator in three major ways. (Construction industry stakeholders have varying views about the desirability of the changes.)

First, penalties for unlawful conduct by employees, unions and employers were reduced by two thirds to be consistent with the penalty regime under the FWA (MBA 2013, p. 4). Under current arrangements, the maximum penalty for a given breach is \$10 200 for an individual and \$51 000 for a corporation (FWBC 2013b). Overall fines may be much greater if there is more than one breach or if a party does not obey a court order (as has occurred). In 2012-13, the total penalties imposed were around \$800 000 (FWBC 2013a, p. 37). This is a relatively small amount compared with the resources of unions and employers, with uncertain impacts on the economic incentives for compliance with the law.

Second, although the FWBC's coercive powers are greater than those applying in the generic IR regime, they are more constrained than those of the ABCC. The ABCC could unilaterally compel any person to provide information regarding an alleged contravention of the law.²⁵ It has been suggested to the Commission that, in many cases, parties quietly urged the ABCC to use its examination powers so that their disclosures would not be seen as those made by a willing informer. The easier and quieter the process, the more willing a party would be to disclose in this way. In contrast, FWBC must go through the Administrative Appeals Tribunal, which must test, among other things, that the notice is well founded. FWBC must notify the Commonwealth Ombudsman of any notice issued (though the Ombudsman cannot overturn a notice). The provision has been rarely used by the agency (FWBC 2013a, p. 35). In 2012-13, FWBC applied for, and was successful in issuing, two notices (for a single investigation). By contrast, the ABCC exercised its compulsory

²⁵ The substantial contrasts between the two arrangements are set out under s. 52 of the *Building and Construction Industry Improvement Act 2005* (Cth) when the ABCC was the regulator, and under Division 3 of the FWBIA when the FWBC became the regulator.

examination notices around 30 times per year over its life (Hadgkiss 2013, p. 4). The difference might also reflect the changing institution's culture and leadership, and not just its capacity to exercise power. In fact, the issue of notices dropped significantly after 2009-10, even though the ABCC was still in place and possessed the same statutory powers (Independent Economics 2013, p. 10).

Finally, where parties were involved in civil litigation and have settled the matter, FWBC must not pursue any further litigation on that matter, even if *prima facie*, there has been a breach of the law (s. 73 of the FWBIA). This raises the risk that, while unlawful, one party could bring tacit pressure on another party to force a settlement, thus avoiding court scrutiny of the original matter. On the other hand, there is a general principle that it is usually better that private parties accommodate their differences with the least involvement of courts. Moreover, it is not clear that s. 73 has been invoked to any great extent.

The Australian Government has proposed a bill that would again widen the differences between the construction-specific and generic IR arrangements (box 12.1).

The Building Code 2013 (the 'Code')

The *Building Code 2013* is a national construction code that exploits the power of the Australian Government to limit its procurement to businesses with 'model' workplace relations arrangements. It applies to those construction businesses that lodge expressions of interest or tender for projects where the Commonwealth provides funding (subject to varying thresholds).²⁶ Once a contractor is subject to the Code, they are required to comply with it for all building projects, even those that are funded privately. Most large Australian construction businesses have been involved with projects that would require them to meet the Code if they wished to tender for future Commonwealth projects.

The Code should not be mistaken for a technical code about construction standards, engineering or planning processes. Its role is purely to use government procurement as a carrot and stick for improved workplace relations and workplace health and safety (WHS).

²⁶ The Code does not stand alone. It codifies IR and WHS obligations contained in the *Fair Work (Building Industry) Act 2012* (Cth) and generic IR law, principally the *Fair Work Act 2009* (Cth). The Code applies to all building work indirectly funded by the Commonwealth where the value of the contribution (a) is at least \$5 million *and* represents at least 50 per cent of the total construction project value; or (b) at least 10 million. It includes BOOT, BOO and PPP projects as well as conventional projects. It applies to all projects (regardless of size) where the Commonwealth has direct financial and administrative involvement.

Among many things, the Code specifies that conduct by a business is noncompliant if there were:

- (i) any explicit or tacit requirements by a building constructor or other building industry participant concerning subcontractors' or suppliers' choices about workplace arrangements or wages and conditions. For example, this could include requirements for subcontractors to pay over-award wages or to provide superannuation or redundancy insurance payments to a particular fund
- (ii) any barriers to freedom of association (so that it would be a matter of choice for a worker to join a union, be represented by it or participate in any lawful industrial activities), so that there is no discrimination against union delegates, union members or non-members
- (iii) 'no ticket, no start' signs displayed (which would imply, in contravention of the freedom of association, that workers must be in a union to perform work on a site)
- (iv) 'show card' days (where a person must show whether they are a member of a union)
- (v) any requirements for a contractor, subcontractor or employer to employ a non-working shop steward or job delegate; or hire an individual nominated by a union (though a consenting supplier could do this if they wished)
- (vi) any barriers to the lawful right of entry by a union official or other permit holder (subject to a variety of additional state, territory, and other Australian Government provisions)
- (vii) any undue influences — either through the tendering process or otherwise — on subcontractors or suppliers to have particular workplace arrangements in place.

FWBC is responsible for monitoring compliance and investigating breaches. It can refer a matter to the Code Monitoring Group (comprising senior officials from several departments), which can impose various sanctions from formal warnings to preclusion of a party from tendering for Commonwealth funded projects for up to six months. Where FWBC finds a breach of the FWA, it can also proceed with litigation.

Construction-industry specific arrangements at the state and territory level

State and territory governments also play a role in IR regulation and have their own workplace legislation (though where there are any inconsistencies with Commonwealth law, the FWA takes precedence).

However, the most powerful instruments for state influence of workplace relations are various codes (and, most importantly, their associated guidelines) that link state and territory government procurement above given monetary thresholds to contractors' workplace arrangements.

The most influential of the codes is the *Victorian Code of Practice 1999*, and particularly the implementation guidelines that the Victorian Government released in 2012 (Victorian Department of Infrastructure 1999; Vic DTF 2013b). The guidelines:

- set out a more stringent and clearly defined (indeed, highly prescriptive) set of requirements on contractors, unions and other building industry participants than the national code
- are directed at maximising productivity and reducing cost and time overruns in publicly-procured projects
- have been tested in the Federal Court for their validity against the background of the Australian Government's IR legislation (see later).

The Victorian Code is overseen by the Construction Code Compliance Unit within the Victorian Department of Treasury and Finance — a body similar in role to the FWBC (and indeed until recently, headed by the person who was appointed as the director of the FWBC in October 2013).

Some of the prescriptive features of the Victorian code are:

- specification that provisions in industrial instruments or contracts should not require, or have the effect of coercing or pressuring, a group apprenticeship scheme
- the prohibition of the imposition, or attempted imposition, of a requirement for a contractor to apply project-specific wages and conditions
- the prohibition of clauses that prescribe the number of employees that an employer may engage on a particular site, work area or in the business as a whole
- the prohibition of restrictions on labour. For example, an industrial instrument must not include provisions that require an employer to consult or seek the

approval of a union over the number, source, type (for example casual, contract) or payment of labour required by the employer

- that a tenderer provide a Workplace Relations Management Plan (WRMP) that, among a host of other things, sets out the contractor's: way of regulating workplace arrangements; selection procedures for workers (for example, in relation to reference checks); approach to management of inclement weather and heat; approaches to relationship management with employees and unions; and identification of IR risks. The Plan also requires contractors to demonstrate that they have a track record of delivering projects on time and within budget (or indicate the actions they have taken that would make them able to do so in the future). If the contractor is the successful tenderer, it must comply with its WRMP.

Quite apart from their effects on workplace relations, WRMPs also specify how the tenderer will measure and report labour productivity and performance. If coordinated among jurisdictions, this will go some way to addressing the current limitations in data on costs and productivity at the project level (chapters 8 and 9).

Some other jurisdictions, most notably New South Wales and Queensland, have drawn on the Victorian Code and Guidelines with the goal of lowering procurement costs (NSW Government 2013; Qld DoJ 2013).

As discussed later, the existence of multiple state and Commonwealth IR law, codes and guidelines have led to confusion and litigation. The early (but now overturned) cases won by the Construction, Forestry, Mining and Energy Union (CFMEU) before the Federal Court led the Victorian and New South Wales Governments to issue 'practice directions'. These prevented the application of their guidelines to enterprise agreements that had been approved by the Fair Work Commission (Vic DTF 2013a; Herbert Smith Freehills 2014). This avoided concerns about any potential inconsistencies between the guidelines and the FWA arising from the initial Federal Court case. However, the full bench of the Federal Court has subsequently found in favour of the legitimacy of actions taken by the Victorian Government under its guidelines. Yet, as of mid-February 2014, the practice directions have not been withdrawn, thus negating the potential impacts of the guidelines.

12.3 A framework for understanding the role of industrial relations in construction

It is important to understand several facets of the IR system in construction that affect industrial unrest, costs and productivity.

Contracting practices and market structure influence the industrial relations environment

Unlike most industries, public infrastructure projects typically involve a head contractor (which may involve a consortium of major construction companies) that does not have a large permanent workforce, but instead supervises a large number of subcontractors to deliver a project. Subcontractors often perform 80 to 90 per cent of the total work value of a project.²⁷

This employment and contracting model reflects that construction demand is cyclical and that major public infrastructure projects are site-specific and often require different skill mixes from project to project or at different phases of the project. In that context, it is more efficient for a head contractor to manage a site and engage subcontractors on a project-specific basis rather than risk carrying capital equipment or personnel that may be underutilised when the contractor does not win bids.

While this model entails some efficiencies, it can affect the IR environment in multiple ways.

Fleeting relationships and diffuse employment arrangements

Prime contractors and subcontractors employ some of their own workers on a permanent basis, but workers from labour hire firms and individual independent subcontractors (or own account workers) are an important source of labour in construction. The common absence of a permanent relationship between the head contractor and the personnel working for the subcontractors engaged on a project may undermine the capacity for loyalty between the parties.

In 2012, the prevalence of independent contractors was higher in construction (29 per cent) than in all other industries (which averaged 8.5 per cent).²⁸ After

²⁷ While this figure is from a dated study (Hampson and Kwok 1997), the Commission understands that this is still the norm.

²⁸ ABS 2013, *Forms of Employment*, November 2012, Cat. No. 6359, 19 April.

taking into account other forms of employment, only 62 per cent of workers in the industry were classified as employees. Independent contractors typically invoice for their costs, rather than receive wages. They would not usually have the same benefits as employees covered by enterprise agreements. Independent contractors and workers covered by labour hire firms typically have low union coverage and there is sometimes an impression that these employment forms are deliberately used by employers to reduce union presence or dilute benefits (ABCC 2010, pp. 34–35).

Given this, depending on whether and what type of agreement is struck at the project site, employees of different subcontractors working on the same site may receive different wages and conditions. Wage flexibility may suit some contractors, for example as a basis for securing a temporary job between longer-term jobs (Mazzotta 2007, p. 6). Nevertheless, any substantive variations provide, on the one hand, the fuel for industrial unrest or create, on the other, the incentives for workplace agreements that seek to establish common conditions across subcontractors even if these are not efficient (PC 1999). In negotiating any such agreements, employers may place greatest emphasis on the terms and conditions of employment for the current project, but neglect the long-term implications for wages and conditions of subsequent projects or for other employers.

Sham contracting is a risk

As employment arrangements are sometimes ill-defined, the industry is more subject to ‘sham’ contracting. Sham contracting ‘involves misrepresenting or disguising an employment relationship as one involving a principal and contractor under a contract for services’, which is unlawful under the *Fair Work Act 2009* (Cth) (ABCC 2010, p. 3).

Regardless of the degree to which sham contracting might sometimes incidentally be characterised as an efficient arrangement that mitigates the inflexibilities in employment relations in the industry,²⁹ it is nevertheless misleading, represents a breach of the law and involves reduced entitlements for workers (although in some cases, there are tax advantages for such workers). The employees affected by sham arrangements are treated like contractors and would generally have no entitlement to paid leave, minimum award wages and conditions, employee-paid superannuation and workers’ compensation insurance (DIIS RTE 2012). The employer pays no payroll tax.

²⁹ In any case, there are legitimate ways of achieving flexibility using genuine labour hire and subcontracting arrangements.

To the extent that sham contractors do not receive higher gross contract payments, this employment arrangement places pressure on the benefits for workers employed under lawful employment arrangements. This occurs directly because of a weakened capacity for bargaining by workers employed under conventional employment arrangements. It can also occur indirectly, as construction businesses using sham contractors may be able to reduce labour costs and win bids ahead of other competing firms, so the practice is also attacked by some employers, as noted by the ABCC (2011, p. 156). Not surprisingly, unions are hostile to the presence of such contract arrangements and to the parties that orchestrate them, as is the Australian Tax Office (2014) when the arrangement leads to tax avoidance by employees or employers.³⁰

The prevalence of sham contracting is unclear, in part because the common law determination of whether it has taken place needs to take account of multiple criteria on a case-by-case basis (ABCC 2011, p. 88). Nevertheless, employers found to be sham contractors sometimes offer the excuse that they are engaged in a practice that is ‘rife’ (ABCC 2011, p. 41). The CFMEU and various other participants also claimed the practice was widespread or, on the basis of incentives, could be expected to be so (ibid p. 91, p. 117 and CFMEU 2011). A recent survey commissioned by FWBC estimated that between 5 per cent and 10 per cent of all workers within the industry were incorrectly classified as contractors, when they were really employees (Elliott et al. 2012, p. 94). Using different methods and data, the CFMEU (2011, p. 27) estimated a comparable range between 9 and 16 per cent. On the one hand, these misclassified workers receive some of the potential tax benefits of independent contracting, while on the other they forego the entitlements of employees. The estimates will exaggerate the prevalence of sham contracting, as some of the misclassification is unintentional and so not legally a ‘sham’. But regardless, the estimates serve to highlight the ambiguities of employment relationships in the construction industry, which in turn comprise one source of IR tensions.

It should also be recognised that employers’ use of sham contracting is driven by economic incentives, with its prevalence likely to be higher when unions exercise excessive bargaining power to drive up employees’ wages and conditions. Accordingly, the prevalence of sham contracting would probably decline were that market power reduced in the construction industry. This is part of a broader story about IR in the construction industry. One legitimate, but reactive, policy approach is (ex post) action by FWBC and the ATO against unlawful conduct. Another approach takes into account that new regulations, codes of conduct and institutional

³⁰ Indeed, the ATO has construction-specific reporting requirements because of the high risks of tax evasion — another aspect of the industry’s peculiar labour market characteristics.

arrangements that, ex ante, alter the payoffs from unlawful conduct by construction industry employers and employees may have similar, if not more, potency.

Insolvency risks affect employee security

There are relatively high insolvency rates in the industry, especially for lower tier contractors. The construction industry accounts for around 20 per cent of all corporate insolvencies — eclipsed only by insolvencies in business and personal services (ASIC 2013). Even second tier contractors are exposed to significant risks. For example, Reed Constructions Australia and St Hilliers Construction became insolvent in the last few years, with flow-on impacts on lower tier contractors (Collins 2012, p. 13; Wilkinson 2013). While the Fair Entitlements Guarantee provides financial assistance for employees to cover certain unpaid employment entitlements after the bankruptcy or at the time of the liquidation of a business, it applies thresholds to some entitlements, so that employees may not fully recover their entitlements. Accordingly, insolvencies expose employees to some risks in relation to their entitlements, and to considerable uncertainty about re-employment and the terms and conditions they may face when they do get another job. The latter two concerns apply even when a business exit is not a business failure. Business exit rates are high in all segments of the construction industry (table 12.1), though comparatively lower than some other industries.

Combined with other characteristics of the industry, these risks may again undermine trust and loyalty between employees and businesses.

Table 12.1 Exit rates by business size

Share of businesses in each industry actively trading in 2008 that were not operating in 2012^a

	<i>Non Employing</i>	<i>1–19 Employees</i>	<i>20–199 Employees</i>	<i>200+ Employees</i>
Building Construction	50.2	26.2	18.1	30.7
Heavy & Civil Engineering Construction	53.3	26.9	19.7	28.2
Construction Services	49.2	29.9	18.3	33.8
All Australian industries	44.4	29.8	23.2	30.3

^a To illustrate the meaning of the numbers, 53.3 per cent of non-employing heavy and civil construction businesses operating in 2008 were not doing so in 2012. Business exit rates need not equate with failure. An exit might reflect a voluntary exit, a sale of the business, a merger or takeover, or any factor that leads to the withdrawal of an Australian business number or failure to remit goods and services tax for five quarters.

Source: ABS 2013, *Counts of Australian Businesses, including Entries and Exits, Jun 2008 to Jun 2012*, Cat. No. 8165.0, 21 May.

The head constructor is the main negotiating party on the employer side

As the head contractor manages the project site, but typically employs few people, it is in the interest of unions to negotiate enterprise bargaining agreements through the head contractor that then embrace a large number of workers employed by subcontractors (ACG 2013, p. 5). As the Australian Constructors Association (sub. 72, p. 11) put it:

One of these areas of concern relates to pattern bargaining on an industry-wide basis. Pattern bargaining was identified in the Cole Royal Commission as having a potentially significant effect on the cost of construction. This form of bargaining was described as a bargaining process in which unions or employers attempt to achieve common outcomes across different enterprises in an industry or sector, for example by the adoption of standard agreements, or a specified wage increase, the effect of which is designed to regulate the employment relationship of a large number of employees and their employers. Information before the Royal Commission indicated that pattern bargaining displaced, or nullified, the scope for genuine enterprise level bargaining about wages and conditions and increased the cost of projects by from 13 per cent to as much as 20 per cent or higher.

It is clear why unions might prefer to negotiate this way, but why would prime contractors accede? As noted by the Australian Constructors Association (sub. 72, p. 9), head contractors face substantial liquidated damages for delays as well as other high-risk employee relations matters. For instance, one commentator claimed that:

In the case of the desalination plant it appears that the contractor is obliged to pay severe penalties for failing to finish by the end of December 2011 - \$15 million for one day late and possibly as much as \$5 million per week thereafter. It has been estimated that if there is a strike it costs between \$5 and \$15 million per day whilst the site is idle. (Moore 2011, p. 6)

To the extent that this holds more generally, industrial disputes — which typically lead to delay or lost productivity — are potentially very costly for head contractors. As a result, head contractors face strong incentives to negotiate generous workplace agreements with unions (which, some contend, may include a capacity to restrict the use of external labour in projects) in exchange for assurances of industrial harmony at the construction site. In effect, the excess costs of the generous agreement are paid for by the client (generally the government), while the head contractor reduces the likelihood of delays. (This issue and recent legal and policy developments are discussed further below.)

Apart from legal and regulatory constraints, the main brake on any such deal struck before tendering would be whether they prejudiced winning the contract. The risk faced by a contractor is that other contractors might negotiate more commercially

sound arrangements with employees that help them to win a bid. However, two factors may undermine this countervailing competitive pressure.

- The Commission understands that greenfields agreements are often struck on a contingent basis by unions and competing bidding head contractors prior to tendering.³¹ This provides the prime contractor and the client with some certainty about input costs and the IR risks that may emerge if the contractor is the successful bidder. However, competing contractors must all negotiate with the same unions. It would make little economic sense for the relevant unions to negotiate lower wages and conditions with one bidder compared with another, so that there is a risk that all contingent agreements include many of the same features. There are exceptions. For instance, in competition with the CFMEU, the Australian Workers Union (AWU) negotiated a new enterprise agreement for the Victorian Rail Link project, displacing the CFMEU, which was the union party to a prior agreement.³²
- There are relatively few tier 1 contractors in Australia (chapter 10), so it is easier for unions or their bargaining agents to set common clauses in greenfields agreements. Accordingly, concentration in the head contractor segment of the construction market may further facilitate the diffusion of common conditions throughout the industry (to the extent that the law and building code guidelines permit this).

Moreover, large construction projects are not exposed to the same level of competitive pressures as many traded good industries, and there are at least some concerns about the extent of effective competition for some large infrastructure projects in particular sub-markets (chapter 10). This may enable head contractors to pass on the costs of deals with unions, undermining their incentives for hard bargaining in these instances. The same risks may apply if a government elects to fast-track a large project for political reasons, diminishing its own bargaining power with bidders.

³¹ The Commission understands that the extent to which agreements are struck before or after tendering varies by project type, project location, the constructor and the union. However, a common feature of such agreements is that they must relate to a genuine new 'enterprise' (which includes a genuine new business, activity, project or undertaking). In many instances, following prior agreement, the multiple unions that may represent workers on a proposed site determine which union will be the negotiating party for employees (to avoid demarcation disputes). Prior to any greenfields agreement, the employer must not have employed any of the persons who will be covered by the agreement and are necessary for the conduct of that enterprise.

³² John Holland Pty Ltd re Abigroup, John Holland and the Australian Workers' Union - Regional Rail Link Footscray to Sunshine Project Agreement 2011–2015, [2011] FWAA 5724, 3 October 2011.

This does not mean that project-specific pattern agreements developed by prime contractors for major projects, typically through greenfields agreements, are necessarily problematic (Australian Constructors Association sub. 72, p. 11). Some sort of assurance about labour input costs and IR management at a project site may be needed before a project client could shortlist head contractors and for provision of finance. The policy issue is whether any such agreements involved coercion of subcontractors or loaded the agreements with excessive conditions.

Of course, greenfields agreements are not the only agreements. Many employers have enterprise agreements that apply to sites in different locations or over time.

12.4 Is construction different in other ways?

Quite apart from its contracting practices, it is sometimes claimed that the construction industry has unique characteristics that justify the creation of IR laws and institutions specific to it. This contention underpinned the creation of the ABCC in 2005 and the persistence of laws and institutions specific to construction after the ABCC was removed. There is partial support for this contention.

IR dispute and distrust is high

IR disputes are high for the construction industry compared with most other industries (as enumerated in section 12.6). Interruption of work by even a single group of workers of a function — such as crane operation, concrete delivery and form work — can bring a whole site to a stop and can delay activity on the whole site. The Housing Industry Association (HIA 2013, p. 5) has alleged that ‘the interruption of a concrete pour remains a stock standard industrial tactic’. Certainly, various court cases reveal that it has been a tactic³³, though systematic evidence about its overall prevalence and cost is not available.

Whatever form it takes, industrial disruption exposes contractors to major delay penalties, the costs of idle capital and payments of wages for employees not involved in industrial dispute. It also damages the reputation of the constructor in subsequent contract bids. The threat of industrial disruption as leverage or a show of power is hard to prove, and can provide strong incentives for parties to acquiesce to the demands of employees or their representatives (HIA 2013; Independent Contractors Association 2012). Given the importance of the sector to many other

³³ For example, FWBC (2014) and *White v CFMEU & Anor* [2010] FMCA 693 (21 September 2010) (in Victoria).

industries, higher costs or delays in the provision of construction projects have widespread effects on the economy as a whole (section 12.4).

As noted earlier, a succession of inquiries has identified a history and culture of distrust and, in some cases, unlawful behaviour by unions, contractors and other parties at levels that exceed that in most other industries. The sentiments echo down the decades:

Observance of the law and law enforcement in general play very little part in the industry. The law of the jungle prevails. The culture is pragmatic and unprincipled. The ethos is to 'catch and kill your own ... The effect of illegal activities upon the culture of the industry and upon the commercial and industrial morality of participants in it is, in the long run, greater than the direct economic consequences. Once it becomes acceptable to break, bend, evade or ignore the law and ethical responsibilities, there is no shortage of ways and means to do so. Those who pay and suffer the other consequences of disruption in the end are the public. (Royal Commission into Productivity in the Building Industry in New South Wales: Gyles 1992)

Much the same sentiments reverberated through the Coles and Wilcox reviews. Most recently, allegations of major corruption in the industry involving suppliers and union officials have surfaced, and are to be investigated by a Royal Commission (section 12.2).

Workplace health and safety concerns are prominent

Workplace health and safety (WHS) issues are also much more prominent than in most industries, suggested by much higher rates of injuries and deaths per employee (table 12.2). For example, in 2010-11, the likelihood of a fatality per construction industry worker was three times higher than average. These safety issues affect worksites in several ways:

- As representatives of workers, unions play a major role in assessing and responding to risks, and will typically act as WHS officers on sites, be the first party to consider WHS issues, and can play a prominent role in ensuring safe practices. At times, construction companies have unlawfully refused a legal right of entry for a union official in relation to legitimate WHS issues.³⁴ And while unions may have sometimes stopped concrete pours on dubious grounds, they have also done so legitimately, with one such incident being in the Australian Capital Territory. The ACT Work Safety Commissioner is reported to have said that concrete pours are one of the most dangerous activities on sites due to their expense and time critical nature (Knaus 2012).

³⁴ For example, *CFMEU v Merhis Constructions Pty Ltd* [2010] FMCA 751 (29 October 2010).

- Subcontractors under financial pressure may be reluctant to follow all the appropriate WHS processes, creating tensions between unions and employers. It is easier to establish safety cultures in businesses that directly control all aspects of their production, unlike head contractors dealing with multiple subcontractors.
- It is notable that higher rates of industrial accidents tend to result in greater union activism, which may partly explain the increased degree of industrial unrest in the coal, stevedoring and construction industries.
- Some union members can exploit their WHS powers to exercise their industrial muscle.

Consequently, WHS issues are a more potent source of distrust and tension than in many other industries.

Table 12.2 **Workplace health and safety indicators**
2010-11

	<i>Incidence of serious claims</i>	<i>Frequency of serious claims</i>	<i>Incidence of fatalities</i>	<i>Frequency of fatalities</i>
	Per 1000 workers	Per million hours	Per 100,000 workers	Per 100 million hours worked
Manufacturing	20.9	10.9	3.1	1.6
Health & community services	13.7	9.6	0.3	0.2
Retail trade	8.3	6.1	0.5	0.4
Construction	17.8	8.9	6.3	3.2
Property & business services	8.5	4.7	0.9	0.5
Transport & storage	21.7	11.2	9.9	5.1
Education	7.9	5	0.1	0.1
Personal & other services	17.5	10.8	1.4	0.9
Wholesale trade	14.2	7.5	2	1.1
Accommodation, cafes & restaurants	10.2	8.1	0.5	0.4
Government administration & defence	9.6	5.8	3.6	2.2
Agriculture, forestry & fishing	21	10.5	6.5	3.4
Cultural & recreational services	9	6.7	1.8	1.3
Mining	12.7	5.6	4.7	2.1
Communication services	6.2	3.5	2.3	1.3
Finance & insurance	2.9	1.6	0.5	0.3
Electricity, gas & water supply	7.3	3.8	1	0.5
Total	12.2	7.3	2.1	1.3

Source: Safe Work Australia 2013, *Compendium of Workers' Compensation Statistics, 2010-11*, March.

Efficient provision of public infrastructure is a critical input to the entire economy

As observed in chapter 1, any inefficiencies in public infrastructure have major economywide impacts. The required pipeline of projects over the next few decades is large. The construction industry is a major input into many other industries — especially mining; electricity, gas and water; transport; communications services; and property and business services (ACG 2013, p. 41; Independent Economics 2013, p. 42 and Masters Builders Association sub. 088, pp. 4–5). For example, Independent Economics found that an IR-related improvement in labour productivity of around 10 per cent increased value added in the construction industry by around 2 per cent, but also increased value added in the mining industry and the electricity, gas, water and waste services industry by 1.2 per cent each.³⁵

A male-dominated industry

It may also be that, as one participant put it, the ‘blokiess’ of the industry sometimes accentuates aggressive attitudes on work sites and during industrial unrest. The construction industry is one of the most male-dominated industries in Australia. Of all the 19 industry divisions making up the economy, construction has the lowest female to employment ratio (at 11.7 per cent compared with 45.8 per cent for all industries). Unions in the industry have low female representation in executive and organiser/field operations.³⁶ The form and language of some industrial confrontations might be a barrier to greater female involvement.³⁷

No single factor makes the industry ‘special’

By themselves, these features are not always peculiar to the construction industry. For example, in many other industries, there are high costs from delay and the potential for bottlenecks to impose large costs throughout a supply chain. As an

³⁵ While the Commission identifies significant shortcomings in the analysis of Independent Economics that lead to the claimed productivity improvement from IR reform, to the extent that this number is nonetheless correct, the economy wide results appear plausible.

³⁶ The head positions of unions comprise the various state secretaries, vice secretaries, and president, while people in the field comprise organisers and field officers. In the case of the CFMEU, across all the states, females accounted for about two per cent of the above positions (but a higher share of office management functions).

³⁷ For example, see p. 3 of [2013] FWC 5839, *Crown Construction Services Pty Ltd; John Holland Pty Ltd v Construction, Forestry, Mining and Energy Union* (C2013/2848) and *John Holland Pty Ltd v Construction, Forestry, Mining and Energy Union* (C2013/5217).

illustration, industrial action, lawful and otherwise, by air traffic controllers has large costly impacts for airlines, the traveling public and businesses in a wide range of other sectors of the economy. This provides substantial bargaining power to unions in that area to achieve wages and conditions outcomes above community norms.

However, taken cumulatively, the construction industry — and especially its complex contracting arrangements — is distinctive. If nothing else, the features of the industry suggest that achieving a good quality IR environment is particularly important, and that there are grounds for a specialist regulator arm of some form. However, the desirable extent of its powers and its governance structures and accountability are less clearcut and, to a degree, would need to be assessed through experimentation (section 12.7).

The industry is diverse

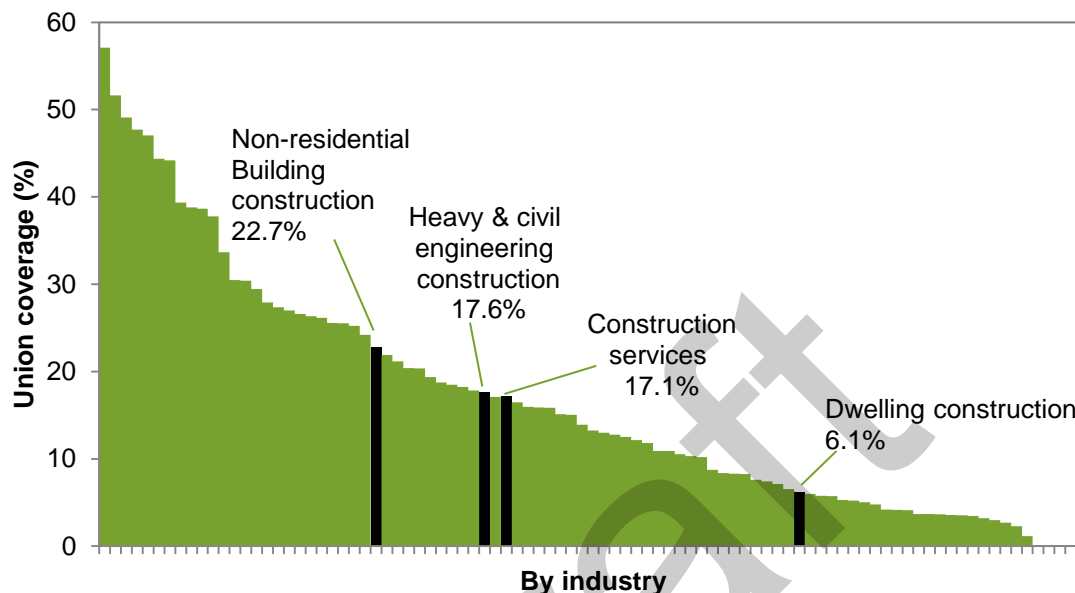
In reaching this conclusion, it is important not to overlook variations within the industry from an IR perspective. The varied nature and reach of unions in the industry provide one indicator of this. Aside from the residential building sector, where union membership is low, unions' presence in the construction industry is roughly commensurate with the average coverage of other industries — and so cannot be characterised as unique compared with other industries (figure 12.1). However, unlike many other industries, the Commission understands from inquiry participants that unions are the principal or even only bargaining agents for employees on major construction projects, and that union membership is high in these instances. (Unfortunately, data from the ABS is unable to substantiate the latter because of high levels of aggregation.)

Variations between the sub-sectors of the construction industry also emerge when the type, organisation and location of unions are considered.

While many unions operate in the construction industry, the two major unions are the Australian Workers Union (AWU) and the Construction Forestry Mining and Energy Union (CFMEU). The former is the predominant union presence in the civil engineering construction projects that are the core focus of this report. Most underground engineering or bitumen work would involve the AWU. The CFMEU has greatest coverage of the building construction industry and so would be most relevant to roofed structures such as hospitals, prisons, barracks and the buildings

associated with civil engineering projects (such as a railway station) and, more generally, the erection of scaffolding and crane operations.³⁸

Figure 12.1 Union coverage by Australian industry group
Share of employees in a union^a



^a Based on data on 91 industry groups, but with unpublished data for the 4 sub-industries of construction.

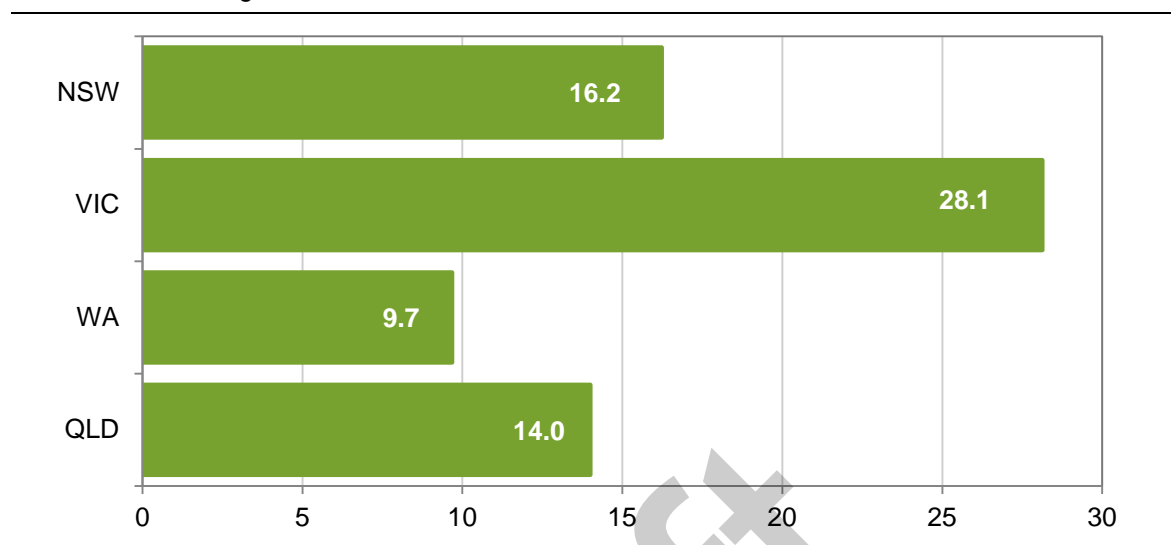
Sources: ABS 2013, *Employee Earnings, Benefits and Trade Union Membership, Australia, August 2012*, released 17 May 2013 and unpublished data from the ABS.

The differences in the unions go further than their relative strengths in different parts of the industry. The CFMEU's nature varies from state to state, reflecting its more federated nature. The leadership and culture of the union in one state may vary from the other, without the central control of a fully national union (such as the Community and Public Sector Union). In contrast, the AWU has a more hybrid structure. It operates federally, but has strong national policies applying across jurisdictions. This suggests that it is more likely to be more culturally similar across borders.

Victoria appears to be more subject to unlawful conduct by unions and officials than other jurisdictions. Union membership also appears to be significantly higher in Victoria than in New South Wales or Queensland (figure 12.2), reflecting the importance of historical factors in the power and capacity of unions as bargaining agents.

³⁸ This does not always apply. For example, the CFMEU was a major union in the construction of the New South Wales M7 motorway.

Figure 12.2 Union membership rates in engineering services
August 2012^a



^a The pattern of the data is similar for heavy and civil engineering, with Victoria having the highest membership rate (at nearly 37 per cent) compared with other jurisdictions (with the next highest rate, that of Western Australia, being half that of Victoria). However, the values for union membership rates are less reliable for heavy and civil engineering.

Source: Unpublished data from the ABS, derived from the August 2012 publication of *Employee Earnings, Benefits and Trade Union Membership*, Cat. No. 6310.0.

Nevertheless, unions appear to be playing a weaker role in all segments of the construction industry, as with other industries in Australia, though clearly still yielding significant power in negotiating enterprise agreements, as discussed later (figure 12.3). So, what holds now may not hold in a decade.

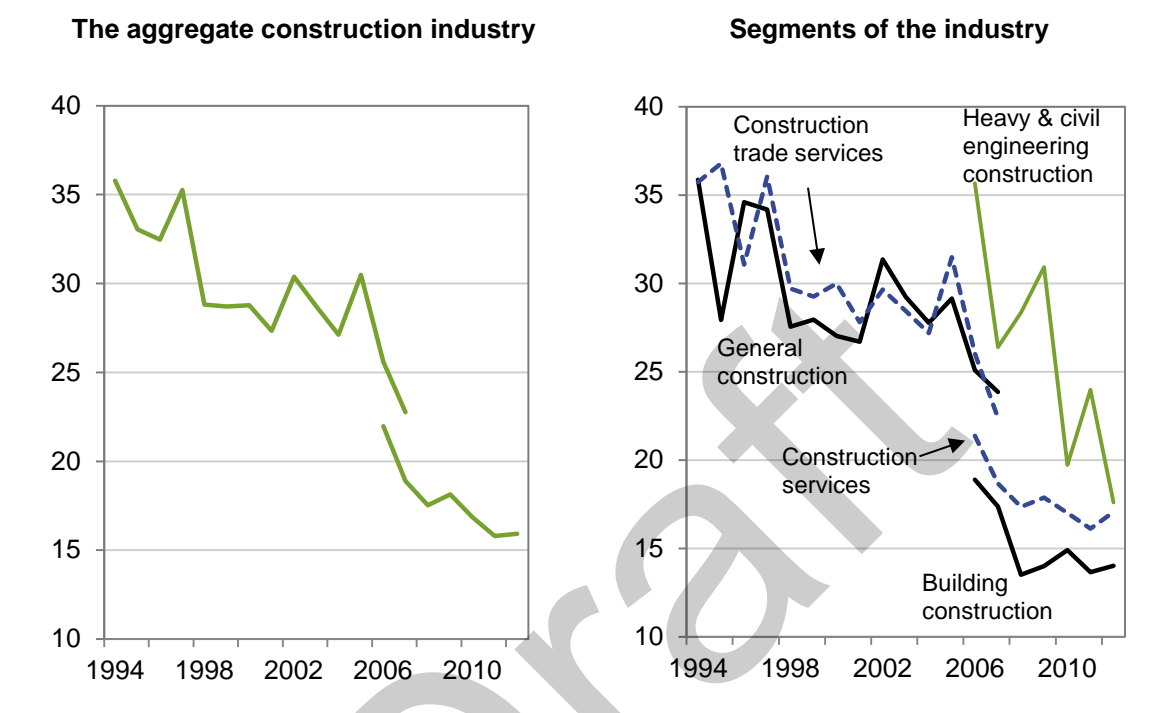
12.5 The impacts of industrial relations at the project level

The construction industry and business groups have often pointed to problems in the IR environment in major construction projects, particularly in relation to:

- excessive terms and conditions and the creation of a wide range of complex allowances
- unlawful or obstructive activities of some unions or officials
- control over the management of the site, including its WHS regime and monitoring, stipulations about hiring subcontractors and the organisation of rostering
- the disruptive effects of go slows, work to order, overtime bans and strikes on the efficient management of a construction site

- identifying ‘dummy’ WHS issues as the basis for exercising power and bargaining.

Figure 12.3 Unionisation has fallen significantly
1994–2012, share of employees (%)^a



^a Definitions of the sub-industries have changed, creating the break in the series.

Source: ABS various issues, *Employee Earnings, Benefits and Trade Union Membership, Australia - Trade Union Membership*, Cat. 6310.

On the other hand, the Commission’s consultations with individual (typically tier 1) construction businesses did not suggest that the IR environment was a major source of cost pressures or low productivity. When asked about cost pressures, many identified wage costs, although less as a symptom of a poor IR environment than as the broadly expected outcome in a country with rich resource endowments and a high standard of living. Similarly, other stakeholders have a mixed view about the importance of IR in affecting site productivity and costs (box 12.2).

It is often hard to obtain objective evidence about these contested issues, but in the following sub-sections the Commission has looked at three strands of evidence concerning wages and conditions, unlawful conduct and case studies that reveal likely wider problems.

Box 12.2 Views on the broad impact of the industrial relations environment in construction

Sadly, building and construction industry unions have a long history of militant and often unlawful behaviour, particularly wildcat strike activities that disrupt workplaces. (Master Builders Australia sub. 88, p. 12)

Australia has narrowly focused on industrial relations reform while other countries have moved ahead more aggressively on a broader range of fronts. Construction productivity is determined by a wide range of factors and Australian needs a multi-dimensional strategy to improve it. The industry should avoid the temptation to focus on wages and industrial relations. While industrial relations is an important ingredient in the productivity debate, it is one of many. Meeting the future's challenges will require trust and genuine collaboration between employers and employees. (University of New South Wales sub. 44, p. 2)

Twenty years ago, the Productivity Commission published a major report into the construction industry. At the time four major issues limiting productivity improvement were: industrial relations, planning consents, Australian participation and project management. The Taskforce believes the major issues confronting the construction industry today are different. The BER [Building the Education Revolution school building] program has been notable for negligible industrial disputation, and we have observed the benefit of the streamlined BER planning approval process. We have however witnessed deficiencies in the quality of workmanship, in project management, in public works capacity and in the framework of private certification. (Chandler 2013, p. 5)

T&T found that when recent Australian projects were compared to like builds elsewhere, Australia compared well to UK projects and to USA projects in cities where construction is unionised, such as New York. ... Other factors that may be significant in other industries (such as labour practices) appear to have been of no material impact in the airport development experience. (Australian Airports Association sub. 90, p. 11)

The Inquiry Panel [in relation to occupational health and safety issues] heard that site visits and union focus is often concentrated on employers undergoing enterprise bargaining negotiations. (Briggs and McCabe 2012, p. 10)

Excessive terms and conditions sometimes occur

In general, employer representative bodies were critical of current enterprise bargaining agreements (EBAs) and the arrangements that underpinned their negotiations (BCA sub. 39 and Master Builders Australia sub. 88). Some employers expressed similar concerns. For example, McLeod Rail pointed out that:

Greenfields enterprise agreements negotiated by Tier 1 contractors lead to excessive remuneration costs, reduce productivity and discriminate against subcontractors unless they either “uplift” pay and allowances to the project, or execute an enterprise agreement that permanently inflates the contractor’s labour costs, reduce their margins or both. Subcontractors may provide value-for-money, safety and quality but will be internally assessed as “high” on the IR risk scale if they do not have an EBA, or elect to maintain their current EBA conditions, rather than pay staff according to “project conditions”. (McLeod Rail sub. 49, pp. 3 4)

The Commission examined a sample of EBAs to assess the variations in pay and conditions (box 12.3). EBAs can be difficult to compare and contrast — particularly in relation to the conduct, roles and powers of the various actors in the workplace. The provisions, terms and conditions contained within individual EBAs can be diverse and wide ranging.

Box 12.3 A small sample of EBAs

To understand the variations in pay and conditions negotiated in individual enterprise bargaining agreements (EBAs), the Commission has examined a sample of 31 individual agreements accessible from the Fair Work Commission website. The EBAs included in the sample are listed in appendix D.

Of these EBAs:

- 30 agreements were negotiated between an employer and a union (or unions), which had (or have) been assessed by Fair Work Australia to be entitled to represent the industrial interests of a majority of employees covered by the Agreement, and binding for all employees while the other agreement was negotiated between the employer directly with its employees
- 16 agreements were negotiated for a specific project (for example, the Dalrymple Bay Coal Terminal Expansion Project in Queensland) and 15 agreements were negotiated to cover all employees working for the employer in a specific jurisdiction (for example, all employees working for Leighton Contractors Pty Ltd in Victoria).

While the sample is not balanced across commencement dates, jurisdictions, employees or unions, it provides useful indicative evidence of some of the terms and conditions that make up the sector's EBAs.

Despite these difficulties, comparisons of the various EBAs found both significant similarities and differences in conditions between agreements. In terms of similarities, most EBAs provided:

- ordinary working hours of 36 hours per week with 8 hours worked each day and 0.8 hours on all days worked accruing towards a Rostered Day Off (RDO)
- overtime rates at time and a half for the first two worked on weekdays and Saturday mornings, and double time otherwise
- four weeks annual per week with an additional week for shift workers and 17.5 per cent leave loading
- loading for casual workers of 25 per cent on their ordinary pay rate as prescribed in the EBA.

In general, agreements on pay increases tended to be higher than averages available for workers in other industries, ranging from 2 per cent per annum to 5.5 per cent, with an average of 4 per cent per annum.

There were also significant differences between EBAs, for example:

- some provided standard employer superannuation contributions, but others provided for flat payments that were more than 50 per cent more generous for lower-wage employees
- one agreement stipulated a living away from home allowances (LAFHA) of \$500 per week in 2012, while another provided for \$240 per week in 2010
- daily site allowances of \$6.25 per hour in one agreement compared with \$4.50 an hour for another agreement (for the same year)
- first aid allowances for first aid officers ranged from zero to \$2.60 a day.

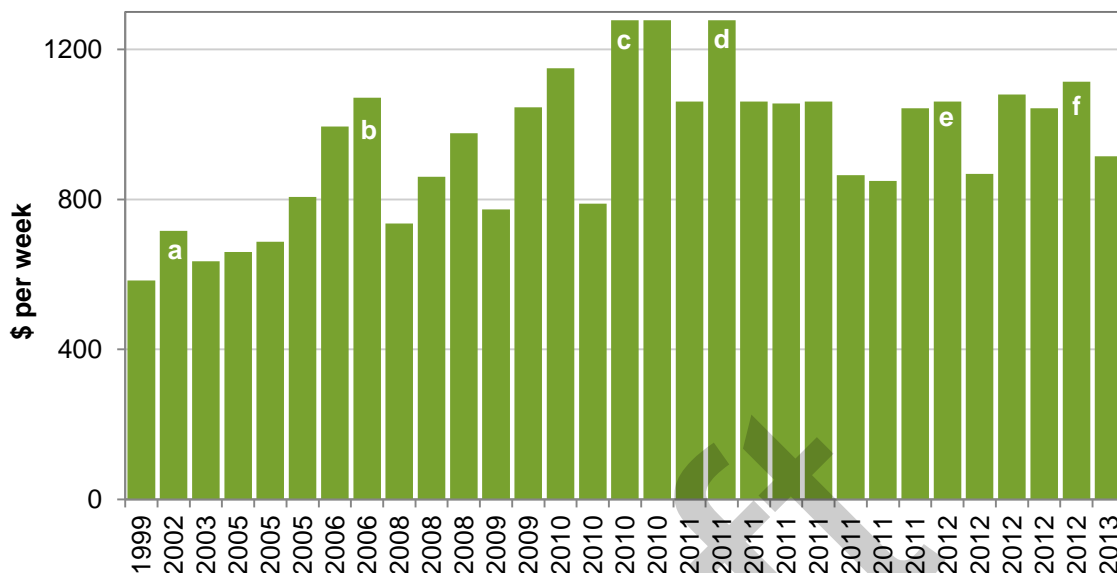
The analysis also reveals that the controversial ‘jump up’ clauses are common. Under such clauses, all employees on a work site have the same pay and conditions, even if they are already covered by agreements with lower benefits. Jump up clauses were in 20 of the 31 EBAs examined.

In order to provide some comparable data across the agreements, the Commission also examined the nominal wage rates of the lowest paid construction worker in each EBA. These have then been grouped by various characteristics to see if, on an indicative basis, differences in EBA terms and conditions can be traced to particular factors.

Untangling the effects of time, jurisdiction, project type and union involvement, however, paints a mixed picture without definitive evidence of causation or significant recent increases in wage costs in the sector. Over time, of the agreements examined, nominal wages of the lowest paid construction worker have risen as would be expected, but appear to have fallen since 2010 (figure 12.4) — a trend in line with market conditions.

Noting that sample size for the smaller jurisdictions is very limited (only one EBA in the Australian Capital Territory, South Australia and the Northern Territory), EBAs in Victoria, Western Australia and Queensland have higher pay rates for the lowest paid worker (figure 12.5). For Western Australia and Queensland, the influence of the resources boom has likely played a significant role in these results. There was no obvious link between outcomes and the unions involved in negotiations (and, in some cases, multiple unions were involved).

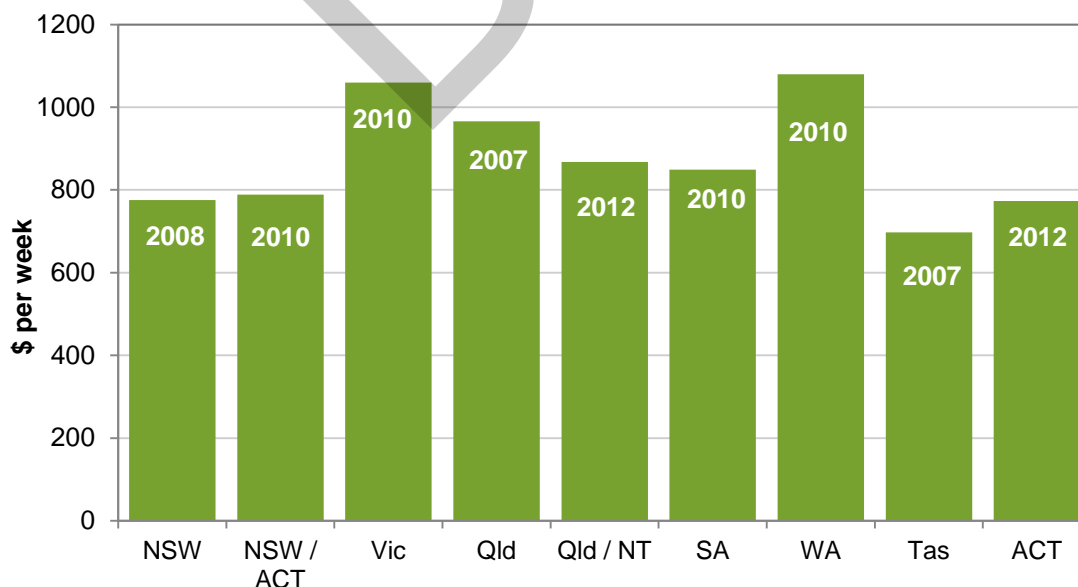
Figure 12.4 Nominal wage rate of lowest paid construction worker for each individual EBA, by commencement date



a Citilink Construction/CFMEU 2002–2005(Vic). **b** John Holland/AMWU/CEPU/CFMEU 2006–2009 (Gold Coast desalination project). **c** Thiess/Degremont/CFMEU 2010–2012 (Victorian desalination project). **d** Abseal Pty Ltd and CFMEU 2011–2012 (Victorian desalination project). **e** Abigroup, John Holland and AWU–Regional Rail Link Project 2012–2015. **f** Leighton Contractors and the CFMEU Building and Industry Enterprise Agreement 2012–2015.

Source: Productivity Commission analysis based on lodged enterprise agreements (appendix D).

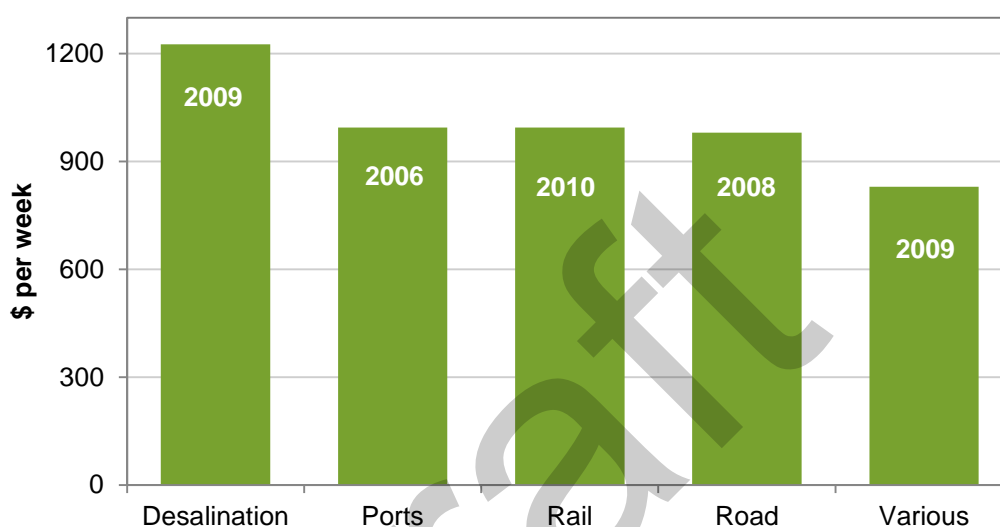
Figure 12.5 Average nominal wage rates for lowest paid worker for all EBAs, by jurisdiction



Source: Productivity Commission analysis based on lodged enterprise agreements.

In terms of project type, the EBAs negotiated for the construction of desalinisation plants have contained the highest wage bills (figure 12.6). The results suggest that bargaining can sometimes yield substantial wage premiums, which must be reflected in contract prices paid ultimately by taxpayers or infrastructure users.

Figure 12.6 Average nominal wage rates for lowest paid worker for all EBAs, by project type



Source: Productivity Commission analysis based on lodged enterprise agreements.

Unlawful conduct remains a problem

Unlawful conduct continues to be a significant problem in the construction industry. There have been 169 legal matters with penalty proceedings overseen by the ABCC and the FWBC since the inception of ABCC in 2005.³⁹ Of these:

- 131 involved unions directly. The CFMEU was the dominant respondent, accounting for 108 cases (82 per cent of the total) in its own right, and a further 7 cases (5 per cent) with other unions. The remaining cases were spread evenly across several other unions (which included the Communications Electrical Plumbing Union – 5 cases; Australian Manufacturing Workers Union – 5 cases; Australian Workers Union – 4 cases; and the Builders Labourers Federation Queensland – 2). Of the 131 matters, 60 involved unprotected industrial action, 25 coercion, 23 unlawful entry to a site and 17 a violation of freedom of association

³⁹ Based on information provided by FWBC and covering the period between 1st October 2005 and 7th February 2014.

- 31 involved employers (either on their own or with employees). The dominant matters were sham contracting (9 cases), pay and entitlements (8 cases) and strike pay (6 cases)
- 7 involved employees, of which at least three represented actions by employees on behalf of unions (and two of these involved the CFMEU)
- Victoria accounted for just over 50 per cent of cases, Western Australia 16 per cent, and the Australian Capital Territory 4 per cent — much more than other jurisdictions based on their relative sizes. The remaining results were New South Wales (9 per cent), Queensland (11 per cent), South Australia (5 per cent), Tasmania (1 per cent) and the Northern Territory (1 per cent).
- just under 90 per cent involved general construction sites, with the remaining 10 per cent being civil construction.

This evidence confirms the heterogeneous nature of the IR landscape in construction. Unlawful conduct is relatively scarce, yet clearly some unions and some jurisdictions have higher rates of unlawful conduct. It should not be assumed therefore that all unions engage in unlawful conduct, and even where a given union is a major source of problems, this need not be characteristic of all of the officials of that union nationwide.

Several compendiums of finalised cases reveal a diverse range of matters where union officials were involved — such as industrial disputes to pressure an employer to renegotiate an agreement, contraventions of right of entry provisions, and attempts to pressure a contractor to employ (or not to employ) certain people.⁴⁰ An example of the latter is the Peninsula Road Project, which involved action by the relevant union against the head contractor Abigroup (a division of Lend Lease) in an attempt to pressure it to employ particular members of the union. Justice Gordon of the Federal Court concluded:

The unlawful conduct constituted a concerted and persistent attempt by the CFMEU and the individual named respondents to coerce Abigroup Contractors to employ four identified members on the Peninsula Link Project. It could not be said that the contravening conduct was inadvertent or genuinely believed to be lawful. The respondents' conduct was part of a deliberate industrial strategy. The unlawful conduct occurred at various sites on various days. The unlawful conduct included blockading of sites, directing workers not to perform any further work at numerous sites and a verbal altercation at a site (Judgment in *Director of the Fair Work Building Industry Inspectorate v Construction, Forestry, Mining and Energy Union* [2013] FCA 1014, pp. 11–12).

⁴⁰ Based on cases finalised by the FWBC to 28 February (FWBC 2014b) and from a (selective) compendium of cases listed by (MBA 2014, attachment C).

Tactics, such as delay, blockading of sites, verbal abuse and other coercive conduct have been features of interactions on sites. The disruption itself would also lead to project delays and lower productivity on sites (box 12.4), but the degree to which industrial disputes have damaged particular construction businesses is not easy to assess, even for courts.

Box 12.4 Delaying tactics

Disruption of construction sites can take many forms, with formal stoppages and strike actions being only the most visible examples.

During this inquiry, the Commission found various cases of less visible, but still highly costly, delays. These included:

- blocking access to work sites through a range of means, including the dumping of debris or materials at work gates, or parking of machinery or trucks for the same purpose
- delaying the delivery or use of materials (including concrete pours), by either preventing access to sites or preventing the further handling of materials once on site
- stopping the removal of waste from sites
- placing 'bans' on the use of critical equipment, such as cranes.

While some instances involved relatively short disruption, others were lengthy, involving multiple days or even weeks.

The estimated costs incurred from such delays vary considerably, but can be substantial and borne by a range of parties (including principal contractors, but also a range of subcontractors). One indication of the possible costs of such delays is related penalties imposed. For example, *Alfred v Construction, Forestry, Mining and Energy Union* [2011] FCA 556 (2 June 2011) stated:

The BCII Act commenced operation in 2005. Since then the CFMEU and its officials have been found, in 28 cases, to be liable for contraventions of that Act. Of these, 22 cases have involved the Victorian branch of the Construction and General Division of the union ("the branch"). Pecuniary penalties totalling \$2,711,150 have been imposed on the CFMEU under the BCII Act. Of this sum \$2,328,550 has been attributable to the unlawful activities of the branch.

For example, in the *Watpac* judgment (involving industrial actions over several days and building sites), Justice Collier concluded that:

No conclusive evidence is before the Court as to the nature and extent of any loss or damage sustained by *Watpac* (or anyone else) as a result of the respondents' conduct. I note, however, that the respondents concede that the effect on *Watpac* was not trivial as the results of the respondents' conduct was to cause an unidentified number of workers to leave the projects on two days and a threat that they might leave on another day.

The bigger concern is the more general potential to reduce competition from subcontractors that have wages and conditions more commensurate with community norms and productivity. This would lead to higher costs. The Independent Contractors Association provided various case studies that suggested that bargaining arrangements could lead to substantial increases in costs (citing the Commonwealth Games Village, the City Links Road Project, and the Victorian Desalination Plant as examples).

‘Sweetheart’ deals and a life easily lived

Most recently, there has been concern that head contractors and unions find it expedient to secure certainty through negotiation of greenfields agreements incorporating excessive wages and conditions before tenders. A major issue is that such agreements have limited the capacity of subcontractors to form their own enterprise agreements with their own employees, and that such agreements have set the standard for subsequent agreements, inflating costs.

McLeod Rail made the observation that tier 1 contractors may not be unhappy with generous greenfields agreements:

A couple of years ago I heard a senior employee of a major contractor brag about the greenfields project agreement they executed but when I read it I could not see why any employer would think it was a proud day to get in place such an expensive and inflexible employment instrument. Contractors blame unions and unions blame contractors, but it's possible they are similarly culpable in producing high cost / low productivity environments. In seeking industrial harmony "at any cost", along with their obsession with "compliance", Tier 1 contractors are failing to obtain "value for money", with attendant impacts on project costs. (ibid, p. 4)

This issue was a live one for the Victorian Government when it raised concerns about enterprise bargaining agreements that were not compliant with its building code guidelines. The critical trigger was that during the tendering process for the Bendigo Hospital project, Lend Lease concluded an EBA with its consortium employees that did not comply with the Implementation Guidelines for the Victorian Building Code. In principle, this could have precluded the Lend Lease consortium from winning the bid, which was the basis for a case successfully brought by the CFMEU before the Federal Court. The full bench of the Federal Court on appeal held the code and its operation to be lawful, thereby providing a legal basis for its use of the guidelines in its procurement decisions (box 12.5).

A crucial difference between the construction of public infrastructure and many other areas of the economy where industrial disruption may be present is that the clients are governments, which tend to be less price sensitive than commercial

clients. Accordingly, to the extent that sweetheart deals take place, the costs are principally borne by governments and ultimately taxpayers.

Box 12.5 The collision of state and Australian Government laws and guidelines

As noted earlier, the Australian Government and various states have codes and guidelines that potentially disqualify contractors from government building contracts if their IR practices are noncompliant. However, variations in the codes and guidelines adopted by different governments raise the risk that one arrangement may be inconsistent with another. This may:

- lead to ambiguity about compliance for purchasers, employers, and employees and their representatives
- involve Catch-22 issues in which a party required to observe an Australian Government statutory provision might breach a state government guideline, thus making them potentially ineligible for tendering for a state government building project
- mean that a construction industry participant observing state government guidelines (or the state government that makes an order based on the guidelines) could be legally in breach of national industrial relations law.

These are not academic concerns, as demonstrated in a succession of cases before the Federal Court involving the application of the Victorian Guidelines to two construction projects (the Bendigo State Hospital and the refurbishment and partial demolition of a building for a theatre group):

- *Construction, Forestry, Mining and Energy Union v State of Victoria* [2013] FCA 445
- *Construction, Forestry, Mining and Energy Union v McCorkell Constructions Pty Ltd (No 2)* [2013] FCA 446
- *Construction, Forestry, Mining and Energy Union v State of Victoria (No. 2)* FCA 1034
- *State of Victoria v Construction, Forestry, Mining and Energy Union* [2013] FCAFC 160.

The CFMEU initially won its cases before the Federal Court, primarily on the basis that it was unlawful under the FWA for the Victorian Government to:

- threaten to contract with a party (Lend Lease) whose Fair Work Commission approved enterprise agreement was noncompliant with the Victorian Guidelines application of its Guidelines
- attempt to coerce a sub-contractor (Eco Recyclers) to change its enterprise agreement.

However, the Victorian Government won on appeal. The cases involved several complex issues, but important elements in the appeal were that the neither the Victorian code nor their guidelines had a legislative foundation and that the Victorian Government could apply them with discretion.

12.6 The aggregate effects of the IR environment on the construction industry

IR problems may affect aggregate economic outcomes in several ways. In some instances, they may increase the labour and capital required in the industry above efficient levels, lowering productivity and raising construction costs. In other instances, IR problems may raise labour costs without corresponding productivity improvements. However, in general, the goal of unions would be to achieve higher wages, rather than to reduce productivity.

Prima facie, the previous section strongly suggests that poor IR environments on major project sites will have adverse effects on their productivity and costs (as well as other effects on subcontractors and employees). However, a key concern is whether these adverse effects are great enough to show up reliably in aggregate industry performance data.

Industrial disputes in the construction industry

The level of industrial disputes provides one measure of the overall state of an IR system and its potential to frustrate productivity and increase costs.

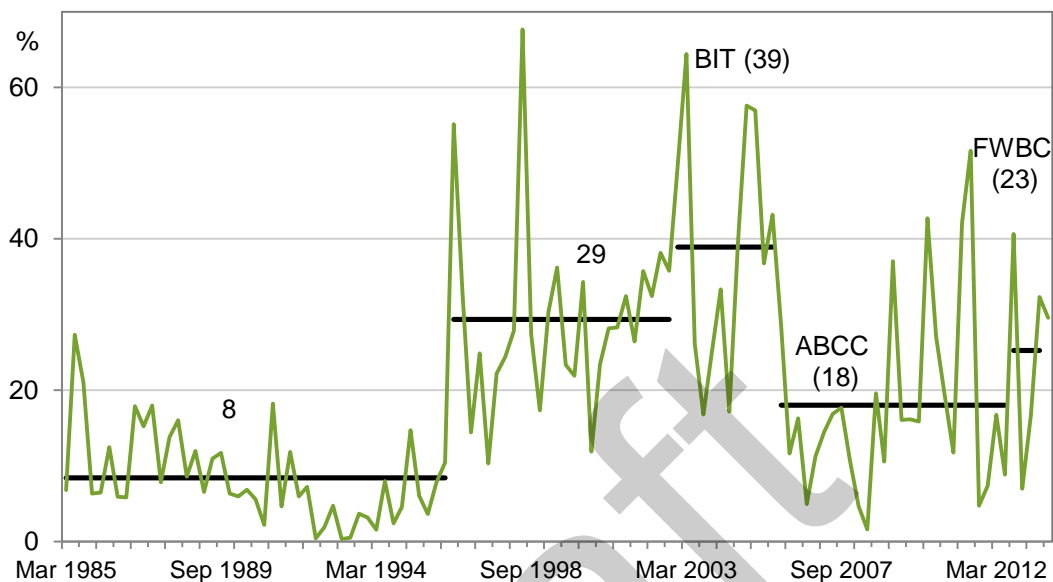
The construction industry's share of total days lost to industrial disputes has mostly exceeded the economy wide share of employment in the industry (figure 12.7). In the September quarter 2013, the days lost per 1000 employees in the construction industry were about four times higher than that for all industries. Looking over the past two decades, the share of days lost was relatively lower during the period of the operation of the ABCC, though outcomes were highly variable.⁴¹ (In contrast, the outcomes associated with the BIT, often regarded as the start of a tougher IR regime, were comparatively poor).

Since 2007, the average days lost per employee in the construction industry have been rising (figure 12.8). This is only partially a symptom of a more general level of industrial disharmony in the economy, as days lost per worker across all industries increased by less. The number of days lost per 1000 employees in the construction industry was more than eight times higher in 2012 than in 2007, while the comparable figure for all industries was around five times.

⁴¹ The lowest industrial dispute rates occurred during the period when the ABCC was active in issuing examination notices.

Figure 12.7 The relative importance of industrial disputes in the construction industry

Construction industry share of all days lost to disputes, March quarter 1985 to September quarter 2013^a

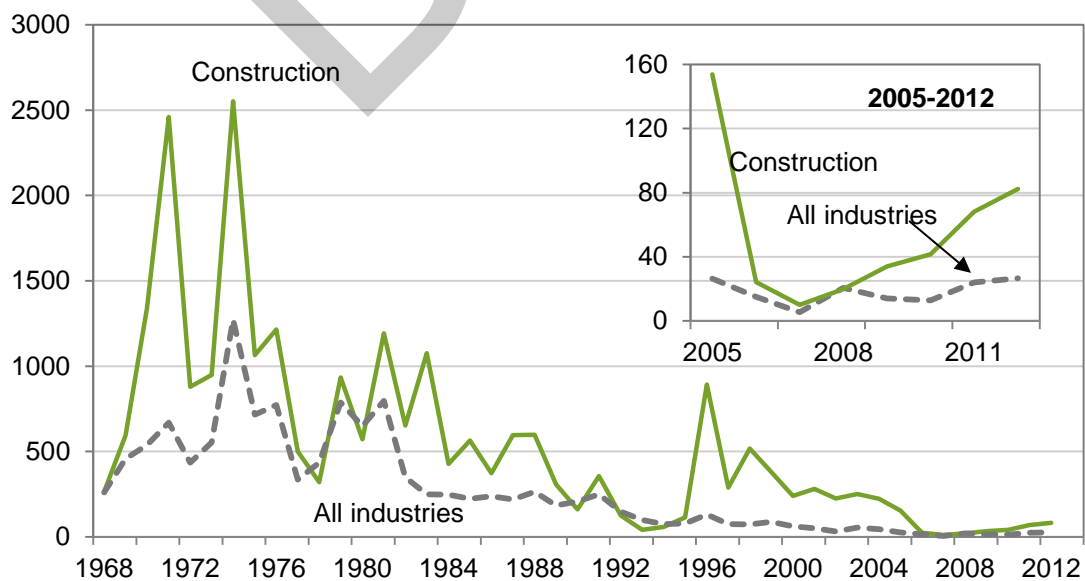


^a Averages are shown for either distinctive periods, where rates were high or low by historical standards or, more recently, for the different IR regime in place in the construction industry.

Source: ABS, various issues, *Industrial Disputes, Australia*, Cat. No. 6321.0.55.001.

Figure 12.8 Days lost per 1000 employees

Construction and all industries, 1968 to 2012, calendar years



Sources: RBA Australian Economic Statistics 1949--1950 to 1996--1997, Occasional Paper No. 8 and ABS (various issues) *Industrial Disputes, Australia*, Cat. No. 6321.0.55.001.

While both changes seem to imply a dramatic change in the IR landscape, these figures should be assessed against a longer historical timeframe. Days lost per 1000 employees in 2012 were around one tenth of that in 1996 and one thirtieth of the rate in 1974, which was the nadir of IR in the construction industry (and the economy as a whole).

To place some perspective on the immediate economic implications of industrial disputes, in 2012-13, they reduced direct labour input in the construction industry by around 0.03 per cent or about 40 minutes per worker per year. This is a fraction of unscheduled absenteeism due to sickness each year.

However, this apparently negligible impact misses several aspects of industrial disputes in the industry.

The threat of industrial action may result in work practices and other conduct inimical to productivity, costs and business performance. For example, it may lead to the diffusion of high-cost enterprise agreements and the selection of subcontractors favoured by a union, even if these are not as productive as alternative suppliers. Threats need not be realised in the disputes figures.

The statistics gathered on industrial disputes by the ABS also miss many aspects of industrial disruption on a work site. For instance, the ABS does not measure the prevalence of work-to-rules, go-slows and overtime bans. Nor does the ABS measure the effects of disputes in locations other than where the stoppages occurred, such as stand-downs because of lack of materials, disruption of transport services and power cuts, despite these having effects on the utilisation of labour and capital. Collecting such data would be complex and expensive — but the point is that the available industrial dispute data are likely to underestimate the prevalence and severity of IR disharmony, a point that MBA has made:

Master Builders notes that in the industry there are now fewer strikes but more disruptive tactics and where the official ABS statistics do not reflect the disruption to work. This is in part facilitated by clauses which permit stoppages which are at the boundary of what may or may not be lawful. (MBA 2014, p. 8)

Furthermore, the average time lost belies the fact that disputes are highly concentrated in parts of the industry. Much of the construction industry is not exposed to disputes (most particularly, dwelling construction), and most project sites do not experience disputes. In 2008-09, there were 52 disputes in the construction industry with just under 13 000 employees involved. So where a dispute occurs, it has the potential to impose large costs on the employers and independent contractors at these sites (and for any associated suppliers). Cranes and other capital can be idle and, as noted earlier, contractors can face large penalties for delayed project delivery.

The implication of these data is also that it may be hard to discover the costs of industrial disputes in highly aggregated industry data. For example, even were the additional costs of industrial disputes to be 100 times the direct economic impact of lost labour inputs in 2012-13, it would amount to only a 0.3 per cent loss in construction output.

Unfortunately, beyond particular case studies, the data that could explore the consequences of industrial disputes for the affected construction projects, businesses and employees is absent. It is not known in any systematic sense why disputes have arisen. If the pattern for all industries applied, the three most common causes would be industrial action for remuneration (19 per cent), other employment conditions (43 per cent) and health and safety concerns (10 per cent), but these may not be typical of the construction industry.

Aggregate returns to workers

Patterns in employee earnings provide another perspective on the possible aggregate impacts of IR practices on the construction industry.

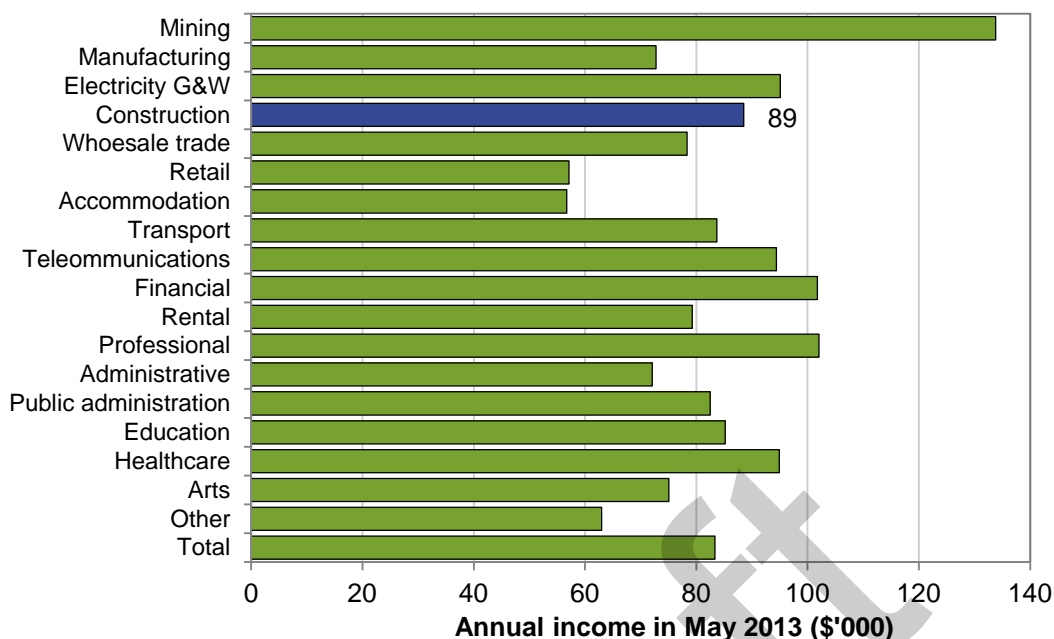
Levels and trends in earnings

As a broad industry, construction has male full-time earnings per week roughly on par with total earnings per week (figure 12.9).⁴² There may be an earnings premium associated with particular enterprise bargaining agreements in the industry (section 12.5), but clearly these have not led to large earnings disparities between construction as a whole and other industries.

However, growth rates in earnings from November 2007 (just prior to the global financial crisis) to May 2013 have exceeded most industries (figure 12.10). At least for this period, the growth in construction industry earnings appears to follow trends in mining, though the relationship has not always been clearcut (figure 12.11). As discussed in chapter 8, wage pressures are likely to have been strongly driven by labour shortages in the mining sector, which uses some complementary labour.

Short-run movements can also be misleading. The annual growth in total full-time male earnings in construction has spiked at around 12 per cent in various years, but only following a period of low wage growth (figure 12.11).

⁴² Using data on full-time male earnings has the advantage that it controls for differences in the share of workers employed part-time and full-time, and of the changing gender mix of the industry (though the latter is largely irrelevant in this male-dominated industry).

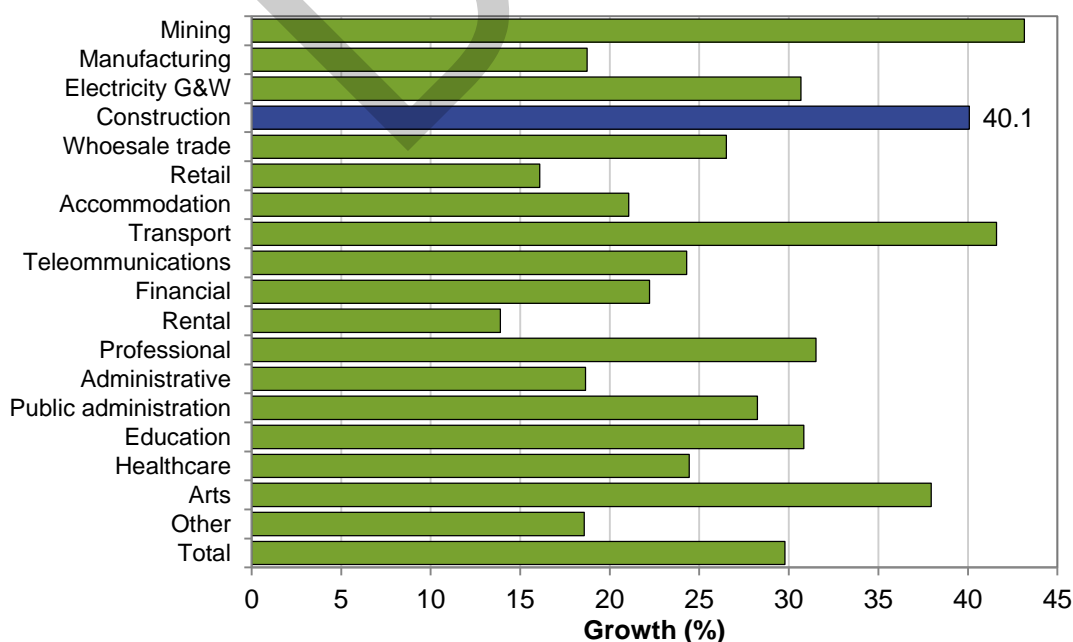
Figure 12.9 Average annual total earnings for full-time males by industry^a

^a Earnings include overtime, site allowances, enterprise bargaining payments, shift allowances, earnings under profit sharing schemes, and any workers' compensation payments. It does not include reimbursements to employees for travel, entertainment, meals and other expenditure incurred in conducting the business of their employer.

Source: ABS 2013, *Average Weekly Earnings, Australia*, Cat. No. 6302.0, table 10B, released 15/08/2013.

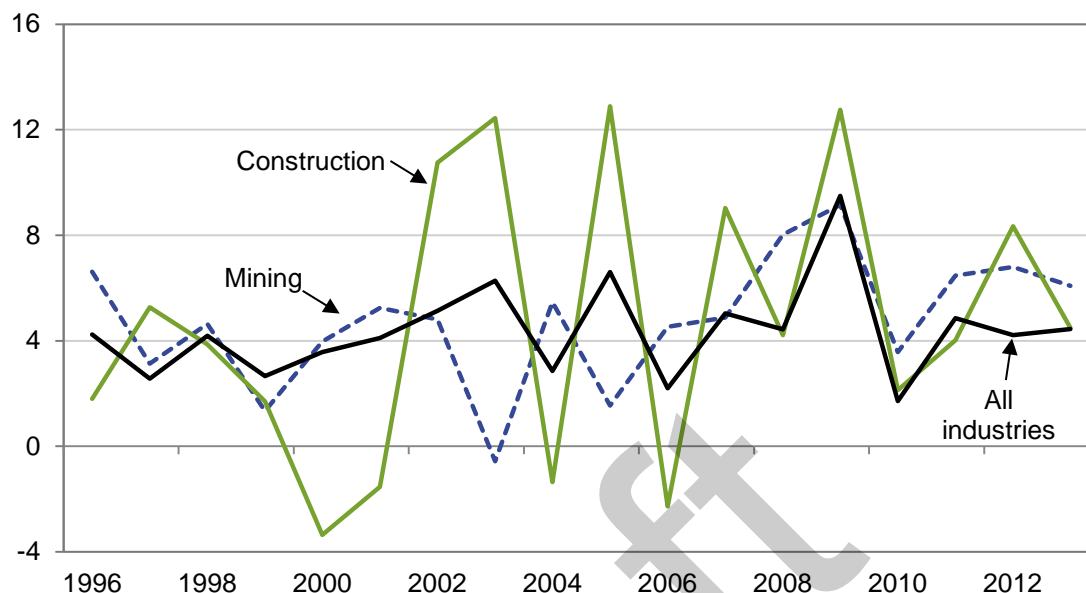
Figure 12.10 Growth in male total full-time earnings by industry

November 2007 to May 2013, per cent



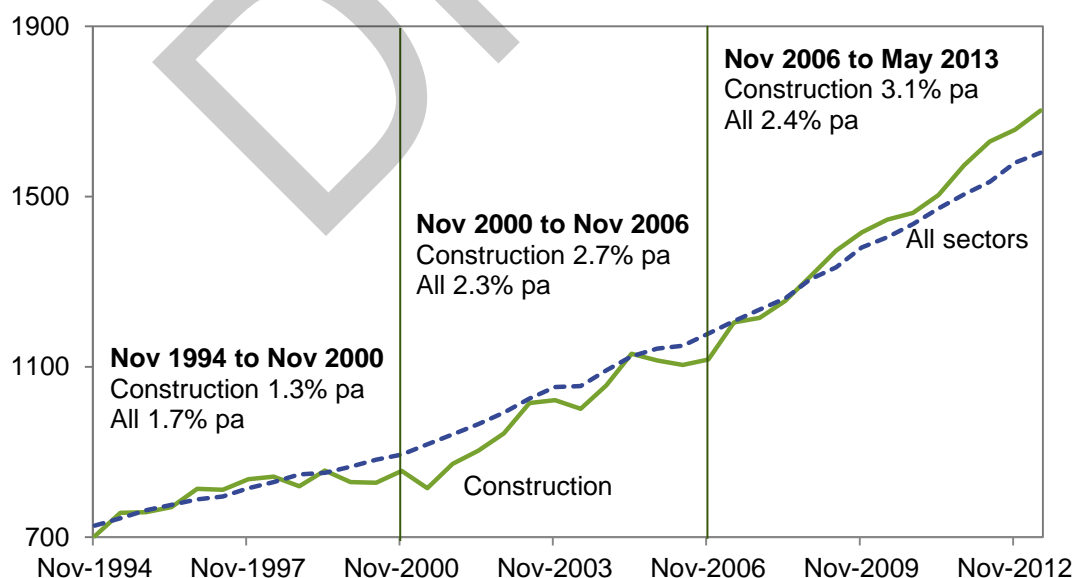
Source: ABS 2013, *Average Weekly Earnings, Australia*, Cat. No. 6302.0, table 10B, released 15/08/2013.

Figure 12.11 Growth in nominal total male full-time earnings
% growth over 4 quarters



Source: ABS 2013, *Average Weekly Earnings, Australia*, Cat. No. 6302.0, table 10B, released 15/08/2013.

Figure 12.12 Total weekly earnings for full-time males by industry
November 2000 to May 2013 (\$)



Source: ABS 2013, *Average Weekly Earnings, Australia*, Cat. No. 6302.0, table 10B, released 15/08/2013.

Over the longer period from 1994, earnings in the construction industry have fluctuated around total male full-time earnings (figure 12.12). There have been prolonged periods where construction earnings were below the all industries total,

and most recently a period where the reverse has been true. Therefore, it cannot be assumed that the current earnings relativity will be maintained or that the IR environment, which has shared many common features over the entire period, is the principal driver of inter-industry earnings differentials.

Is there a link between earnings and the creation of construction-specific IR arrangements?

A robust relationship between different IR regimes and the costs and productivity of the construction industry provides evidence about the overall importance of IR to the performance of the construction industry.

Prima facie, it might have been expected that the changing IR arrangements accompanying the formation of the BIT and the ABCC would have reduced industrial dispute rates, as well as labour income shares. The ABCC sought to strongly reduce unlawful conduct by unions (and employers) in the industry, mitigate industrial unrest and generally weaken the exercise of market power by unions. As shown above, there may be a possible link between the formation of the ABCC and industrial disputes, but it is not strong and, to the extent that it existed, seems to have weakened over time.

One possible test of the influence of the different IR regimes are the pattern of wage growth rates in the period before the BIT, the short-lived BIT era, the ABCC era, and most recently in the FWBC period (which is so short as to be highly unreliable as a test of growth patterns). There are multiple indicators of labour cost growth, but they collectively show that wage growth per employee was in fact high during the IR periods most likely to dampen excessive wage demands (table 12.3). However, wage growth also tended to be higher for the economy as a whole, which was not significantly affected by the construction-specific arrangements.

This suggests that factors other than the IR regime were also in play. The resources construction boom is one likely culprit.

Nevertheless, the data show that wage growth was still greater than that in all industries during the tough IR period. It may be that the ABCC and its predecessor were more effective in addressing unlawful conduct than in reigning in union bargaining power (or that wage growth would have been even higher in its absence). Either way, association is not causation — a fact with equal applicability to various claims about the impacts of different IR regimes, as explored next.

Table 12.3 **Measures of relative nominal wage growth under different IR regimes**

Construction versus all industries

	1997-98 to 2001-02 (pre-BIT)	2001-02 to 2004-05 (BIT)	2004-05 to 2011-12 (ABCC)	2011-12 to 2012-13 (FWBC)	1997-98 to 2012-13
AWE (ABS 6302.0)					
Construction	1.21	6.56	5.83	5.03	5.02
All industries	3.48	5.01	4.66	4.77	4.51
Wage index (ABS 6345.0)					
Construction	3.32	4.05	4.17	3.26	4.04
All industries	3.17	3.54	3.75	3.28	3.62
National Accounts (ABS 5204.0 and Labour force data)					
Construction	2.96	2.08	5.87	1.19	4.46
All industries	3.85	4.12	4.34	2.31	4.22
	1998 to 2002	2002 to 2005	2005 to 2011	..	1998 to 2011
Employee Earnings Benefits and Trade Union Membership (ABS 6310.0)					
Construction	3.77	4.11	4.80	..	4.75
All industries	4.72	4.22	4.82	..	4.81
	..	..	2006-07 to 2011-12	..	..
Australian Industry (ABS 8155.0)					
Construction	..	..	5.13	..	..
All industries			3.04		
	1998 to 2002	2002 to 2004	2004 to 2012		1998 to 2012
Employee Earnings and Hours (ABS 6306.0)					
Construction	2.92	3.14	5.99	..	4.89
All industries	3.20	4.23	4.85	..	4.55

^a The period up to the year ending June 2002 predates the taskforce, which operated from October 2002 until October 2005. Changes over the period from the year ending June 2002 (pre-taskforce) to the year ending June 2005 may therefore show some of the influences of the taskforce. Similarly, the ABCC operated from October 2005 to June 2012, and so changes over the period from the year ending June 2005 (pre-ABCC) to the year ending June 2012 may therefore reveal some of its influences. Each of the measures has various inclusions and data availability, and so are not on a completely comparable basis. In all cases, the data relate to employees, and not own-account workers. Some of the notable aspects are as follows. The AWE values relate to full-time male employees and represent the total wage and salary bill divided by employees. The Wage Index is a price index adjusted for compositional changes in hours worked over time and also relates to all employees. The National Accounts data are based on wages, salaries and supplements for all employees divided by hours worked by employees (the latter from the labour force survey). Values from the Employee Earning Benefits and Trade Union Membership relate to male full-time employees, and exclude salary sacrifice amounts before 2007. These were not large before 2007. Estimate from Australian Industry are based on wages and salaries for all employees. Data from Employee earnings and hours relate to weekly earnings of full-time male non-managerial employees, with salary sacrifice amounts imputed for all years. All growth rate estimates are based on regressing the logged wage values against a time trend (and therefore reflect a trend rate of growth across all the relevant years).

Source: As shown in the table.

The labour share of factor income and the real wage overhang

The labour share of factor income (which are the gross payments to labour and capital) provides another perspective on the degree to which labour has been able to secure higher returns relative to other factors — an outcome expected if unions are able to disproportionately re-balance bargaining power in their favour (as opposed to returns to capital). Moreover, another interpretation of the labour share of factor income is that it shows the extent to which real wages (measured in producer prices) outpace labour productivity growth (the ‘real wage overhang’).⁴³

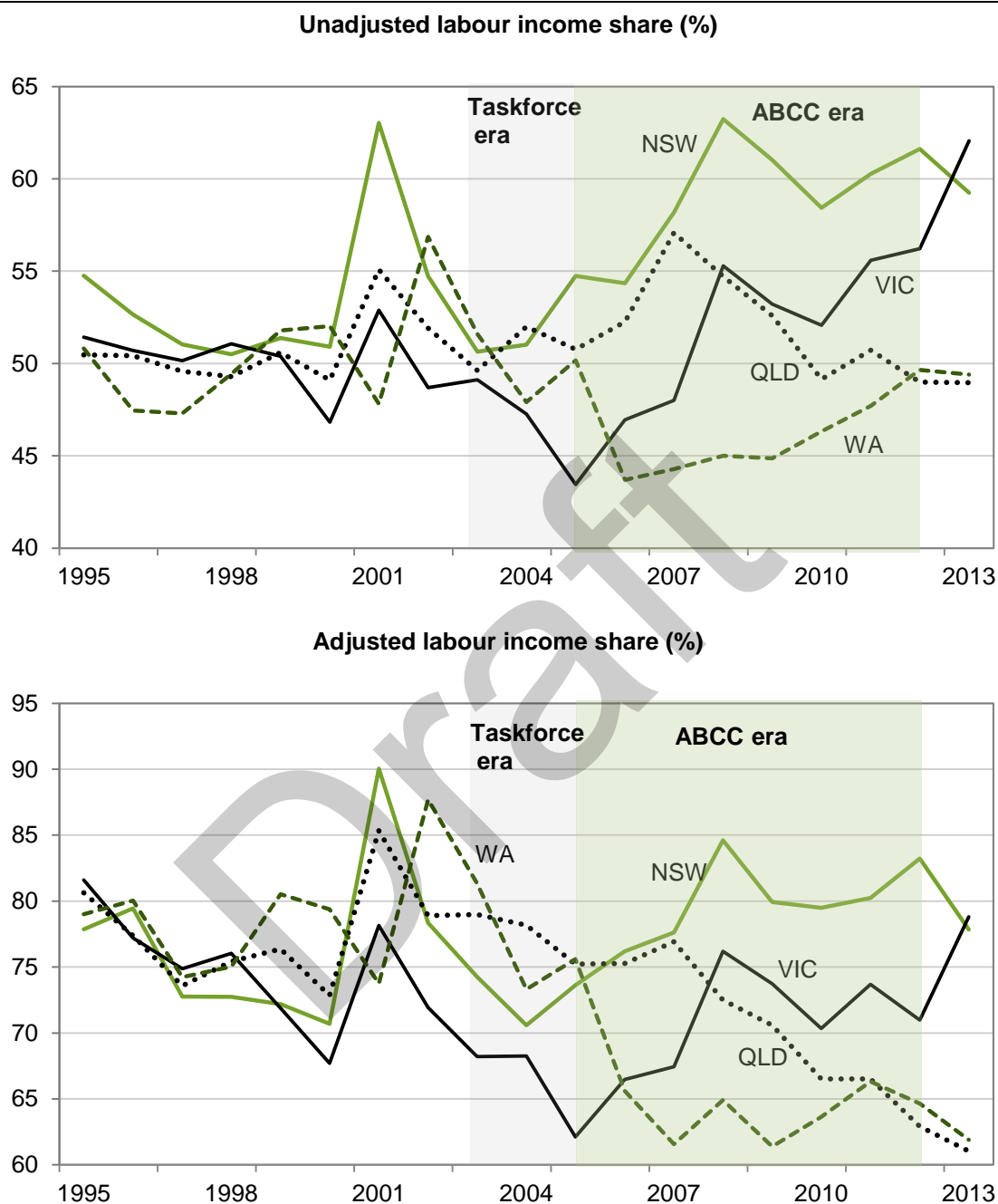
The evidence shows that the labour income share has fluctuated considerably over time (figure 12.13 and 14). However, in general, the evidence suggests that when properly measured (as noted by the Australian Council of Trade Unions sub. 95, p. 7), the Australia-wide labour income shares of the construction industry have decreased in recent years, without any obvious link to the different IR regimes in place. This suggests that construction workers have not been able to make wage demands in excess of labour productivity growth.

The picture is less clear at the jurisdiction level. In particular, in New South Wales and Victoria, the labour share increased during the ABCC years (though, in a continuation of a prior trend, it decreased during the Building Taskforce years). In some other jurisdictions, the pattern was quite different.

Of course, it is hard to make clear judgments about the extent to which the IR regime contributed to any change in the labour share without an understanding of what would otherwise have happened. However, at the national level, the gap between the construction sector’s labour income share and that of industries as a whole has not changed, whereas some difference might be expected were IR arrangements to have had distinctive impacts on the construction industry (figure 12.15).

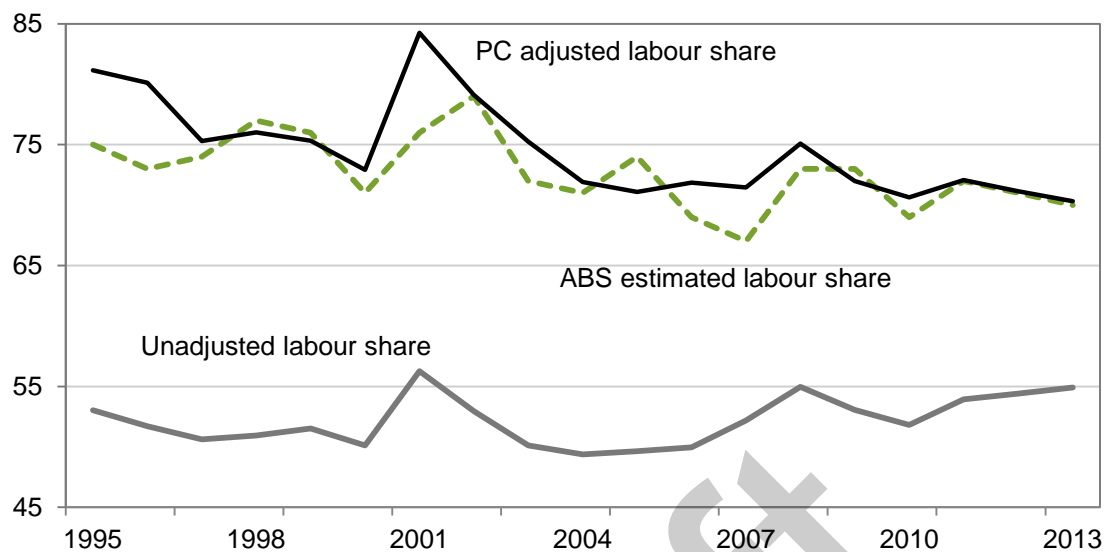
There is an important caveat to the above analysis. Data on the wage share is most easily available for the construction sector as a whole. Yet the most problematic behaviour by unions, and the main target for the actions of the ABCC, has been non-residential buildings. The story in that segment of the industry is likely to be different. The Commission proposes to undertake more research at the disaggregated level.

⁴³ That is, real wages = w/p , where wages are nominal wages and p the price deflator for construction. Labour productivity = y/L where y is gross value added for construction and L is hours by all construction employees. So the real wage overhang is $[w/p] / [y/L] = wL/p.y$, which is the labour share of income.

Figure 12.13 Construction labour shares of total factor income, 1995 to 2013^a

^a The BIT operated from October 2002 until October 2005, while the ABCC operated from October 2005 to June 2012. Some refer to the entire period from October 2002 to June 2012 as the 'ABCC era' because of the similarity of the regimes (MBA sub. 88). It is difficult to measure the labour income share of factor income accurately. The unadjusted measure is wages, salaries and supplements as a share of total factor income for each of the major jurisdictions. However, the residual factor income includes gross operating surplus (of incorporated businesses) and gross mixed income (which includes labour provided by independent contractors and others who supply labour, while not strictly being an employee). The (superior) adjusted figures calculate the average earnings per employee and impute the same labour income to all other employed workers. The labour income share uses this re-calculated value of labour returns.

Sources: Data derived from ABS 2013, *Australian National Accounts: State Accounts, 2012-13*, Cat. 5220.0, released 28/11/2013 and ABS 2013, *Labour Force, Australia, Detailed*, Cat. 6291.0.55.003.

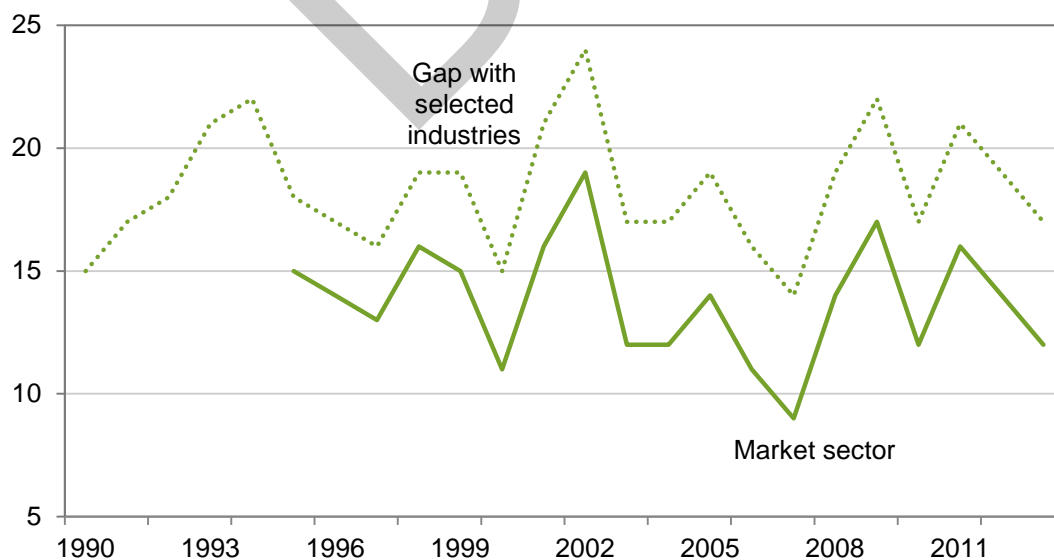
Figure 12.14 Construction labour shares of total factor income^a

^a The unadjusted and adjusted labour shares are as defined using the previous chart. The ABS estimate is from its calculations of multifactor productivity, and involves a more complex imputation method that also directly takes account of returns to capital. Despite its sophistication, the ABS method may not be the more reliable, especially given the difficulties in measuring the capital stock. As in the previous chart, the data relate to the fiscal year ending from 1995 to 2013.

Sources: As above, but also ABS, 2013, *Estimates of Industry Multifactor Productivity*, Cat. No. 5260.0.55.002.

Figure 12.15 The labour share 'gap'

The difference between the construction labour share and other industries



^a Selected industries exclude some market sector industries where measurement problems existed prior to 1994-95. The data relate to 1989-90 to 2012-13.

Source: ABS, 2013, *Estimates of Industry Multifactor Productivity*, Cat. No. 5260.0.55.002.

INFORMATION REQUEST 12.1

The Commission seeks information on the extent to which wages growth has exceeded productivity growth for non-dwelling construction and civil and heavy engineering construction activities.

Construction productivity

Master Builders Australia have emphasised the importance for productivity growth of the creation of the BIT and then the ABCC:

Research on total factor productivity shows that productivity in the building and construction industry grew by 13.2 per cent between 2003 and 2007, whereas productivity grew by only 1.4 per cent between 1998 and 2002. While these productivity indicators are not directly comparable, they all indicate that the timing of improvements in the building and construction industry coincides with the timing of improved workplace practices. (sub. 88, p. 6)

There is clear evidence that labour, capital and multifactor productivity improved significantly in the years immediately after 2001-02 (chapter 9), and therefore coincident with the creation of the BIT. This was in contrast with the market sector as a whole, where productivity growth was weaker than the preceding years.

However, notwithstanding the likelihood that the BIT and the ABCC had some positive productivity impacts, it is less clear that the raw aggregate productivity data provides robust evidence of a link:

- It seems likely that much of this productivity performance reflects the aftermath of the sharp contraction in the construction sector in 2000-01. Output fell by more than 14 per cent, and then rebounded in the subsequent two years. Smoothed data that partially control for the business cycle suggest that the growth in productivity was weaker than suggested by the raw data, but still reveal an acceleration of productivity after the creation of the BIT
- Multifactor productivity growth stalled after the creation of the ABCC (compared with the strong growth after the creation of the BIT). To the extent that it is measured well, multifactor productivity provides a superior measure of the changing technical efficiency in an industry over time
- The data are flanked by exceptionally high productivity growth rates in 2002-03 and 2011-12. These may be outliers in the data. If the period from 2002-03 to 2010-11 is considered (the bulk of the years of the operation of the BIT/ABCC), then the average labour and multifactor productivity growth rates are considerably lower than the period from 1989-90 to 2001-02.

The Independent Economics evidence

Independent Economics (IE), previously Econtech, undertook research for the ABCC and subsequently MBA on the effects of the BIT/ABCC on productivity in building projects (Econtech 2007, 2008; Independent Economics 2012, 2013; KPMG-Econtech 2010). The series of studies have been highly influential in debates about the effectiveness of the ABCC on construction productivity, and by inference, relevant to various conjectures about the degree to which diminished union power affects productivity at the macro level. Most umbrella groups representing construction and other businesses have highlighted the studies and claimed that they are valid. The studies comprise the most important stream of systematic empirical research in support of the wider *economic* benefits of the changes to IR arrangements in the construction industry. The validity and interpretation of these studies are therefore key issues.

IE's evidence took two forms.

One was based on comparing actual productivity growth with that predicted from historical experience. This showed that actual productivity growth exceeded that predicted, and by an ever growing margin. IE noted:

In 2010, actual construction industry productivity was approximately 12.6 per cent higher than predictions based on its relative historical performance. This indicates that improved workplace practices have lifted labour productivity in the building and construction industry. (Independent Economics 2013, p. 15)

No statistical model (or specification tests of that model) was provided for this definitive conclusion, so the model's appropriateness cannot be tested. The deviation of its out-of-sample predictions from observed productivity levels cannot reliably be ascribed to a new IR regime unless alternative explanations are ruled out (such as misspecification or a host of other factors that influence productivity). The likelihood of misspecification error is high given the short period of time on which the model is based. The Australian Council of Trade Unions (sub. 95, pp. 14–21) demonstrated many of the potential problems with the inferences drawn by IE's modelling approach. As it stands, IE's predictive model should be given little weight.

IE's second modelling approach was, in principle, more soundly based and drew on micro cost data for non-dwelling construction compared with dwelling construction. (In that regard, the results may not have significance for civil and heavy engineering projects, which are also a major focus of this inquiry.) The basic logic and empirical conclusions of IE's approach is as follows.

Dwellings are largely free of union influence, and are built predominantly by independent contractors. In contrast, unions play a major role in non-dwelling construction projects, and can exert their bargaining power in multiple ways, which may affect onsite productivity.

Some tasks are common to dwelling and non-building construction such as building reinforced slabs, erecting a carpentry wall and painting doors. While IE initially undertook studies based on eight building tasks, it took account of criticisms about their appropriateness, and subsequently reduced the comparisons to six tasks. IE combined the costs of the various tasks into a composite index.

The costs of performing those tasks are higher in non-dwelling construction than in dwellings (using Rawlinsons detailed costing data for the industry⁴⁴). However, Toner (2003, p. 3) correctly points out that the nature of at least some of the tasks in the two segments of the industry is different in character. Non-dwelling construction is more complex in design, involves multi-story buildings and requires the organisation of large construction sites. This undermines the usefulness of any comparisons in the *levels* of unit costs. However, IE did not give emphasis to the different levels of unit costs, but to the differences in the growth rates in the unit costs between the two industry segments. By taking differences, IE at least partially controlled for the variations in the complexity in, or other engineering differences between, the tasks.⁴⁵

IE's main conclusion from this sequence of analyses is that there was convergence in costs, and that this could be attributed to improved productivity resulting from the operation of the ABCC and the weakening of union power. IE also tentatively concludes that the creation of the FWBC had reversed the beneficial effects of the ABCC.

There are several difficulties with these conclusions.

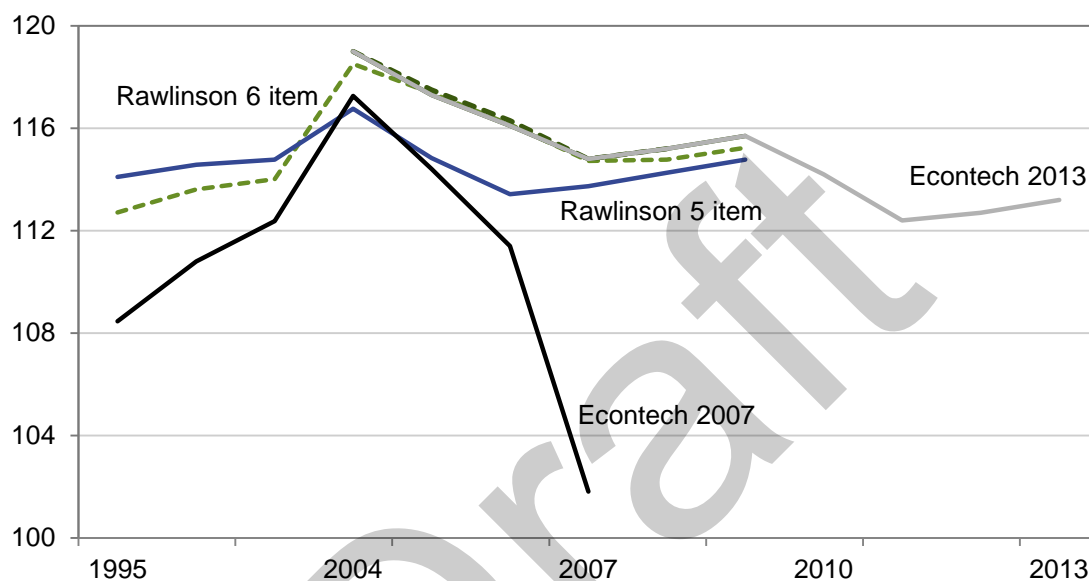
First, no judgment can be made about the effects of the FWBC from the data currently available. There is only one year of data and the conclusion ignores the fact that, even during the ABCC period, relative costs sometimes rose.

⁴⁴ Rawlinsons is a business comprising quantity surveyors and construction cost consultants. It produces an authoritative annual report on costs by building type at a highly disaggregated level. No party arguing about the validity or otherwise of the IE reports cites Rawlinson's data as the source of the problem.

⁴⁵ In modelling terms, IE adopted a 'difference in difference' or fixed effect model, which has many advantages in separating the influence of fixed characteristics from the impacts of policy changes.

Second, over a longer period, the link between the IR regimes and productivity is not robust (as suggested by the detailed analysis of Allan, Dungan and Peetz 2010). Econtech (2007) originally produced a measure of the relative costs for the period prior to 2004. This revealed a sharp reduction in relative costs compared with the average over the pre-2004 period (figure 12.16).

Figure 12.16 Is there cost convergence during the ABCC era?
Relative building costs between commercial and residential buildings



^a Econtech (2007) originally produced a measure of the relative costs for the period prior to 2004. However, in subsequent reports, the data series commence in 2004, after the establishment of the BIT. Econtech/IE made an error in its 2007 analysis, which they subsequently amended, and which substantially changed the picture of changing costs.

Source: (Allan, Dungan and Peetz 2010) and various Econtech and Independent Economics issues of the construction cost reports.

This large reduction was the basis for the original contention that new IR arrangements had dramatically reduced costs. The sharp reduction reflected an inadvertent data error by Econtech, which it subsequently corrected. Yet the strong conclusions reached on the basis of the 2007 study have persisted. In subsequent reports, the data series commenced in 2004, which is *after* the establishment of the BIT. Econtech noted that one reason for reducing the length of the period was that the costs of one of the tasks underpinning the analysis appeared to be subject to a series break. But using a composite cost index based on the five remaining building tasks addresses this problem. Over the long run, it appears that there has been

convergence *back* to the pre-BIT/ABCC cost relativity.⁴⁶ It is nevertheless true that, since 2004, the cost relativity has trended down.

Third, even if the IE numbers were robust, concluding that IR is the exclusive factor explaining the trend fails to consider a range of rival explanations and considerations:

- the method used by IE assumes that technological and managerial change is the same in dwellings and non-dwelling construction — an assumption that deserves more scrutiny. For example, the adoption of improved management approaches to large building sites, the use of pre-fabricated technologies and changes in labour and capital input prices facing the two segments could affect unit costs in non-dwelling construction by more than dwellings construction.
- aggregate productivity trends in construction do not appear to be rising throughout all of the years in the BIT/ABCC era
- the story at the jurisdictional level provides mixed evidence. The ABCC's focus was on Victorian building sites, where there is a higher degree of industrial unrest and litigation before the courts than in other jurisdictions (as discussed above). It could therefore be expected that findings of reduced cost relativities would mainly relate to Victoria, and not to other states. The evidence provides some support for that contention. On the other hand, in Queensland, relative costs actually increased for the first four years of the ABCC, and then fell significantly from 2009. It would be expedient to assume that the Victorian evidence favours the IE conclusion, while ignoring the implications of the Queensland data (which suggest other factors have played a role).

Accordingly, while IE's methods are more sophisticated than suggested by some critics, the conclusions are not robust. It would be useful to:

- examine more data prior to 2004
- assess how much of the effect reflected input price changes, and especially the potentially differential impact of the end of the mining boom on capital and labour costs in the non-dwelling versus dwelling sector
- assess whether the benchmarked building tasks would be representative of building construction costs generally

⁴⁶ IE also produce estimates that suggest the extent to which lower relative labour cost growth explains the narrowing of the relative costs of commercial and residential building costs. These calculations seem to be mathematically incorrect (and indeed the effects would be *larger* were the calculations correct), but more particularly, the underpinning assumptions would result in a large reduction in the labour share of dwelling construction, which seems unlikely.

- test whether, over a longer period, variations in strike activity and duration were correlated with the differential cost growth rates in the two market segments.

As it stands, without further investigation, IE's results are neither reliable nor convincing indicators of the impact of the BIT/ABCC. Major business consulting firms have expressed doubts as well (ACG 2013; PwC 2013a, p. 8). For example, Allen Consulting argued in a report to the Business Council of Australia:

It is not feasible to link the size of the productivity shock to definitive evidence of recent performance. Events that have given rise to concerns about industrial relations unrest are too recent to appear in economic statistics. (ACG 2013, p. 39)⁴⁷

INFORMATION REQUEST 12.2

The Commission seeks feedback on any alternative explanations of the differences in the growth rates of input costs between the dwelling and non-dwelling construction segments of the industry, and whether the patterns found for building construction have broader applicability to other forms of public infrastructure.

What can we conclude about productivity and IR?

Given the micro evidence, there is no doubt that productivity is adversely affected by union (and associated employer) conduct on some building sites. However, notwithstanding the plausibility of some link, the aggregate empirical evidence is not strong enough to substantiate that the BIT/ABCC regime created any resurgence in productivity (or that the removal of the ABCC has had any material effect).

However, weak evidence of the existence of an IR effect does not equate to proof that *no* effect exists. It is quite possible that an effect could exist but would be undetected given the confounding influences of unobservable factors. It is less likely that a major impact would be undetected in empirical analysis. Accordingly, while the contention that the new tougher IR regime instituted with the creation of the BIT generated a part of the shift in productivity seems reasonable, it is unlikely to have been the exclusive factor sometimes suggested.

⁴⁷ On the basis of previous productivity evidence (including that of Econtech/IE), Allen Consulting nevertheless examined the impacts of a 2 per cent hypothetical increase in labour costs. Exploring hypotheticals in economic analysis can be insightful and is a legitimate modelling approach. However, it is also easy for commentators to confound an *assumed* shock to the costs of the IR regime with an *estimated* one (as has sometimes occurred).

DRAFT FINDING 12.1

There is no robust evidence that the new industrial relations environment specific to construction had significant effects on the costs and productivity performance of the construction industry as a whole. However, for some segments of the industry and specific project sites, there remains evidence of unlawful conduct, overly generous enterprise bargaining arrangements, and other problematic industrial relations arrangements that are inimical to productivity and costs.

12.7 The scope for improving the IR environment

On face value, the fragility of the link between the industrial environment in the construction industry and productivity and costs might suggest that little policy action is required. However, as section 12.6 demonstrates, the proponents for IR reform have chosen to emphasise empirical evidence ill-suited to the verification of the problems of the current system.

A more disaggregated assessment suggests that significant problems still occur (section 12.5). Multiple reviews have found criminal conduct and intimidation as a feature of certain projects, and this appears to be a continuing feature of the industry. A Royal Commission is about to consider fresh allegations of unlawful conduct by employers and unions in the construction industry.

Cases before the Federal Court of Australia have revealed industrial tactics designed to secure common and generous conditions across project sites and to unduly pressure parties to join unions. The nature of the construction projects provides unions with significant leverage, which they sometimes abuse. Businesses are exposed to large delay penalties, and high costs if construction work is interrupted (such as during a concrete pour). Bargaining pressures have increased some project costs, particularly in the building construction segment of the construction industry (as revealed by the excessive pay and conditions in some projects).

For particular projects, the nature of the project, the relevant union and delegates, the negotiating competencies of parties, and the incentives of the head contractor can lead to costly, combative and problematic outcomes. So while many projects may not be dogged by problems, some have involved toxic relationships.

Further, while the current system is designed to allow individual businesses to negotiate terms and conditions with their employees that suit the circumstances of both the business and employees, various pressures by the head contractor and the principal unions can lead to the implicit adoption of pattern bargaining (which leads to the same agreements across all subcontractors on a site).

The most promising policy approach is for Australian governments to use their purchasing power as a countervailing measure against conduct that leads to high costs, ‘sweetheart’ deals and coercion. This could be achieved as a policy change through adoption of guidelines modelled on those of the Victorian Government. As non-statutory provisions, they have the advantage that governments can use them proportionately and amend them as necessary. Using governments’ procurement in this way mimics normal market competition, in that businesses and workforces that strike costly bargains would lose out to others that more closely aligned productivity and labour costs.

The Commonwealth could encourage the Australia-wide adoption of building code guidelines similar to those of Victoria in several ways:

- where the Commonwealth is the procurer, it would apply the Victorian code to its tenderers
- where the Commonwealth is a funder of state and territory projects, it would require compliance with a code embracing the Victorian principles as a precondition for funding.

Equally, there are grounds for experimentation with greater civil penalties for unlawful conduct, especially given that some parties have been repeat offenders, and that the costs of disputes and excessive bargaining power ripples throughout the various tiers of the construction industry (and associated suppliers) and ultimately results in higher contract prices. These prices must be borne by taxpayers or infrastructure users. A higher ceiling on penalties would provide the Federal Court with the greater discretion to impose penalties that take account of the likely economic damages of any conduct and the degree to which the penalty might reduce recidivism.

Policy measures that reduce any barriers to entry to second tier construction businesses (chapter 10) would also undermine the capacity for overt or covert sweetheart deals by other head contractors.

The role and powers of a specialist construction industry regulator

The appropriate form and powers of the specialist IR regulator has been an enduring and contentious issue. The reaction to the ABCC has been polarised. Many business groups have called for the re-establishment of the ABCC, while unions have been strongly hostile to any such initiative. A number of inquiry participants have indicated that the issue is ‘neither here nor there’ when it comes to infrastructure construction.

Of course, the name of an organisation is an irrelevant concern. The key issue is whether the powers, structure and governance of the agency efficiently achieve the desired goals of an IR system. The goals are widely agreed upon — the even-handed maintenance of industrial harmony and the associated prevention of unwarranted disputes, the protection of employees, and the discouragement of unlawful conduct by employers and employees. Any governance arrangement must meet the usual standards of probity, respects for individual citizens' generally accepted legal rights, accountability, impartiality and independence from stakeholder influence. In that respect, putting aside its specific IR objectives, the issues relating to the design and governance of any IR regulator are not much different from a myriad of other economic and social 'regulators', such as the Australian Competition and Consumer Commission, the Australian Tax Office, various state and territory agencies that regulate safety, and, for that matter, the police.

Certainly the Cole and to a lesser extent the Wilcox reviews considered there were grounds for coercive powers beyond those applying to the generic regulator of IR. However, in principle, the optimal duration of any such powers and their form should be tested based on their relative performance compared with alternative mechanisms, including those in the generic IR system.

Regardless, establishing nationwide building code guidelines sets up strong incentives that will reinforce the capacity of any specialist regulator to control unlawful conduct and monitor the IR practices of contractors and unions.

Finally, policy initiatives are not a cure all for problematic IR in the construction industry. Many employers, employees and unions bargain in good faith and without hostile relationships. A critical aspect of the IR system is simply the competence of the parties to negotiate with each other.

DRAFT RECOMMENDATION 12.1

All Australian governments should adopt the Victorian building code guidelines (or ones with an essentially similar framework) for their own major infrastructure purchases. The Australian Government should require compliance with these guidelines as a precondition for any infrastructure funds it provides to State and Territory Governments.

DRAFT RECOMMENDATION 12.2

The Australian Government should increase the ceiling of penalties for unlawful industrial relations conduct in the construction industry.

DRAFT REPORT

This draft report is no longer open for consultation. For final outcomes of this project refer to the inquiry report.

Draft

13 Workforce Skills

Key points

The evidence on skills shortages and their impacts on infrastructure construction is patchy. While survey results are common, they are not conclusive. As such, it is generally only possible to infer the effects of skills shortages on construction costs.

One of the most important drivers of skill shortages in infrastructure construction has been the intermittency of construction projects. Intermittency results in difficulty in retaining staff, leading to a lack of staff with significant industry-relevant experience. It can also reduce the employer's incentive to provide training beyond immediate needs.

- Prospective improvements to intermittency would be possible if the Commission's suite of recommendations are adopted — this could have a significant indirect effect of improving incentives for employers to provide training and for employees to remain in the industry.

Nevertheless, the ramping up of major construction projects in the last decade could not be considered to be a typical reference period for major infrastructure. Temporary shortages in such conditions are unsurprising.

Several occupations relevant to infrastructure construction, including engineers, technicians and operators, have been in apparent shortage at various points since the early 2000s. However, the most recent data suggests shortages are decreasing.

The persistence and severity of the shortages have varied across occupations; levels of experience and seniority; and jurisdiction.

- Most occupations require some years' experience before reaching proficiency. The shortage of engineers has been strongest for those with 14 to 18 years' experience.
- Major projects have a relatively greater need for experienced staff.

Evidence suggests that skill shortages are unlikely to account for a large proportion of overall construction costs. About 11 per cent of respondents to a survey of engineers had observed cost increases or delays caused by skill shortages. Around 3 per cent saw projects that did not proceed due to skill shortages in 2012 — down from 8 per cent in 2008 and 2009.

As construction projects become less intermittent, better projections of labour demand will be possible. Such projections can be used to inform both private and public investment in training, as well as the levy rates and conditions of training funds.

The coverage of types of occupations and training should also be reviewed to ensure that access to training funds is not deterred by classification.

The importance to this inquiry of skill shortages, skill gaps and recruitment difficulties rests equally on two factors: the extent to which they are apparent in infrastructure construction; and the extent to which they are significant drivers of construction costs. Several other inquiries both past and present have investigated skill shortages in their own right.⁴⁸

This chapter investigates skills shortages relevant to infrastructure construction, based on past analysis, contemporary statistical evidence and stakeholder submissions. It first considers the evidence for skill shortages in occupations relevant to major public infrastructure (section 13.1). It then considers evidence regarding the impact of skill shortages on infrastructure construction costs (section 13.2). The drivers of these skill shortages are then explored in section 13.3. The chapter then addresses the main question underlying this analysis — whether further government action on skills could benefit the long term productivity, cost and efficiency of public infrastructure construction (section 13.4).

13.1 Evidence of civil construction skill shortages

An initial question for this chapter relates to whether the availability of specific *skills* is more relevant to infrastructure construction than the availability of *labour* more generally. A priori, specific skills are likely to be highly relevant to public infrastructure construction as the workforce on major construction projects tends to be made up of specialised occupations (box 13.1). This specialisation may come in the form of education and certification, but it is also likely to come in the form of knowledge and experience gained on the job. In fact, much of the specialisation is industry specific — engineers, technicians and operators are unlikely to be working on roads one day and gas pipes the next day. As such, while there are potentially labour shortages in the industry, any shortages applying to a specialised and skilled occupation is better characterised as a skill shortage.

A lack of workforce skills will also require different policy responses than would an overall shortage of labour. As Richardson (2007) points out, free working markets are capable of dealing with labour shortages by attracting new applicants through higher wages. However, if there are shortages in particular skills, it is less likely that

⁴⁸ Inquiries into skill shortages include: NSW Legislative Assembly inquiry into skill shortages currently being undertaken by the Economic Development Committee (currently being undertaken); Senate Education, Employment and Workplace Relations Committee *Inquiry into the Shortage of Engineering and Related Employment Skills* (2012); Victorian Education and Training Committee, *Inquiry into skill shortages in the rail industry* (2010); Queensland Legislative Assembly Public Accounts Committee, *Addressing Skill Shortages in Queensland* (2008).

wage movements could quickly resolve them, as it would take time to build up or develop such skills. Addressing skill shortages may, therefore require policy intervention. Even where governments avoid direct intervention, they already have ongoing involvement in areas affecting skills through policies relating to education, training and taxation.

It is also useful to make the distinction between skill shortages, skill gaps and recruitment difficulties (box 13.2). The available empirical evidence is often better at observing skill shortages and recruitment difficulties rather than skill gaps.

Box 13.1 Infrastructure construction workforce

Infrastructure construction projects require several types of specific occupations. While an exhaustive list would be difficult, most occupations could broadly be classified as: managers; engineers; surveyors; technicians; tradespersons; plant operators; constructors; or labourers.

These occupations are generally specialised according to the types of infrastructure constructed. For instance, this inquiry is mainly concerned with the construction of:

- transport networks such as road, rail, ports, airports
- water and sewerage networks
- energy networks including gas pipes and electricity lines
- telecommunications networks.

Further specialisation exists within each broad category of infrastructure — for instance, within road networks, some engineers, technicians or constructors might have specific experience in building bridges or tunnels. Engineers tend to be specialised both in their education and their on-the-job experience — there are several separate engineering occupations relevant to infrastructure construction, for example, chemical and materials engineering, civil and environmental engineering, and electrical and electronic engineering. Similarly, road constructors tend not to be interchangeable with rail constructors without retraining.

Box 13.2 Shortages, gaps and recruitment difficulties

A *shortage* occurs when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available and willing to work under existing market conditions, and if the supply is greater than demand then there is a surplus. Over time, the market might adjust in a number of ways, including price and/or quantity adjustment, and the imbalance clears.

A *skills gap* refers to a situation where employers are hiring workers whom they consider under-skilled or that their existing workforce is under-skilled relative to some desired level.

Recruitment difficulties refer to the situation when employers cannot fill vacancies in spite of an adequate supply of workers. The reasons for this may be varied. They could include such things as relatively low remuneration being offered, poor working conditions or image of the industry, unsatisfactory working hours, commuting difficulties, ineffective recruitment effort by the firm or skills needs that are very specific to the firm.

Source: Shah and Burke (2003).

Trends and evidence of skill shortages

Given that this inquiry focuses on infrastructure construction, which spans several distinct construction activities (such as road, rail, ports, airports, telecommunications and energy infrastructure), collecting a comprehensive dataset on the relevant workforce is challenging. For example, Skills DMC and the Civil Contractors Federation (2010) decried there being ‘no detailed figures available’ regarding the size of the workforce for civil construction, though they estimate it to be in the range of 350 000. Furthermore, much of the available workforce data are classified according to the Australian and New Zealand Standard Classification of Occupations (ANZSCO), which is often too broad to pinpoint particular occupations of interest like ‘road constructor’ or ‘bridge constructor’ (Skills DMC and Civil Contractors Federation 2010, p. 4).

As such, official data on skill shortages is necessarily supplemented by other sources including industry surveys and stakeholder comments. The comments and submissions of stakeholders to this inquiry and to other inquiries on skill shortages suggest that there have been some significant skill shortages in the industry in the last few years (box 13.3).

Box 13.3 Stakeholder comments on skill shortages

It is well recognised by governments, employers, academics and the unions that the building and construction industry is facing a shortage of skilled workers. (CFMEU 2010)

Over the six months to September 2012, a higher proportion of firms expect major or moderate difficulty in the recruitment of qualified labour (69.7%), sourcing of subcontractors (54.5%) and the hiring and purchasing of equipment (36.3%). (Australian Constructors Association 2013, p. 3)

Engineers are globally in short supply, with Australian higher education providers producing only around half of the graduates needed to fill domestic demand, and in this environment systemic cultural issues, low numbers of women in education and in the workforce and an ageing workforce have produced widespread issues with retention and sustainability.

The problem is not just qualified engineers but those generally involved in civil construction and infrastructure renewal. (Institute of Public Works Engineering Australia NSW 2013, p. 4)

The Issues paper for this inquiry rightly acknowledges a shortage of civil engineers. But demand depends on experience, so from a graduate engineer's perspective the opposite problem exists – the barriers to entry are so high that some have quit the industry completely while others are reliant on Centrelink. Because so much depends on tenders (which are hard to win at the best of times) the prospect of future income is uncertain, therefore small engineering firms are often reluctant to take on more staff, and starting a successful engineering business is very difficult. (Aidan Stanger sub. 71, p. 4)

In a highly competitive environment where clients invariably choose the lowest tender, SMEs are reluctant to spend scarce funds on up-skilling their staff, except in the areas of compliance such as OHS. (Victorian Civil Construction Industry Alliance sub. 28, p. 8)

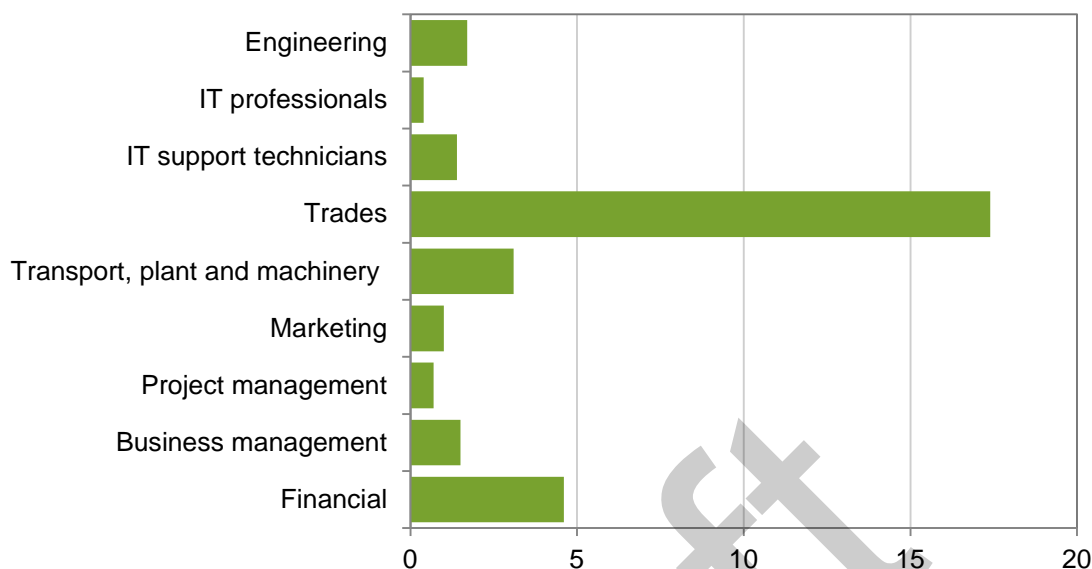
Sources: (Australian Constructors Association 2013; CFMEU 2010; Institute of Public Works Engineering Australia NSW 2013).

Shortages in specific occupations

Evidence for skill shortages can differ slightly according to the scope and timing of the data. A snapshot by the ABS shows that in 2011–12, the difficulties in hiring trades were particularly widespread in the construction industry (figure 13.1).

Several occupations relevant to infrastructure construction have shown persistent skill shortages over the past ten years at the national level (table 13.1). This represents situations where employers have ‘considerable difficulty’ filling vacancies or skill needs for an occupation at current levels of remuneration, conditions, and in accessible locations (Department of Employment 2013, p. 5).

Figure 13.1 Skill shortages and deficiencies in construction
Per cent of respondents who observed a shortage or deficiency



Data source: ABS 2013, *Selected Characteristics of Australian Businesses, 2011–12*, cat. no. 8167.0.

Table 13.1 Skill shortage ratings for selected construction occupations^a
Green shading denotes an observed skill shortage

ANZSCO title	1986–2003 2002	2004	2005	2006	2007	2008	2009	2010	2011	2012
Construction Project Manager										
Engineering Manager										
Surveyor										
Urban, Regional Planner										
Civil Engineering Professionals										
Quantity Surveyor ^b										
Civil Engineering Draftspersons Technicians										

^a The cells shaded green denote an observed skill shortage. ^b For Quantity Surveyors, skill shortages were observed for some years between 1986–2002 but not all. There were four such years with observed skill shortages for Quantity Surveyors — 1986, 1987, 1988 and 1990.

Source: Department of Employment unpublished data.

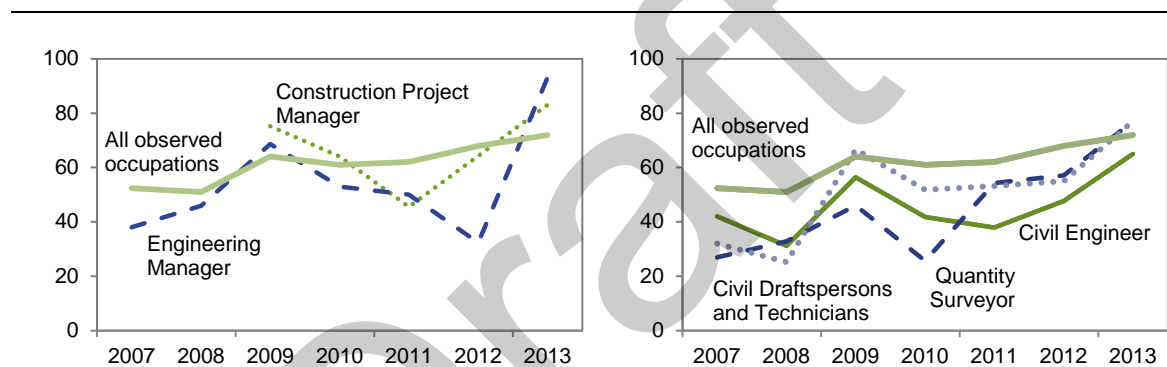
Some occupations that have had persistent shortages in the past ten years did not have any observed shortage in the preceding sixteen years (table 13.1). Hence, for

many occupations, skill shortages of this magnitude have not been a regular occurrence that could be predicted easily according to cyclical factors.

The recruitment experiences of employers give some insight into how skill shortages have fluctuated over time. The Commission analysed Department of Employment data showing the proportion of job vacancies that were filled within four weeks (for trade occupations) or within six weeks (for professional occupations) (figure 13.2). For several relevant occupations, the rate at which these vacancies were filled has tended to be lower than the average of all surveyed occupations between 2007 and 2012, though it appears to have changed in 2013.

Figure 13.2 Proportion of vacancies filled^a, selected construction occupations

Per cent



^a Vacancies were observed to be 'filled' if they had been filled within a six week period for professional occupations or a four week period for other occupations.

Data source: Department of Employment unpublished data.

As mentioned earlier, shortages in some occupations are more difficult to observe, as they may be obscured by the ANZSCO classifications. For instance, industry data shows that occupations such as road and bridge constructors are currently seen as 'priority occupations' in some areas (table 13.2), consistent with what the Commission has heard anecdotally.

Table 13.2 Priority occupations to 2012

Number of workers

Occupation	Total new and additional workers required to 2012
Leaders and supervisors	8478
Bridge Constructors	1413
Pipe Layers	2862
Plant Operator	8080
Road Constructor	7572

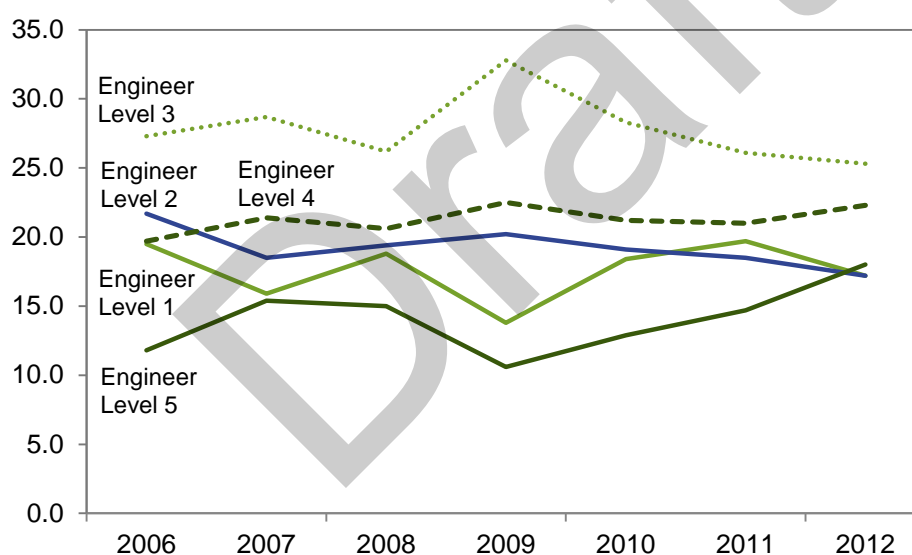
Source: Institute of Public Works Engineering Australia NSW (2013, p. 5).

Shortages of experience

Some industry studies have highlighted skill shortages at particular levels of seniority. Different levels of seniority generally reflect differences in years of on-the-job experience — a fact not well reflected in ANZSCO skill levels (Skills DMC and Civil Contractors Federation 2010, p. 5). As such, skill shortages observed by the Department of Employment are unlikely to account for different skill levels within each occupation.

Engineers Australia (sub. 26) showed that recruitment difficulties between 2006 and 2012 were worst for ‘level three’ engineers (figure 13.3). Engineers at this level are able to both ‘independently exercise engineering decisions’ and ‘supervise other engineers’ (Engineers Australia, sub. 26, p. 11).

Figure 13.3 Engineering Responsibility Levels and Recruiting Difficulties
Responsibility levels increase from level 1 to 5



Data source: Engineers Australia sub. 26, p. 10.

Shortages by jurisdiction

Neither the demand nor supply of skilled labour are uniform across jurisdictions, with recruitment difficulties and skill shortages occurring separately in the various states and territories (table 13.3). Nonetheless, shortages may also be widespread, as with civil engineers in 2012.

Table 13.3 **Skill shortages by jurisdiction in selected occupations, 2012-2013**

	<i>Civil Engineering Draftspersons and Technicians</i>		<i>Civil Engineering Professionals</i>	
	2012	2013	2012	2013
New South Wales	■ Shortage	□ No shortage	■ Shortage	■ Recruitment difficulty
Victoria	■ Recruitment difficulty	□ No shortage	■ Shortage	□ No shortage
Queensland	■ Regional shortage	□ No shortage	■ Shortage	□ No shortage
South Australia	□ No shortage	□ No shortage	■ Shortage	□ No shortage
Western Australia	■ Recruitment difficulty	na	■ Shortage	■ Recruitment difficulty
Tasmania	■ Shortage	■ Recruitment difficulty	■ Shortage	■ Shortage
Northern Territory	■ Shortage	□ No shortage	■ Shortage	□ No shortage
Australian Capital Territory	■ Shortage	□ No shortage	■ Shortage	□ No shortage

Sources: Department of Employment (2013, ANZSCO 2332 Civil Engineering Professionals; 2013, ANZSCO 3122 Civil Engineering Draftspersons and Technicians).

13.2 The impact of skill shortages on infrastructure construction costs

Given that some level of shortage has occurred for construction occupations in recent times, an important further question for this inquiry is whether these shortages have had any significant impact on the cost and efficiency of public infrastructure construction.

A true shortage in any critical occupation can be expected to have impacts on several aspects of construction projects. In the extreme case, it has been suggested that the shortage of engineers was a contributing factor to serious incidents such as the Lane Cove Tunnel collapse (Senate 2012, p. 49). More commonly, the concerns are that a lack of workforce skills will reduce the quality or quantity of output; increase input costs; lead to time overruns; or increase the risk of future incidents. In an industry survey, engineers noted that the underutilisation of their skills within their organisation had several consequences:

- 34 per cent identified an impact on efficiency and effectiveness
- 25 per cent identified an impact on productivity
- 17 per cent identified a loss of organisational capability
- 11 per cent identified an impact on cost and project delays

-
- 9 per cent identified a loss of morale or demotivation as a result. (ANET 2010, p. 7)

While these survey responses do not provide information on the quantum of cost increases or number of delays caused by engineer shortages, it is significant that 11 per cent of engineers responding to the survey had observed such impacts. Moreover, this survey relates only to shortages of engineers — if shortages of technicians, operators and constructors were to have similar impacts, then many more organisations could be expected to have experienced increased costs or delays.

This section considers three main areas where skill shortages are likely to affect the cost and efficiency of construction projects: wage cost increases; project delays; and the decision not to bid for or continue with a given project.

Wage pressure

The Commission has heard anecdotally that shortages in some occupations have led to upward wage pressure, although quantifying this is difficult. For the various tradespersons, technicians and labourers covered by enterprise agreements, this wage pressure can be difficult to disentangle from the influence of various factors of the industrial relations system (discussed in chapter 12). For instance, enterprise agreements have at times involved annual improvements in wages or conditions for up to four year terms (Australian Constructors Association sub. 72, p. 14), whereas both skill shortages and recruitment difficulties have been shown to change from year to year (table 13.1, figure 13.2). Moreover, from discussions with a number of market participants, the Commission considers it unlikely that wages fell in subsequent enterprise bargaining agreements, even if skill shortages were no longer apparent.

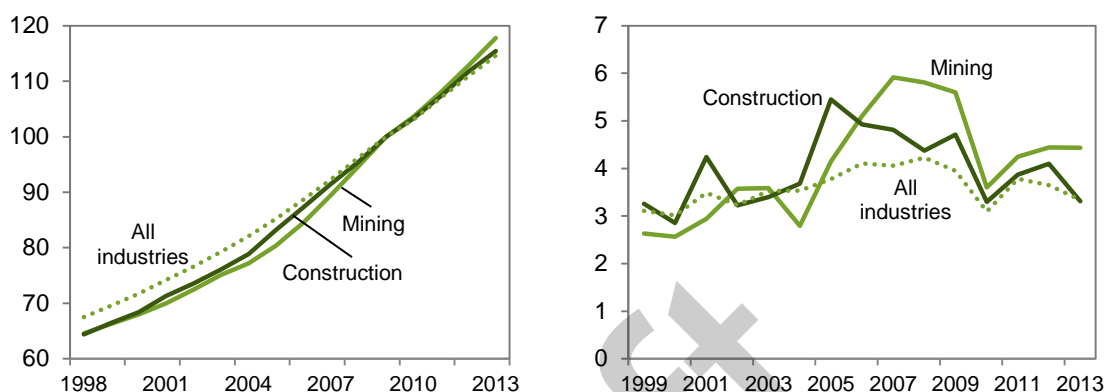
The overall wage costs of the construction industry can be approximated by the ABS Wage Price Index (figure 13.4). The data shows that from around 2003, construction wages began to grow at a faster rate than the average of all industries. While this is broadly consistent with the existence of skill shortages observed at the time, it does not show how much wage growth is attributed to skill shortages.

GHD Meyrick (2011) point out that the growth in the construction wage index was slowing around 2007–08 (figure 13.4, right panel), at the same time there was a peak in construction costs (chapter 8 figure 8.1). As such, GHD Meyrick argue that wages growth was unlikely to be a major driver of the construction cost increases observed at that time and that skill shortages are unlikely to be one of the major overall cost drivers of construction. While skill shortages alone may not have caused a peak in costs in 2007–08, certainly the increase in wages that began in

2004 had contributed to ongoing cost increases, which was consistent with the timing of skill shortages in some occupations.

Figure 13.4 Construction and mining sector wage costs

ABS Wage Price Index; Annual growth in ABS Wage Price Index



Data source: ABS 2013 (*Wage Price Index, Australia*, Cat no. 6345.0, table 5a).

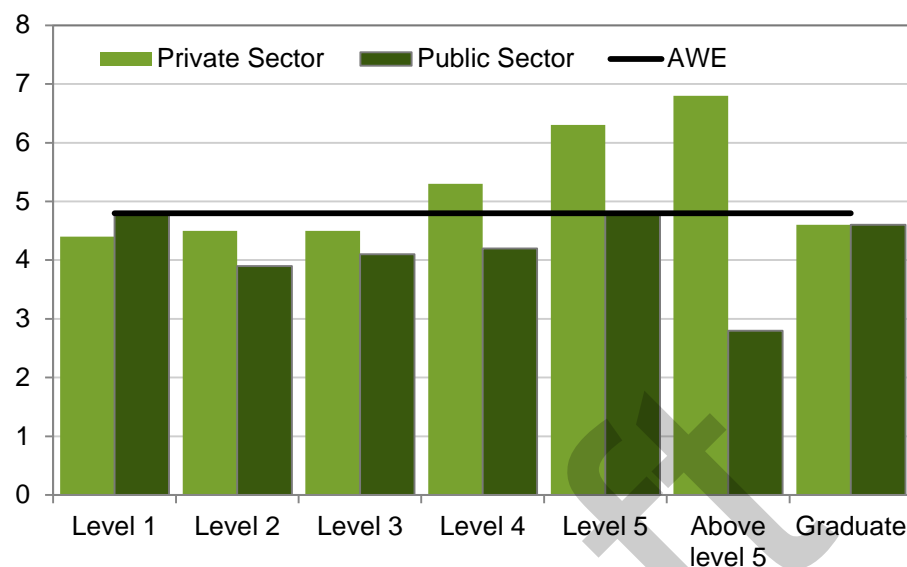
More detailed data is required to consider the true impacts of particular skill shortages. Aggregate data does not address differences from year to year in what kind of infrastructure is being constructed; the project mix in terms of size; and the occupation mix of each project. Neither does the data show how particular occupational shortages may have contributed to wage costs, or how annual fluctuations in wage costs were caused.

Wage increases have also varied within particular occupations. For engineers, who are more likely to have contracts separate to the predominant enterprise agreement, wage growth has differed both according to managerial level and between public and private sectors (figure 13.5). Those employed as graduates up to level 3 have seen less wage growth between 2000 and 2012 than the Average Weekly Earnings (AWE). Those employed in the private sector at level 4 or above have seen their wages grow faster than AWE. As these are general findings for engineers and are not constrained to the construction industry, more detailed data would be useful.

The general wage growth for engineers from 2000–12 appears to be consistent with the presence of skill shortages in the private sector at levels 4 and above. However, the main recruitment difficulty for engineers from 2006–12 has consistently been in level 3 (figure 13.3). This raises the question of whether the apparent recruitment difficulties or skill shortages for these engineers could be partly attributed to slow wage growth rather than skill shortages. Aggregation may be a problem here, as those with persistent shortages for level 3 engineers may not be a large enough minority to influence the average wage.

Figure 13.5 Average annual growth in professional engineer salary packages, 2000–12

Per cent



Data source: Engineers Australia, sub. 26, p. 13.

There is some evidence that those firms who have had difficulty recruiting engineers have had to pay higher wages. An Engineers Australia survey showed that among firms who had difficulty recruiting engineers between 2006 and 2012, between 69 and 82 per cent could not recruit a specific skill set (table 13.4). Between 32 and 58 per cent paid higher salaries than expected.

Table 13.4 Specific experiences of firms who had difficulty recruiting engineers

Per cent of survey respondents who had recruitment difficulties

Difficulty	2006	2007	2008	2009	2010	2011	2012
Could not recruit required skill set	82	80	80	72	77	76	69
Paid higher than expected salary	42	58	58	32	31	43	32
Recruited different skill set and retrained	18	28	28	20	24	23	20

Source: Engineers Australia (2013).

Delays, termination and competitive pressure

Information provided by Engineers Australia (sub. 26) shows several projects either being delayed or abandoned due to a lack of the appropriate workforce skills (table 13.5). Again, these figures do not relate specifically to civil construction. However, they are consistent with other evidence citing skills shortages as the cause

of delays for rail projects in New South Wales (Australasian Railway Association sub. 58, p. 15).

The Commission also heard anecdotally from subcontractors that a lack of a particular skill set has been enough for them to decide not to bid for a project. The Commission also heard from contractors who stated that some areas of subcontracting become much less competitive at times when there are several concurrent projects.

Table 13.5 Reported consequences of difficulties recruiting engineers
Per cent of survey respondents

<i>Consequence</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>
Major problems, including delays & costs	43	42	33	28	29	28	31
Did not proceed with available project	6	7	8	8	4	6	3

^a Results from the Australian Engineers Skills Survey 2006–12. Survey respondents were engineers.

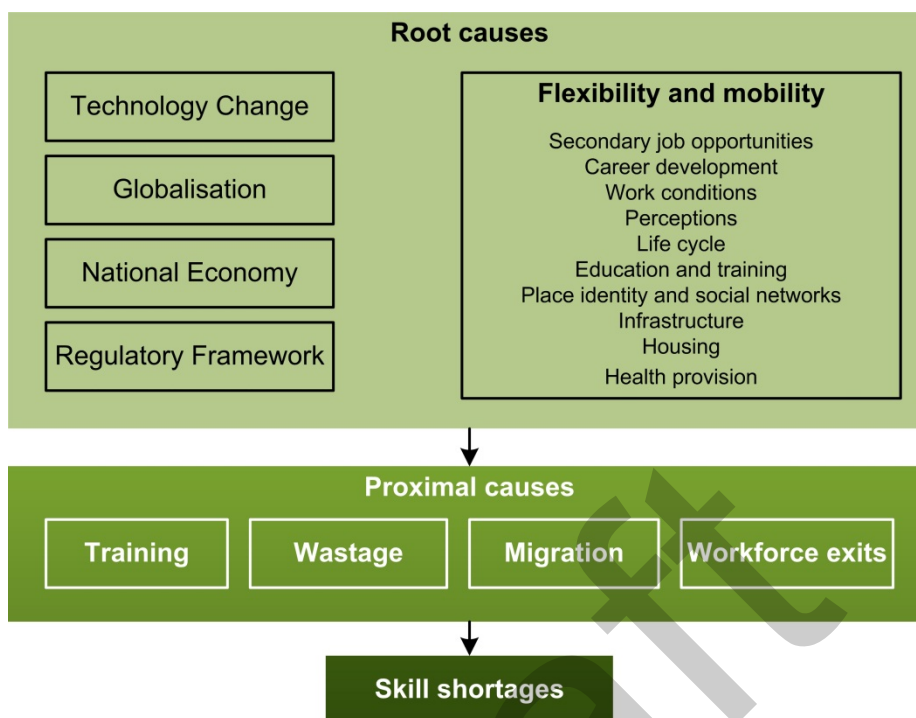
Source: Engineers Australia, sub. 26, p. 13.

13.3 The causes of recent skill shortages

Many factors can contribute to skill shortages. The then Bureau of Transport and Regional Economics (2006) classified some of the most common drivers into broad categories of *proximal* causes, which are immediate and direct, and *root* causes, which are underlying causal factors (figure 13.6). This separation reflects that while some drivers may be observed, quantified and addressed at the industry level, other underlying factors may not be.

The empirical and anecdotal evidence suggests that some of these drivers are more relevant than others to the construction industry, particularly regarding the most recent skill shortages observed. In broad terms, this includes training (including on-the-job experience), exits from the industry, technological change, and migration issues. Exits from the industry are affected by both push factors (issues within the infrastructure industry) and pull factors (opportunities in competing sectors).

Figure 13.6 Drivers of skill shortages



Data source: BTRE (2006, p. x).

Training and formal qualifications

At one end of the scale, there are some occupations that benefit from specialist experience or training but do not involve any formal qualifications. For example, around 51 per cent of plant operators had no formal qualifications in 2009 (Skills DMC and Civil Contractors Federation 2010, p. 4)⁴⁹. The informal nature of training can have implications for people's career progression, access to government training grants, and labour mobility. This is an inevitable part of some occupations, as formal certification may not always be appropriate. On the other hand, it is possible for some occupations to expand their skill needs over time such that certification becomes more appropriate.

Many construction occupations do require formal training, which can vary from apprenticeships and trade qualifications to other tertiary education and professional accreditation. These qualifications vary in the time taken for completion and the depth of training.

⁴⁹ The lack of formal qualifications is not particularly unusual. Nationwide, around 52 per cent of people did not have a formal qualification at Certificate III or above in 2006, dropping to around 42 per cent in 2012 (PC 2012b).

Apprenticeships

Some construction occupations involve apprenticeships and traineeships. Recent experience also suggests that the willingness of employers to employ apprentices and trainees has varied over time and is likely to be affected by business expectations and general business conditions. For example, while there had been an increase in apprenticeships during the first years of the mining boom (box 13.4), the global financial crisis had a negative effect in subsequent years. A joint report between Skills DMC and the Civil Contractors Federation noted that:

... the GFC has clearly had an impact as in the previous survey 65 per cent of the businesses surveyed intended to take on an apprentice or trainee in the period to 2007 to 2009 but the actual figure was some 58 per cent. (Skills DMC and Civil Contractors Federation 2010, p. 53)

The Australian Industry Group (2013) suggested that apprentice numbers are recovering after being significantly affected by the global financial crisis. Its survey showed that in 2012–13, more companies were planning to increase their apprenticeship numbers and fewer planned to reduce their numbers compared to three years earlier. Among companies with apprentices in 2012, 60.5 per cent intended to maintain their apprentice numbers in the next year, while 4.3 per cent of companies planned to reduce their numbers and 35.2 per cent of companies planned to increase their numbers. This compares to 2009–2010 levels, when 36.8 per cent of companies planned to reduce apprentices and 24.5 per cent of companies planned to increase apprentices.

Another issue is that many people who are hired as apprentices do not complete their apprenticeships (table 13.6). Data on completion rates suggests that around half the apprentices in the construction industry complete a full trade — this is true of both employers with large and small apprenticeship programs. The reasons for non-completion are varied, and can include apprentices' perceptions of poor commitment to training from their employers (McDowell et al. 2011, p. 49). There is also evidence that many apprentices lack basic work skills — around 30 per cent of survey respondents were dissatisfied with the basic literacy of school leavers (Australian Industry Group 2013, p. 10). In addition, 42 per cent of employers had difficulty recruiting technicians and trades workers with sufficient skills in Science, Technology, Engineering and Maths (STEM skills).

Box 13.4 Recent trends in apprenticeships

The National Centre for Vocational Research (2011) outlined recent broad changes in the use and administration of Australian apprenticeships:

1999 onwards

National training packages progressively replaced the course and module curricula developed by the states as the specifications for the content and outcomes needed for recognised VET programs, including apprenticeships and traineeships. Schofield and Macdonald (2004) subsequently recommended refinements to improve the conceptualisation, development and implementation of training packages.

This reduced the influence that RTOs have on training programs and increased the role of industry skills councils (ISCs) and employers. More recently, a tendency towards excessive proliferation of units of competency and qualifications has been controlled.

2000-2008

Apprenticeship and traineeship commencements increased during the economic boom, and also stretched the capacity of the apprenticeship system to supply the required numbers of qualified tradespeople in key industries such as mining, building and construction.

This prompted debate about whether skill shortages are inevitable during economic booms, or could governments do more to ameliorate the problem (Richardson 2007)... It also prompted COAG to accelerate reforms such as moving from time-based to competency-based completion of apprenticeships.

Source: NCVER (2011, p. 12 table 1).

Table 13.6 Apprenticeship completion rates in selected industries

Per cent

Industry/ employer	Number of apprentices at the workplace					
	1	2-10	11-25	26-50	50-100	100+
	%	%	%	%	%	%
Construction	50.9	51.7	54.3	52.5	51.7	49.3
Electrotechnology	54.2	56.9	64.0	69.8	72.2	73.6
Engineering/ ICT/ Science	58.5	64.5	67.5	72.1	69.4	68.4
Automotive	49.1	50.9	56.3	60.5	61.0	59.9

Source: McDowell et al. (2011).

Pay rates are also a significant concern for apprenticeship retention, particularly for younger apprentices. For those beginning apprenticeships who are aged under 21 years and have completed year 12 of school, a typical wage structure would be 55 per cent of the equivalent tradesperson classification in year 1, and then 65, 75 and 88 per cent for the next three years of the apprenticeship respectively (Fair

Work Building and Construction 2013).⁵⁰ For example, a first year apprentice welder could expect to be paid \$10.68 per hour including an industry allowance. While these current wage rates reflect increases in first and second year wages implemented on 1 January 2014, it is still likely that many apprentices would be attracted to better paid entry-level positions in other industries.

Higher wages are available for people who begin their apprenticeship after the age of 21 years (referred to as ‘adult apprentices’), as they are entitled to the pay rate of an entry level adult worker⁵¹ (Fair Work Ombudsman 2014). If adult apprentices are already employed when they begin their apprenticeship, then they are entitled to the rate of pay for the classification of work they had undertaken prior to the apprenticeship. However, wages may still be a concern for the retention of adult apprentices, particularly if their alternative wage (based on experience) were much higher than the entry level wage.

Engineering graduates

In terms of engineering graduates, there is little evidence of an overall shortage. While the number of *domestic* graduates has stagnated in recent years, this has been compensated for by international students in Australian universities (figure 13.7). And as with many professions, a large proportion who graduate with engineering degrees do not work in that specific field (Engineers Australia, sub. 26). It is possible that specific engineering fields will vary in terms of the supply of graduates, or that the number of working graduate engineers may not be sufficient to meet the future demand of experienced engineers. However, much more detailed data would be required to establish this.

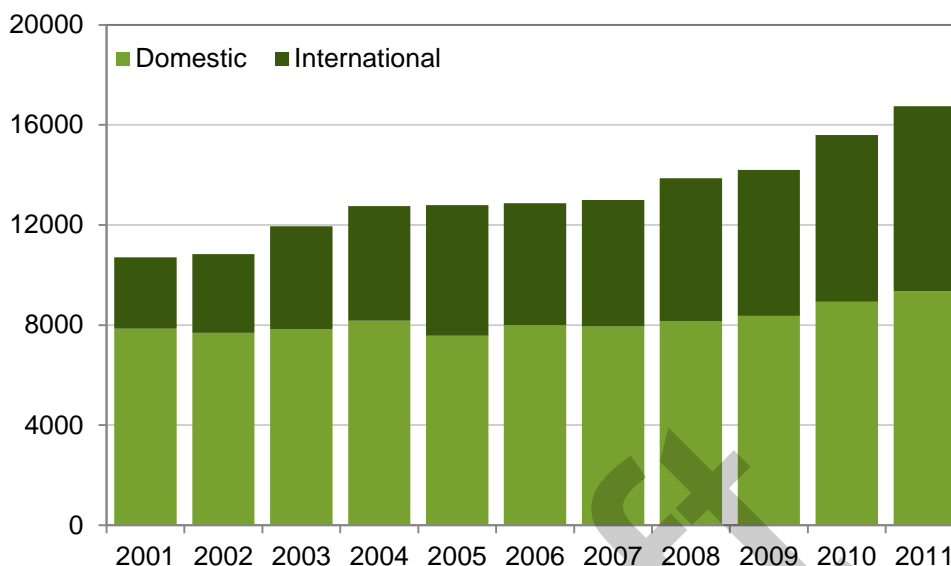
Moreover, the number of *working* graduates in specific fields and industries will also depend on the opportunities afforded to them upon graduation. Anecdotally, the Commission understands that graduate intakes in various industries can fluctuate markedly with business expectations. The willingness of firms to hire graduates likely reflects their needs in the near, foreseeable future — it is unlikely to ‘shield’ them from sudden spikes in labour demand.

⁵⁰ For those apprentices who have not completed year 12, the corresponding wage relativities are 50, 60, 70 and 80 per cent for years 1 to 4 respectively.

⁵¹ If it is higher than the apprentice wage rate, adult apprentices are entitled to the Award level for commencement in the industry is CW/ECW 1 (level a).

Figure 13.7 Engineering graduates from Australian universities

Number of graduates



Data source: Engineers Australia (2013 tables 5.9, 5.10).

It is worth noting that historically, private firms were not the only avenue for engineering graduates to enter the profession. Government departments and agencies had been a significant employer of engineers, creating a further pool of talent for private firms to draw on during boom times. The numbers of engineers in the public service began declining markedly in the early 1990s, as outsourcing increased (Yates 2000). While this would have increased the pool of available engineers at the time, it has increased the reliance on the private sector for hiring graduates, meaning that graduate intakes are more likely to be affected by the immediate needs of businesses: the public sector is no longer a buffer employer.

Technological innovation leads to retraining

Technological change has a significant relationship with workforce skills. Any innovation in design and construction could require retraining to enable workers to properly use the technology. Innovations may include new types of materials that require a particular method of installation, or new methods of installing the same materials (say, laying asphalt). In this sense, even in the absence of any other significant drivers, it can be expected that some retraining will be required to keep up with ongoing improvements in technology in the infrastructure construction sector, as is the case in many other sectors.

PriceWaterhouseCoopers (2013b) stated that the need for retraining that resulted from new technologies was one of the two principal skills-related challenges faced

by the construction industry. It reports that 24 per cent of surveyed industry stakeholders identified reskilling as a major concern.⁵²

This is a particularly important factor when considering the timing and implementation of policies which either encourage or mandate particular technologies, such as the mandating of Building Information Modelling (BIM) by the UK Government (discussed in chapter 11). While such policies will necessitate retraining, they may still be worthwhile given appropriate implementation.

Attracting and retaining staff in the industry

Major infrastructure projects span urban, rural and regional areas. As such, geography presents one potential challenge to attracting and retaining a workforce (particularly because for many relevant occupations, telecommuting is not a feasible option for most workers in the sector). The Australian Government provides a Living Away From Home Allowance (LAFHA) in order to facilitate the attraction of workers to regional sites. Some stakeholders have raised the issue of the administrative burden associated with such schemes. In principle, such schemes should not be overly burdensome, though there should also be sufficient oversight to prevent abuse of the system.

The issue of geographic labour mobility is the focus of a concurrent Commission study that is due to report to Government by 21 May 2014. In its draft report (released on 3 December 2013), the Commission found that the main impediments to geographic mobility were related to personal factors that were unlikely to be responsive to policy (PC 2013b, p. 27). However, issues such as training, licensing and regulation were all found to be important to labour mobility.

For the civil construction workforce, there appear to be several factors driving attraction and retention other than geography. In a workforce survey undertaken by Skills DMC and the Civil Contractors Federation (2010), 12 per cent of respondents cited relocation as a major reason for leaving the civil construction, whereas 42 per cent said either career progression or money were important factors (Skills DMC and Civil Contractors Federation 2010, p. 54).

⁵² Results from the Construction and Property Services Industry Skills (CPSISC) 2013 Stakeholder Survey. The results reflect the broader construction industry, including such major technological advancements as prefabrication for residential buildings.

The importance of experience

As outlined earlier, the infrastructure construction workforce is split not only across a number of occupations, but also types of construction (such as bridges, pipelines, tunnels, ports among others). It has been consistently noted by stakeholders that the skills required in construction occupations rely on industry-relevant experience and on-the-job training. Skills that are developed through experience have been among those lacking in recent years, and pose a real challenge to policy.

The importance of specialisation and experience is also well illustrated in the shortage of engineers. The discipline of Engineering is comprised of many specialisations, each of which with a relatively distinct labour market and, potentially, with their own particular skill shortages. To some degree, this specialisation begins during formal study, although Engineers Australia states that:

The main way in which specialisation occurs is through [postgraduate] professional experience and practice. In most engineering specialisations there are only limited degrees of substitutability. While it may be true to suggest that a civil engineer who has specialised in bridge construction could also in theory build steel framed sky scrapers, a move of this nature is generally not possible because in this example the engineer can claim expertise and thus status in his/her area of specialisation but not in the second area. Few engineers would see such a move as feasible. (Engineers Australia sub. 26, p. 10)

It is useful to think of engineers as people who have learned to perform a particular engineering role, as opposed to people who have earned engineering degrees. BIS Shrapnel (2009) point out that graduate road engineers typically take between four and five years to reach a point of high competence, which, anecdotally, is similar for other fields of civil engineering. As such, it is important to retain engineering staff in the relevant industries for several years in order to avoid shortages.

Where people leave their industry or specialisation instead of moving up to senior positions, this can lead to shortages in senior positions — as shown earlier in figure 13.8, recruitment difficulties for engineers were consistently present for engineers with around 14–18 years' experience (Engineers Australia, sub. 26, p. 11).

Similarly, other technical occupations generally require a period of on-the-job learning before a level of competence is reached. For example:

...a plant operator may be 'qualified' after 4-6 months but in most instances 24–36 months has been identified as the minimum time required on the job for an operator to be competent, and therefore, of value to the business. (Skills DMC and Civil Contractors Federation 2010, p. 5)

The requirement for experience may be especially relevant for major infrastructure projects:

As infrastructure projects are potentially more complex than commercial projects there has been a tendency to employ only those persons with the necessary skill levels to undertake the work within project programs and safely. As there are a finite number of persons with the requisite skills they have been more costly to employ, although this is moderating following the slowdown in resource projects. (Australian Constructors Association sub. 72, p. 13)

It is unlikely that the requirements for on-the-job training could suddenly be changed, unless there were changes to the competency levels expected of various occupations. To some extent, many of the recent skill shortages are likely to have been caused by an insufficient number of people staying in their occupation or industry, leaving a shortage of experience. It is also clear that any policy action would have to occur well in advance of any skill shortages.

Workforce ageing

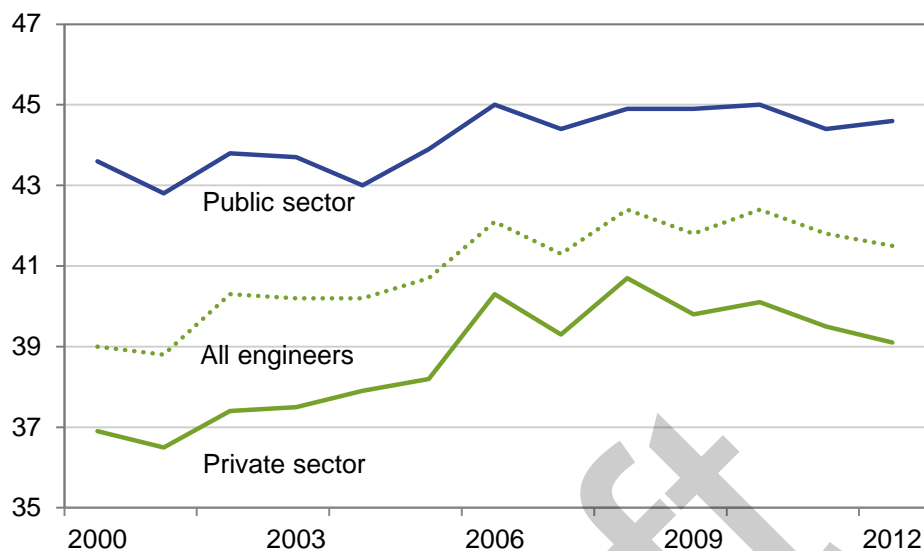
There is some concern in the industry about the ageing profile of the workforce. In a survey by the Construction and Property Services Industry Skills Council, 12 per cent of respondents identified the ageing workforce as a major skills-related concern (PwC 2013b, p. 6). Workforce ageing is clearly apparent for engineers (figure 13.8).

An ageing construction workforce can be attributed to several drivers, such as a reduction in the number of younger people entering the workforce; extensions in the length of careers, such as from delays in retirement; or changes in organisational structure such that more senior staff are required.

More generally, the Australian workforce will continue to age along with the changing age profile of the population (PC 2013a). In the future, this may affect several jobs in construction, such as those involving more physical labour.

Figure 13.8 Average age of engineers

Age in years



Data source: Engineers Australia 2013, *The Engineering Profession: Statistical Overview*.

Competition from the resources sector

Although many occupations in infrastructure construction are relatively specialised, stakeholders have noted that many people have left the industry to work in other sectors, particularly mining. As discussed earlier, several skill shortages relevant to infrastructure construction occurred in the early to mid-2000s during the construction boom in the resources sector. The Senate inquiry into the Shortage of Engineering and Related Employment Skills investigated this issue, finding that:

The mining boom in Queensland and Western Australia has driven up demand for workers with engineering and related skills which, because of the skills shortage, have been recruited to a significant extent from the manufacturing, power and traffic sectors. This demand exacerbates skills shortages in other engineering sectors, and creates frustration when recently trained apprentices depart for the mines.

The committee heard that a large number of engineers were migrating from the eastern states to Queensland and Western Australia. The Chamber of Minerals and Energy Western Australia observed that 11 per cent of population growth in Western Australia was from interstate migration, and this 'historically is a very, very high number'. (Senate 2012, p. 54)

Not all data analyses showed a clear link between construction skill shortages and the mining boom. GHD Meyrick (2011) note that the growth in mining wages does not, at the industry level, appear to have sparked competitive wage growth in construction. Wage growth, as measured by changes in the Wage Price Index, was

strong in the mid-2000s for mining and declining for construction (figure 13.4), suggesting that the growth in mining did not drive skill shortages in construction. However, GHD Meyrick also note that there is a ‘striking difference’ between what is observed in aggregate statistics and the anecdotal evidence:

There are regular anecdotes of young workers being enticed by the extremely high salaries on offer to go and work in the mining firms in the north-west of Western Australia (the Pilbara region) and Queensland. The difference between the statistical evidence and anecdotes suggests there may be scope to explore this issue in more detail. (GHD Meyrick 2011, p. 31)

It seems very likely, therefore, that some proportion of the civil construction workforce has been affected by competition from the resources sector in recent years, although the effect is likely to differ across occupations and skill levels. In some cases, such as road or rail construction, it is very likely that some subcontractors would have had a choice between mining and civil projects.

It is also very likely that any impact the recent mining construction boom has had on civil construction skill shortages is ending. Reports suggest that the severe shortage of engineering graduates during the mining construction boom is no longer apparent, due to changes in business conditions in Western Australia and Queensland (Diss 2013).

Project intermittency and career uncertainty

Stakeholders have also raised the issue of project pipeline uncertainty (discussed fully in chapter 7), and its effect on careers in construction. When several similar projects coincide, the immediate effect is a sharp increase in labour demand, which can result in short term skill shortages:

During the period between Christmas 2013 and early January 2014, we expect to deploy around 50 people on rail work, including many casual employees. Through January we would expect the majority of the casual employees to be unemployed or underemployed. (Mary Thompson, McLeod Rail, sub. 49, p. 3).

In the longer term, this unpredictability is a significant issue for building depth of experience in the workforce. The Australian Constructors Association stated that:

The unreliability of continuity of employment is a mitigating factor for long term commitment to the industry and the consequent lead times to undertake university studies and trade apprenticeships means that potential employees cannot be guaranteed jobs when they complete their training. (Australian Constructors Association sub. 72, p. 14)

Similarly, Engineers Australia reported that ‘an absolute majority’ of respondents to a 2013 survey agreed that the intermittency of infrastructure projects was detrimental to engineers’ employment and careers (sub. 26, p. 9).

The connection between project pipelines and skills is well summarised by Infrastructure UK:

Attraction, retention and training of key talent in engineering and management is hampered by the stop-start nature of the pipeline, as is the ability to keep high-performing teams together. Sectors with stable pipelines progressively up-skill over time. (Infrastructure UK 2010, p. 18)

The particularly intermittent timing of major infrastructure projects not only provides incentives for workers to leave the industry, but it also changes the incentives for employers to hire and train staff. When contractors face a ‘feast or famine’ scenario, it may not be efficient for them to train staff for one project without knowing if they will need the staff on the next project. Due to the time it takes to train new employees to a competent standard, it may not be a cost-effective option for meeting current needs. On the contrary, it is likely to use up the time of more qualified staff in the short term, only producing a fully competent employee some years later.

The Australian Constructors Association stated that as a result of the inconsistent timing of projects, employers are less likely to employ workers directly, and more likely to rely on the ‘general pool of workers’ as needed (sub. 72, p. 14). This is likely to involve attempts to hire people who need no or minimal amounts of training — those who can ‘hit the ground running’. As a result, skill requirements for vacancies are likely to have become more specific, narrowing the pool of talent and exacerbating skill shortages.

13.4 Policy options for skill shortages in infrastructure construction

The above section outlined several drivers of the recent skill shortages that should help inform any policy intervention. However, governments should mainly direct policy at *efficiently* minimising future skill shortages. This should not only take into account what could have been done in the last decade, but also what would be appropriate given forecasts of future demand and the associated uncertainties with these.

There are several areas where policy interventions can take place — for example governments are already heavily involved in education and training; infrastructure planning; and migration policy.

Addressing project intermittency and the ‘people pipeline’

Many inquiry participants argued for policy measures to address the impacts of project intermittency on skill formation (box 13.5). As discussed in chapter 7, prospective improvements to the predictability of major infrastructure projects would occur if the Commission’s suite of recommendations were adopted.

In this way, the intermittency of major projects would not be eliminated, but could be minimised and made more predictable. This would go some way to improving career stability and, thereby, to the depth of crucial workforce experience in infrastructure construction. In this sense, one of the most important contributions to addressing skill shortages would not come from direct government intervention in the labour market, rather it would result from a host of reforms that improves both the functioning of the sector and the predictability of likely future demands.

Fluctuations in labour demand will still be influenced by activity outside major infrastructure projects, including activity in the resources sector; private construction; minor public infrastructure construction; and infrastructure maintenance. As such, a more predictable pipeline of major projects would be a very significant though partial solution to addressing skills shortages.

Projecting labour demand

If the timing of major infrastructure projects were to become more predictable, this would help improve the ability of stakeholders to plan for future labour demands. The importance of such planning has been discussed in relation to the resources sector:

As one mining executive put it: ‘We understood the project pipeline concept very well; what we didn’t do was invest in a people pipeline to go with it.’ (PwC 2012, p. 6)

The planning of training investment by both businesses and governments would be greatly helped if credible projections of the future demand for skilled labour were available. Such projections would, in turn, become more feasible in an environment where major infrastructure projects were more predictable. Skills Australia (2011) currently undertakes such projections in the resources sector for the Australian Government, aiming to:

...better inform industry forward planning for future major projects, assist in better meeting industry skill needs, and to inform further policy responses to the emerging needs of the resources sector... (Skills Australia 2011, p. 2)

It would be useful if a similar exercise were completed at appropriately regular intervals for the various forms of civil infrastructure. Projections of labour demand would provide a timely indication of the risks of future skills shortages, which would be key given that many of the relevant policy and business decisions (such as those related to training) would take time to take effect. The projections would provide a useful perspective of future industry needs, which would complement the information obtained from ongoing industry consultation.

Box 13.5 Stakeholders comments on pipeline management

As a first step in developing stronger tripartite arrangements, the Taskforce invites Skills DMC to take up the lead role and, working with the appropriate Industry Skills Councils, engage with employers and unions and relevant organisations to develop an all-embracing workforce development plan for major resource projects... In addition, the Commonwealth should provide purpose funding and support services to Skills DMC and the Industry Skills Council Group. (AWU 2010, p. 3)

...there is a need for industry to more effectively coordinate its activities on a broader basis to ensure that an appropriate pool of skilled workers is available both now and into the medium to longer term ... This will require cooperation between industry leading organisations representing industry sectors such as construction, mining, resources and related activities, clients and government agencies to develop the necessary processes for fast tracking skills development and targeting the occupations based on a more reliable pipeline of work than has previously been available. The ACA has already established a working party of member companies to assess this strategic approach. (Australian Constructors Association sub. 72, p. 14)

...perhaps a better model for 'major shut'⁵³ coordination could be trialled in NSW and Victorian rail maintenance and construction activities over, say three years, and if successful in terms of reducing labour and plant shortages, and improving costs, this could be rolled out to the broader construction market. The same 'pilot' approach for the management of a national, long term major infrastructure project pipeline, which has been talked about for years by contractors and governments alike, would also be extremely useful in smoothing the supply and demand size peaks and troughs which apply to major project delivery currently. (Mary Thompson, McLeod Rail sub. 49, p. 3)

With targeted intervention, there is an opportunity for governments to enhance productivity and moderate the extremes of the boom/bust cycle that has characterised infrastructure investment in years past. In the longer-term this will lower construction costs for future investment when an upswing in demand will require skills lost in the downturn. (Consult Australia sub. 23, p. 2)

⁵³ Refers to situations where rail lines are shut completely for maintenance purposes. The alternative would be for maintenance to occur after the passage of the last train of the night and before the passage of the first train in the morning.

Projections of infrastructure construction labour demand would first require credible data on future major infrastructure projects. This data would need to be supplemented by data on construction activity related to maintenance; private infrastructure; minor works and subdivision; the resources sector; and local councils. Relevant data should be made available for Skills Australia and other stakeholders to make such projections, including data from cost benefit analyses of public infrastructure projects.

DRAFT RECOMMENDATION 13.1

The Australian Workforce and Productivity Agency should make and publish regular projections of labour demand from public infrastructure construction. Information collected and produced as part of the proposed benchmarking activities (draft recommendation 8.2) should support this activity, including data from all cost–benefit analyses undertaken for infrastructure projects that receive Commonwealth funding. The private sector and State and Territory Governments should be invited to participate in providing data pertaining to non-Commonwealth-funded projects.

Training provision and funding

Industry training funds

Given that individual firms will vary over time in terms of their incentives to train workers, and that there is some potential for firms to capitalise on the training programs of other firms, one policy solution would be to partially centralise the funding of training. That is, to have all firms pay into a centralised levy that is used to fund training. To a large degree, this has been well institutionalised in the construction industry (aside from in New South Wales) (table 13.7). While some aspects of the training funding framework have only been implemented for a short time, such as the National Workforce Development Fund, many of the funds and programs are longstanding.

There may be issues regarding the allocation of funding, particularly since a number of specialised jobs do not have any recognised certification and may therefore be ineligible for grants. As mentioned in the above section, it may be appropriate for some occupations not to have standardised formal qualifications. At the same time, it should be considered whether training funding should still be made available for those occupations if there is considerable specialist training required. As technology progresses and specialisations develop further, and as the flow of infrastructure

investment becomes less intermittent, it is also important that the coverage of formal qualifications is kept up to date.

Table 13.7 Construction industry training funds

<i>Fund Authority (State)</i>	<i>Levy/ funding</i>	<i>Levy applicable projects</i>
Construction Skills Queensland (Qld)	0.1 per cent of the contract price	All construction work \$80 000 or more
Construction Training Fund (WA)	0.2 per cent of the contract price or \$200 in every \$100 000 of project value	All construction work valued over \$20 000
Construction Industry Training Board (SA)	0.25 per cent of the contract price	All construction work valued over \$15 000
Tasmanian Building and Construction Industry Training Board (TAS)	0.2 per cent of the estimated value of construction work (up to 0.5 per cent at Minister's discretion)	All construction work \$12 000 or more
Building and Construction Industry Training Fund Authority (ACT)	0.2 per cent on all construction work	All construction work \$10 000 or more
Incolink (VIC)	Varies	Employers subject to CFMEU and CEPU agreements
State Training Services (NSW)	NSW Government funding	
National Workforce Development Fund (AUS)	Australian Government funding	

Sources: The Australian Forum of Construction Industry Training Funds (<http://www.afcittf.com.au>); Building and Construction Industry Training Fund and Levy Collection Act 1990 (WA); Construction Industry Training Fund Act 1993 (SA); Building and Construction Industry (Portable Long Service Leave) Regulation 2013 (QLD); Building and Construction Training Fund Act 1990 (TAS); Building and Construction Training Levy Act 1999 (ACT); Incolink (2013, p. 29); NSW Government (2012); SkillsDMC (2012).

This follows a more general principle that such agencies need to keep abreast of industry needs. Lend Lease noted that the debate around skill needs often appears to focus on the preferences of teaching institutes rather than the needs of industry, suggesting that a change to the institutional structure around industry skills bodies may help (sub. 46, p. 33). In any case, it would be of paramount importance that the prevailing bodies maintain a connection with the industry's needs. As such, Skills DMC (and where relevant, the Construction and Property Services Industry Skills Council), should continue to improve their responsiveness to changing industry needs.

DRAFT RECOMMENDATION 13.2

In a reformed partnership with key stakeholders, the administrators of training funds should review existing objectives, conditions and processes around funding allocation. The parties should agree on suitable guidelines that will be able to meet the current needs of industry, as well as their likely future needs in an environment where there is a more continuous flow of infrastructure investment.

Facilitating apprenticeships

There are several policy approaches to facilitating the use of apprenticeships, including the removal of regulatory and other barriers; the improvement of employer incentives, or the improvement of incentives for the apprentices themselves. The latter could potentially be improved by targeting wages and providing incentives to progress and complete apprenticeships — this would be true of apprentices generally, given that they are relatively low paid workers. In construction more particularly, the Commission has heard anecdotally that employer incentives to hire and train apprentices are often a concern.

It was suggested that as clients, governments could encourage the hiring and training of apprentices by considering this as a criterion in its choice of contractors (Lend Lease sub. 46, p. 34). However, such an incentive is likely to be obscured given other important factors considered in the procurement process (discussed in chapter 11), or could potentially sway choice away from more efficient options if such constraints are binding. Moreover, given that a large proportion of employment in infrastructure construction occurs at the subcontractor level, governments could not simply use their tendering process to implement such a policy. Progressing such a policy would involve problems similar to those of local content rules (discussed in chapter 11).

A more direct policy mechanism is to directly subsidise the employment of apprentices. Several separate funding schemes already exist to facilitate apprenticeships, including state and territory based travel and accommodation assistance, as well as direct funding and other programs (box 13.6). Some programs have been implemented specifically to address skill shortages, such as the National Apprenticeships Program (NAP) and the temporary Kickstart program.

Some stakeholders have suggested the continuation of a direct subsidy for apprentices (such as the Kickstart program). Such a policy could help address skill shortages if focused on the appropriate trades. They are still a blunt instrument in that they assume the main barrier to hiring apprentices is the initial financial outlay. While these costs are often substantial (as they include medical checks, safety training, construction industry induction among others), there would alternatively be scope to review such costs for potential efficiencies. Moreover, evidence suggests that payments to employers only have a marginal effect on hiring decisions (McDowell et al. 2011, p. 10).

Box 13.6 Examples of government programs to facilitate apprenticeships

There are a number of government incentives available for employers to hire apprentices in those occupations listed on the National Skills Needs List. Incentives (generally cash-based) include Commencement Incentives; Recommencement Incentives; Completion Incentives; Rural and Regional Skills Shortage Incentive; Declared Drought Area Incentives; Mature Aged Workers Incentives; Australian School-based Apprenticeship Incentive; Assistance for Australian Apprentices with Disability; Support for Adult Australian Apprentices.

The Australian Government also provided a direct subsidy for new apprentices in 2012–13 as part of the temporary Kickstart program. The program was extended in terms of duration and funding for apprentices in the building, construction and engineering trades.

The National Apprenticeships Program (NAP) was designed to address skill shortages in the resources and energy sectors by offering an expedited accreditation for mature age workers, which involved formally assessing prior knowledge and using this as the basis for the apprenticeship (sub. 9). It extends to applicants who already have at least 40 per cent of the skill requirements of a specific trade, and aims to produce certified tradespeople in an 18 month timeframe (as opposed to four years for a traditional apprenticeship). PriceWaterhouseCoopers evaluated the financial case for the scheme in 2013 and found it produced savings for employers and governments when compared to traditional apprenticeships.

Sources: National Apprenticeships Program, sub. 9; Australian Government (2013); Australian Business Apprenticeships Centre (2013).

Hiring apprentices requires substantial forward planning from employers, as it will generally take four years before apprentices are fully qualified. This may improve if, as mentioned earlier, the timing of construction projects becomes more predictable. It would also improve if apprenticeships could be made shorter — to this end, apprenticeships are now generally competency-based or have options to have competencies recognised. Competency-based vocational training is also supported by programs such as the Accelerated Australian Apprenticeships Initiative.

NAP is another competency-based program that was specifically designed to address skill shortages identified in the resources and energy sectors. However, it focuses more on upskilling existing employees rather than changing the incentives to employ more staff. It offers an expedited accreditation for mature age workers, which involves formally assessing prior knowledge and using this as the basis for the apprenticeship (box 13.6). It aims to produce certified tradespeople in an 18 month timeframe, thereby reducing costs to the employer compared to traditional apprenticeships.

Similar programs to the NAP could be undertaken for trades more relevant to infrastructure construction if such shortages were identified and if industry were suitably involved. A particular advantage of the NAP has been the involvement of major employers to identify training needs. Similar to the experience in the resources sector, and dependant on industry demand, it would be useful for the NAP to be trialled in the infrastructure construction sector before potentially moving to a pilot program and full rollout. However, few stakeholders have commented directly to this inquiry on their experiences of the program or of alternative schemes.

INFORMATION REQUEST 13.1

The Commission seeks feedback on the effectiveness of the National Apprenticeships Program and whether it would be appropriate to extend the program to trades and employers in the infrastructure construction sector.

Registration/ accreditation of engineers

Registration of engineers currently exists in various forms:

- An engineer can become a Chartered Professional Engineer (CPeng) in a particular specialisation based on an assessment of work experience. The process of becoming chartered takes between one and three years, and is usually initiated after three or four years of professional work. The accreditation is audited every five years and requires ongoing completion of professional development.
- Alternatively, engineers can register their competence in a particular specialisation on the National Professional Engineers Register (NPER), based on a similar assessment of work experience to the CPeng (though not requiring membership to the governing body).
- Another similar assessment of work experience to the NPER or the CPeng is needed to become a Registered Professional Engineer of Queensland (RPEQ). To work as an engineer in Queensland, it is compulsory to either register as a RPEQ or to work under the supervision of an RPEQ.

These accreditation processes are indicative of the amount of learning required by engineers after university. Although only Queensland has mandatory registration for unsupervised engineers, the ACT Government has also agreed to implement a similar scheme and Western Australia has also considered similar requirements (Briggs and McCabe 2012). There is debate around whether accreditation should be mandated nationally.

The peak bodies representing Australian professional engineers — Engineers Australia, Consult Australia, APESMA and IPWEA — believe that Australia should have nationally consistent State registration systems for professional engineers.

Unlike a number of other important professions, registration is largely voluntary for engineers in Australia, and there are different regulatory requirements for engineers in each Australian jurisdiction. (Institute of Public Works Engineering Australia NSW 2013, p. 11)

Mandating occupational registration has costs and benefits — while purporting to improve the quality of engineering work, it can also act as a barrier to entry for proficient and otherwise suitable workers. Conceptually, registration would only be relevant where a principal-agent problem exists — for lumpy transactions or where potential costs of a bad decision are high (e.g. health), and where consumers cannot judge the quality of the practitioner. Businesses that hire engineers are able to screen them during the hiring process, and to dismiss them if they are not proficient. As such, there are no strong conceptual grounds for mandating registration.

The impacts of the Queensland scheme are unclear. The Australian Institute of Mining and Metallurgy (2013) noted that the scheme has yet to be the subject of a comprehensive impact assessment, and neither has there been a transparent evaluation of alternatives to the scheme. The Queensland Resource Council also noted the need for data on safety performance; number of breaches and prosecutions; and other impacts. It is also difficult to consider its effectiveness given that noncompliance remains an issue. According to the Board of Professional Engineers of Queensland:

While the practise of direct supervision over nonregistered engineers would work if properly undertaken the reality is many organisations are not properly implementing the requirement for direct supervision. A lot of engineers do not work in a properly supervised environment. (2012, p. 9)

This highlights the difficulty in considering whether mandatory registration has led to superior outcomes in Queensland than in other jurisdictions.

At the same time, anecdotal evidence suggests that there may be problems in some jurisdictions regarding engineering proficiency. The ACT Government inquiry into its construction industry found anecdotal evidence of poor practice:

There were comments that appropriately qualified engineers can be difficult to access here in the ACT... Concerns were also expressed about inappropriately qualified or poorly experienced engineers 'signing off' on certain types of structures outside their field of expertise or beyond their experience. There was even anecdotal evidence from credible and experienced industry participants to suggest that there have been instances of some engineers having signed off on work they have not personally sighted, or of

signing off on complex structures based on visual observations alone. All of these represent potentially significant concerns. (Briggs and McCabe 2012, p. 45)

While on the face of it, such practices are serious enough to warrant regulation, it is doubtful that mandatory registration of engineers would be the best recourse for the issues cited above. For instance:

- management practices may be as important as technical proficiency. Yet, mandatory registration of engineers (as it is currently structured in Queensland, for example), does not imply any recourse for employers who encourage poor practice (Board of Professional Engineers of Queensland 2012).
- the difficulties experienced in accessing qualified engineers in the ACT may require new incentives or addressing barriers. Mandatory registration is not in itself a strategy designed to attract experienced engineers into the region; indeed it might reduce the number of experienced engineers in a region
- engineers signing off on work unseen is not leading practice and could be addressed directly through guidelines and expectations on ethical behaviour
- there is no underlying market failure rationale to justify mandatory registration.

Overall, the Commission considers that further evidence would be required to conclude that mandatory registration has benefited Queensland and would benefit other jurisdictions. State and territory governments should consider more direct options to address the issues observed in their construction industries.

Occupational licensing

The licensing of trades is another area of regulation that is of clear relevance to public infrastructure construction projects. The Australian Industry Group noted:

Industry continues to face significant challenges finding skilled labour and struggles with an arcane system of state-based licensing of trades which does not meet the needs of today's workforce or construction companies. We urge the Productivity Commission to recommend that all levels of government recommit to a timely harmonisation of licensing along the lines already agreed by COAG. (Australian Industry Group, sub. 47, p. 3)

The lack of progress over the years has been attributed to a lack of consensus on several issues. The National Occupational Licensing Authority described the lack of consensus in its submission to the Commission's inquiry into labour mobility:

Current governance arrangements hamper the policy development for national licensing and timing for its introduction. There has been confusion about final approval of policy decisions. Jurisdictional and industry interests have competed on different levels: some policy issues that have been negotiated and resolved on one level have subsequently

been elevated to another level or revisited through another forum and at times reversed. (submission to PC (2013b), sub. 17, p. 10)

In its commissioned study on Geographic Labour Mobility, the Commission made a draft recommendation that national occupational licensing reforms should commence in 2014 (PC 2013b Draft Recommendation 12.5). On 13 December 2013, COAG decided not to pursue the National Occupational Licensing Scheme reform, and to begin the disestablishment of the National Occupation Licensing Authority from early 2014 (COAG 2013). Rather than committing to the existing state-based system, states and territories will work together via the Council for the Australian Federation (CAF) in order to develop other options for minimising licensing impediments.

In any case, it is important in principle that interstate barriers be kept to a minimum. The disestablishment of the National Occupation Licensing Authority has meant that such an outcome will be further delayed and remains subject to uncertainty.

DRAFT FINDING 13.1

The Commission considers that overall, men and women who work as tradespeople, their clients and their employers have been poorly served by the lack of progress amongst governments in producing consistent occupational licensing across jurisdictions.

The use of temporary skilled migration

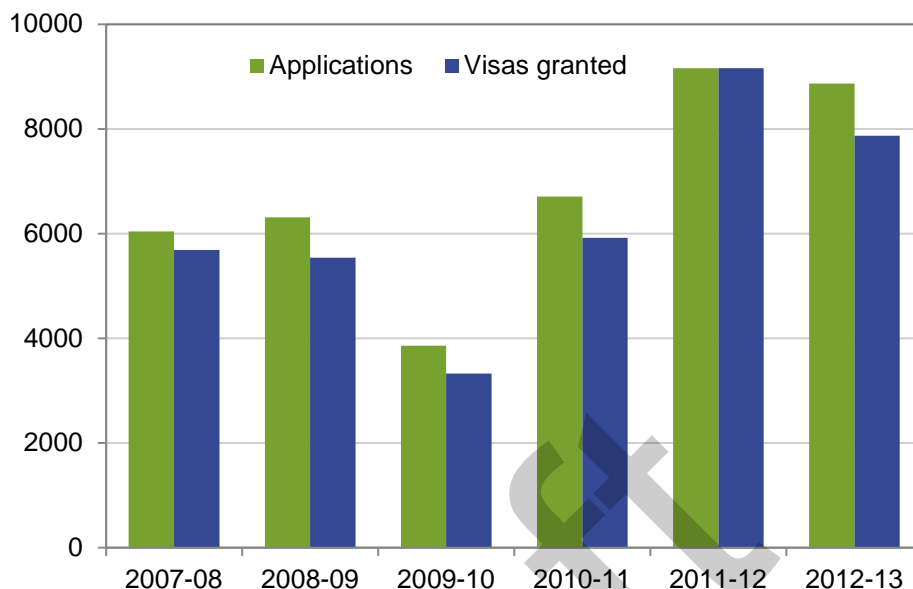
Temporary skilled work (subclass 457) visas continue to be relevant to infrastructure construction.⁵⁴ The visas are provided for up to four years, which would generally be a long enough timeline for most major infrastructure projects. Since 2007–08, construction has accounted for between 11 and 13 per cent of 457 visas.⁵⁵ The number of 457 visa applications have varied from year to year (figure 13.9). The numbers of Temporary Skilled Migration subclass 457 visas granted for civil engineers, draftspersons and technicians grew rapidly in the mid–2000s (figure 13.10), which is broadly consistent with the existence of recruitment difficulties.⁵⁶

⁵⁴ Skilled migration, particularly temporary skilled migration, is an issue covered in the Commission's recent inquiry into Geographic Labour Mobility (PC 2013b).

⁵⁵ Department of Immigration and Border Protection (various years), *Subclass 457 State-Territory Summary Report*.

⁵⁶ Although the peaks and troughs in 457 visa numbers do not appear to correspond directly with those in figure 1.2, there is certainly a sharp drop in 2009–10 in both the proportion of vacancies

Figure 13.9 Number of 457 applications and visas granted in the construction industry^a



^a Includes the entire construction industry, not restricted to civil construction.

Data source: Department of Immigration and Border Protection, *Subclass 457 State-Territory Summary Report*, 2008–2013.

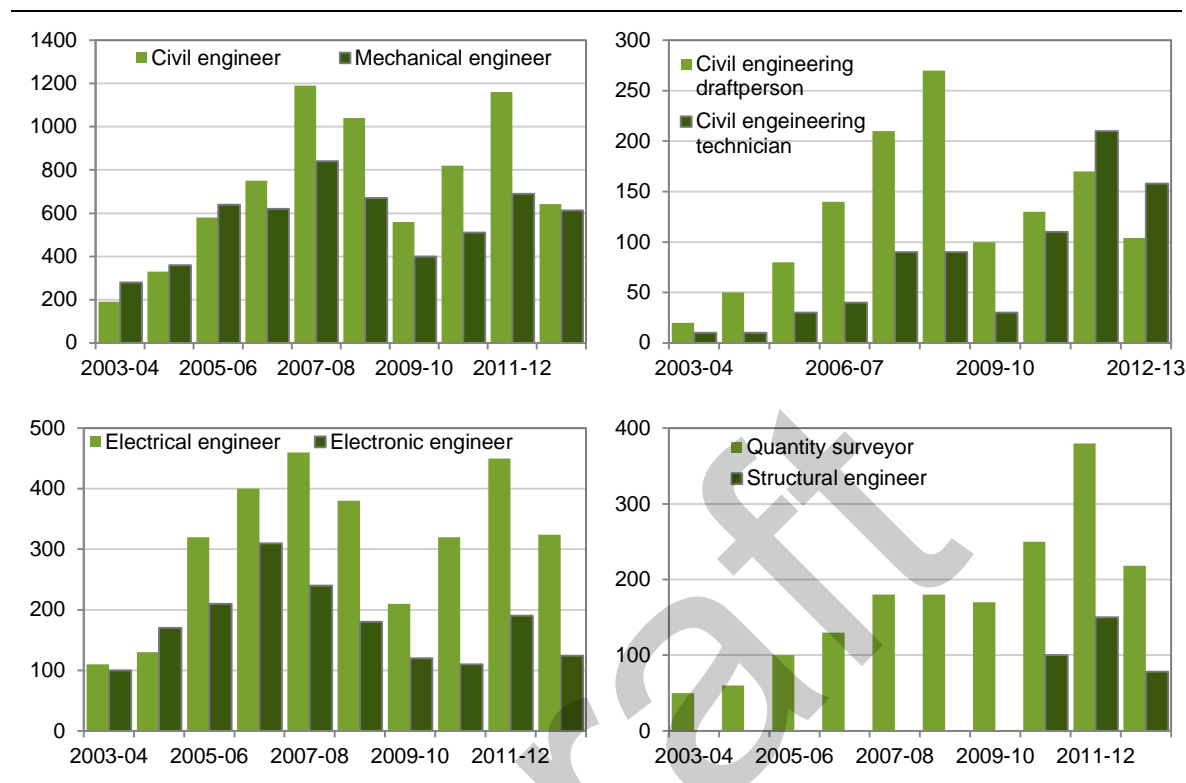
A more comprehensive breakdown of occupational data shows that the largest occupational category granted 457 visas in the construction industry was Technicians and Trades Workers (table 13.8). This differs from the experience across all industries, where Professionals comprise a larger share, accounting for almost half of 457 visas.

Temporary skilled migration visas have been used by both private construction companies and government agencies. For example, RailCorp used overseas recruitment in their management of skill shortages (NSW Auditor General 2007, p. 22). Several stakeholders have commented on the issue, advocating for both increases and reductions of temporary migration numbers (box 13.7).

filled and the number of 457 visas. That it affects all industries (and not just construction) suggests that it may be the effects of the broader economic climate.

Figure 13.10 Temporary visas granted for selected civil engineering occupations

Number of visas



Data source: DIAC data as reported in Engineers Australia, sub. 26.

Table 13.8 Occupational breakdown of 457 visas granted in all industries not limited to construction

Number of visas granted

Occupation	Construction	All industries
Managers	909	11 740
Professionals	1 943	33 440
Technicians and Trades Workers	4 240	18 230
Community and Personal Service Workers	5	1 060
Clerical and Administrative Workers	646	2 590
Sales Workers	Na	260
Machinery Operators and Drivers	105	420
Labourers	23	100
Other	Na	630
Total	7 871	68 480

Source: Department of Immigration and Border Protection (*Subclass 457 State-Territory Summary Report, 2010–2013*; unpublished data).

Box 13.7 Stakeholder views on 457 visas

The Civil Contractors Federation are in favour of expanding the coverage of the temporary skilled migration scheme:

The ability for civil contractors to access skilled labour through skilled migration programs such as Enterprise Migration Agreements and the sub-class 457 Visa program is currently limited.

A number of highly skilled civil construction occupations are not recognised on the present sub-class 457 Visa program, due to the way in which civil skills are recognised within the ANZSCO framework.

Skilled migration, both permanent and short term, complements other training initiatives as it will enable the industry to support labour market mobility, particularly for short-term projects.

In this area, CCF believes that the government may be able to better measure labour shortages so that skills need can be met effectively. (Civil Contractors Federation, sub. 34, p. 16)

Similarly, in their submission to the Senate Inquiry into the Shortage of Engineering and Related Employment Skills, Australia Wide Personnel (2012) suggests that it should be made easier for recruitment firms to sponsor overseas engineers, as it had been prior to 2007.

Other stakeholders, such as Engineers Australia, the CFMEU and the AWU are in favour of limiting or reducing the scope of temporary skilled migration.

Impacts of 457 visas

The role of temporary skilled migration is to supplement the workforce in areas where there are genuinely short-term shortages of appropriately skilled workers. This will continue to be an important role given that some level of skills shortage is likely to occur in the future (though it may be minimised with appropriate policy action). The use of temporary skilled migration can potentially have several impacts on the broader workforce and the labour market, which need to be considered.

The ability to hire people on 457 visas to meet short-term skill shortages may reduce employers' incentives to provide the training that may reduce or avoid future skill shortages. For example, the use of 457 visas for technicians and trades workers may be an attractive alternative to hiring and training apprentices, especially since it takes several years to produce a qualified tradesperson.

457 visas may also reduce wage pressures in those parts of the construction workforce experiencing skill shortages. Unfortunately, comparable wage data is not available at the occupational level. The average wage of a 457 visa applicant in construction has consistently been above the industry average (table 13.9). This is likely to reflect that:

- shortages are often in more senior, higher paid roles
- for the employer, there are on-costs involved with the 457 visa scheme, meaning that they may be more inclined to use them for more senior roles.

Certainly, temporary skilled migration is neither intended to lower wage rates nor to reduce the long-term incentives for Australians to acquire skills, and the design of the system should reflect this.

Table 13.9 Real average annual salaries in construction, 2007-08 to 2012-13

Dollars

	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Construction 457 visas	85 830	93 833	102 601	100 654	95 116	89 200
Construction ^a	64 310	67 656	70 920	71 579	72 579	74 222
All industries ^a	65 651	67 329	69 479	70 183	71 247	73 239

^a Annual salaries calculated as average of May and November data points.

Sources: Commission calculations based on Department of Immigration and Border Protection (various years), *Subclass 457 State-Territory Summary Report*; ABS (*Average Weekly Earnings, Australia, Cat. no. 6302.0, table 10G*).

13.5 Conclusion

The skill shortages observed in civil construction have been specific to occupations, skill levels, and geographical areas. Based on current evidence, it is unlikely that skill shortages are a major cost driver for large infrastructure projects. However, they do have the potential to cause project delays and to affect wage costs and the competitiveness of subcontractors.

Policy action will not be able to remove all future skill shortages in construction — it should aim to reduce their occurrence and their impact on businesses. While there are some direct policy interventions that are possible in this area, an overarching requirement is to improve and maintain the information based on current and likely future industry needs through both consultation and analysis of data.

The intermittent nature of infrastructure construction is a significant underlying factor to skill shortages in the construction industry generally, and one that is not easily negated. Improvements to the predictability of infrastructure projects should be pursued via the Commission's suite of recommendations in this report. This approach is itself an important aspect of reducing skill shortages, in addition to its other prospective benefits.

14 Social and environmental regulation

Key points

- The scope and stringency of the social and environmental regulations that apply to public infrastructure have escalated over time. The regulations are often complex and duplicative, and add to infrastructure costs. The costs can be significant, albeit difficult to quantify.
- Some regulatory costs are warranted. Reforms should focus on only those regulations or requirements that are unnecessary to deliver worthwhile social and environmental outcomes.
- Unnecessary costs arise where regulations are poorly designed, coordinated and/or administered. For example, delays in project approvals impose major costs on the financier (often the Government) and reduce the benefits to the community from the deployment of infrastructure. Where approval processes can be expedited without sacrificing their coherence and efficacy, there are likely to be significant gains to the community.
- There is substantial scope to rationalise and improve the web of regulations and approval processes in the infrastructure construction sector. The Commission identified many such opportunities in its recent study of development assessment processes. Australian governments are currently considering that study's wide-ranging recommendations for reform.
- While this chapter does not duplicate the Commission's previous analysis, it does look closely at two specific regulatory concerns raised by participants.
 - Lead contractors on Commonwealth-funded projects are required to be accredited by the Federal Safety Commissioner. Accreditation adds an additional layer of regulation and associated compliance costs, and may be a barrier to entry for some foreign and local firms. A Review focused on reducing compliance costs has just begun. The Review should also examine options such as 'recognition' of foreign requirements and 'provisional accreditation'.
 - A raft of social and environmental regulation affects quarries, some of which may impose undue costs and restrict supply. Failure to allow new quarry developments or expansions, particularly close to cities, could lead to future scarcity of some key inputs into many infrastructure projects.

Major public infrastructure projects are subject to an array of regulations aimed at addressing social and environmental concerns. The regulations are typically coupled with, or embody, requirements for community consultation, pre-approval assessments and, in some cases, monitoring and reporting during and/or after construction.

The regulations and requirements add to the costs of the projects. While recognising the valid public goals that often underlie them, several inquiry participants expressed concern about the cost burdens created.

This chapter discusses the nature of the regulations and requirements, and some broad means to reduce their costs while maintaining appropriate social and environmental protections. That said, many of the issues are generic, applying to all forms of economic activity — not just public infrastructure projects — that are subject to social and environmental regulation. Moreover, the Commission examined many of the issues that apply more heavily to public infrastructure projects in its recent report into *Major Project Development Assessment Processes* (MPDAP) (PC 2013c). Accordingly, for the most part this chapter restricts itself to outlining the issues and reporting the findings of the earlier study. It covers:

- the nature and scope of the social and environmental regulation affecting public infrastructure (section 14.1)
- participants' concerns about that regulation (section 14.2)
- the costs that it creates (section 14.3)
- the proposals from Commission's MPDAP report to reform development assessment and approval processes (section 14.4)

The chapter also looks at two issues given particular emphasis in submissions and not analysed in the MPDAP report, namely.

- safety accreditation for Commonwealth-funded projects (section 14.5)
- planning and other regulations affecting the costs of quarrying (section 14.6).

14.1 Nature and scope of the regulation

The broad swathe of regulation in question covers matters such as pollution control and waste management; threatened species, habitat and biodiversity issues; Indigenous and non-Indigenous heritage; native title; land access, planning and zoning; noise levels and urban amenity; and workplace and public health and safety.

While there is a range of regulatory standards and codes that are enforced only if and when breaches occur, many social and environmental regulatory protections are also embodied in development assessment and approval processes. Governments typically require the proponents of major projects to obtain various permits and authorisations for the project before proceeding.

Where a government agency itself is the proponent (as is usually the case with public infrastructure), the project must still comply with relevant standards and codes and the agency still needs to obtain the relevant clearances from other government regulatory bodies. Indeed, governments sometimes impose additional requirements on projects for which they are responsible. For example, the Australian Government requires firms constructing its projects to have safety accreditation of greater stringency than required for other projects (section 14.5).

Where a project is contracted out, all these requirements will typically be embodied in the conditions a head contractor will need to satisfy. Tenderers would be expected to reflect the likely costs of satisfying the various regulations and requirements in their bids.

Social and environmental regulations and associated requirements can emanate from any of the three levels of government.

- The Australian Government is responsible among other things for matters of national environmental significance, certain heritage matters, and for projects on Commonwealth land and water.
- The states and territories have the primary role for granting and determining the conditions that are attached to the approval of major infrastructure projects.
- Local governments can play a role through planning legislation and ‘secondary approvals’ (although these requirements can be bypassed where state ministers ‘call in’ a project).

The upshot is that a vast array of legislation and regulatory instruments may apply to a project, some duplicative and others contradictory, depending on its size, type, and location. For example, the Port Phillip channel deepening project had to comply with around 79 pieces of state or federal legislation or policies (PC 2013c), while

Lend Lease (sub 46, p. 27) said that projects can require up to around one hundred separate approvals from across the three levels of government.

14.2 Participants' concerns

Social and environmental regulation was not the main focus of submissions to this inquiry, and only a few discussed the matters in any depth. This may reflect the broad-ranging nature of the terms of reference, the short time available for preparing submissions, and that the Commission had recently covered much of the ground in its report on MPDAP (to which a number of submissions referred).

Of those submissions that did discuss social and/or environmental regulation, most were received from entities involved in developing infrastructure. Common themes were that the regulation and requirements:

- are complex, duplicative and costly to business
- have increased substantially in scope and stringency over recent years
- often could be reformed in ways that reduce costs without diminishing genuine social and environmental protections.

These comments — a selection of which is set out in box 14.1 — mirror comments by project proponents to the Commission's MPDAP study. While participants raised concerns about a number of different areas of regulation, environmental regulation attracted the most comment.

Importantly, while few counterinterviews were put in submissions to this study, a number of participants in the Commission's MPDAP study emphasised the importance of maintaining (or strengthening) social and environmental protections, and argued that the resulting regulatory costs need not be inappropriate. The Commission had regard to all these arguments in arriving at the recommendations in that report.

Box 14.1 Selected comments on regulatory impacts and issues

Lend Lease stated:

[t]he regulatory conditions that are often imposed on a project can result in extraordinarily high compliance cost. For example, major projects often have in excess of a thousand conditions. In many cases discharging these conditions can in itself produce a requirement for lengthy research and planning exercises as well as highly labour intensive processes to implement. In many cases the environmental or social benefits are elusive but the economic costs are very significant. (sub. 46, p. 40)

Lend Lease estimated that the costs of addressing environmental regulatory requirements have more than doubled over the last ten years, reflected in part in the significant increase in approvals and assessments required. It also estimated that there has been a fourfold increase in the number of (non-blue collar) staff necessary in the design and construct stages of a project (sub 46, p. 27).

The Minerals Council of Australia submitted:

The growing burden of overlap and duplication in approvals processes is indicated by a July 2013 study of regulations influencing exploration and mining activity ... [which] identifies a considerable increase in regulation compared with an earlier cross-jurisdictional scorecard in 2006. Across all Australian jurisdictions, new and/or amended legislation included:

- six new pieces of legislation;
- six replacement Acts; and
- more than 60 sets of additional amendments to primary legislation governing approval processes and more than 50 sets of amendments to subordinate legislation.

Despite the impost placed on project proponents, there is little, if any, evidence these additional processes have improved environmental outcomes. The complexity of project assessment has increased in part as a result of a plethora of technical and administrative changes that seek to make minor adjustments to the law, regulatory processes, fees and charges. These changes tend to be politically reactive and considered in isolation from existing regulations. Further, the increase in regulatory processes has been compounded by the imposition of additional independent advisory panels at State and Commonwealth levels (sub. 70. p. 10).

The Civil Contractors Federation said that ‘the regulatory burden now faced by the construction industry is adding considerable costs both for contractors and procuring agencies alike’. For example, it expressed concern:

... with the impact that meeting environmental laws and regulations can have on project approval timeframes. This is particularly the case with large projects that can face significant delays as environmental impacts, licenses or permits are assessed.

... CCF is opposed to unfeasible, unreasonable and impractical government environmental standards, specifications and the like, that impose unfair demands on contractor provisions and activities. When developing and implementing new environmental standards, specifications and regulations, government bodies must consult with industry in order to analyse the costs versus benefits to business. (sub. 34, pp. 14–15)

The Federation recommended a range of measures to reduce business burdens, including in relation to work, health and safety regulation; environmental standards, approvals and permits; and carbon pricing.

Box 14.1 continued

The Property Council of Australia said:

The duplication between the *Environment Protection and Biodiversity Conversation Act 1999* and state-based environment protections is well understood and there has been no credible evidence presented that this duplication results in environmental benefits. The EPBC Act lacks clear definitions, rules, and tests which has resulted in broad and inconsistent interpretations for more than a decade. All stakeholders have suffered from a lack of certainty and consistency (sub. 53, p. 9).

The Australasian Rail Association drew particular attention to the costs of revisions to regulations after commencement of an infrastructure project, noting that:

The rail operators' design standards are constantly under review and are periodically revised to achieve improved outcomes. The design standards cover a wide range of issues such as environmental, acoustic, safety, performance, durability and maintenance requirements. Design standard changes can occur at any stage, and they generally result in increased costs. An allowance for potential changes to design standards needs to be considered in the contingency allowance. Alternatively, projects should be quarantined from changes in design standards after the design has been approved, as is common practice in major road projects.

... While the industry should not lower its HSE (Health Safety and Environment) standard in order to lower the project costs, it is worth weighting the annual expenditure increases on specific HSE initiatives against the actual improvements in their outcomes. (sub. 58, p. 16)

The Australian Airports Association submitted:

... a major issue in airport planning revolves around the need to obtain numerous Commonwealth, State/Territory and Local Government approvals, often from numerous agencies at each governmental level. Any unnecessary delay at any of these stages by any of these agencies can fundamentally and detrimentally defer entire development projects and thereby deprive the economy and community of major benefit. (sub. 90, pp. 12–13)

According to the Lean Construction Institute of Australia:

In an endeavour to drive improvement in safety, government legislation which focused on the culpability of senior management tended to drive bureaucratic, defensive behaviour among contractors, often adding more cost than value to their management systems. In some instances safety documentation on projects became so excessive that it was counterproductive. It added little value other than hoped for legal protection should something go wrong (sub. 104. p. 3).

In more broad-ranging comments, Henry Ergas contended:

Further, likely substantial, cost savings could come from reviewing and rationalising the regulations that have a major impact on infrastructure, with tighter environmental standards and occupational health and safety requirements making a substantial contribution to recent infrastructure cost inflation. Obviously, the issue is that of assessing and where possible, improving, the cost-effectiveness of those regulations. And reforming labour market regulation would also help, for example, in increasing the flexibility with which labour can be used on works sites and in eliminating cost-increasing union rules. So too would revising unnecessarily prescriptive design standards, which 'gold plate' everything from bridges to level crossings. (sub. 87, p. 9)

14.3 Impacts on costs

Types of compliance costs

Business regulation typically brings with it an array of costs on the regulated entities (as well as costs for other businesses and individuals, and for governments).

Paperwork burden and related compliance costs can arise from the need to:

- provide management and staff time to keep abreast of regulatory requirements, liaise with regulators, complete forms and assist with audits
- purchase and maintain reporting and information technology systems
- obtain advice from external sources (such as consulting scientists and engineers, accountants and lawyers) to assist with compliance activities
- obtain licences or accreditation where these are required to perform work.

Regulation can also cause businesses to adjust their processes in ways that add to costs. For example, regulatory requirements may limit innovations in the design of infrastructure, or require that more expensive processes or materials be used for construction than might otherwise be adopted.

Delays in project approval processes can add to business costs where, for instance, capital or workers lay idle or opportunities cannot be seized at the most lucrative time or sequenced in the most efficient manner. Where regulatory requirements are changed midway through a project, this can create additional delays and costs, including by requiring rework or redesign. Regulatory changes and delays also push back the time from which the project can be opened and, thus, start providing revenue for the owner. This in turn can add to the financing costs of projects.

How significant are the costs?

While it is clear from inquiry participants' comments that all these types of costs arise in relation to major infrastructure projects, only a few submissions included quantitative estimates of the costs entailed, and these related only to some particular components of the compliance costs. For example:

- Lend Lease (sub. 46, p. 27) said that (non-blue collar) staff costs for compliance activities could be 11 per cent of the total 'design and construction' cost of a typical project.
- The Victorian Civil Construction Industry Alliance (sub. 28) submitted that it costs a business around \$150 000 to gain Federal Safety Commissioner accreditation, and around \$120 000 a year to maintain it.

-
- Xstrata Coal submitted to the Commission's MPDAP inquiry that the costs 'in consultancy fees alone' of environmental impact statements and related requirements for a new mine, rail or port in Queensland could range from \$3 million to \$15 million per development type (PC 2013c, p. 139).⁵⁷

More comprehensive estimates of the costs of social and environmental regulation on public infrastructure are not available, in part because regulators and other bodies do not systematically collect compliance cost information. A further complication is that the extent of the regulatory costs to businesses involved in public infrastructure projects will inevitably vary, depending on the type of project, its size and location, and the jurisdiction in which it is located. In any case, from a policy perspective, what matters is not the cost of complying with regulation per se, but rather the element of those costs that is 'unnecessary' or 'excessive' to deliver worthwhile social and environmental outcomes.

That said, the available quantitative information, together with qualitative evidence from participants on the extent and causes of the cost burdens created by social and environmental regulation, suggests that those burdens can be significant and that reform efforts to reduce them, where appropriate, should be pursued across and between jurisdictions. This was also the conclusion reached in the Commission's recent MPDAP report.

14.4 General reform issues

Are regulatory objectives appropriate?

One way unnecessary infrastructure costs might arise is if the social and environmental objectives embodied in regulatory requirements are overly ambitious, or at least if benefits that would flow from fully attaining the objective would not be sufficient to justify the extra costs.

Some participants argued or implied that this is sometimes the case. Peter Katz (sub. 45), for example, said that the design of several rail infrastructure projects had been over-specified on safety grounds. In a similar vein, the Australasian Rail Association (sub. 58) argued that it would be worth weighing the annual expenditure increases on specific health, safety and environmental initiatives against the actual improvements in their outcomes. And Lend Lease noted that there

⁵⁷ Other estimates of the costs of environmental assessments reported in the MPDAP were lower. For example, a 2009 Allen Consulting Group study estimated the costs of preparing an average environment effects statement at around \$1.2 million.

had been an increase in regulatory requirements over time and contended that, in relation to some requirements, ‘the environmental or social benefits are elusive but the economic costs are very significant.’ (sub. 46, p. 40)

There are some good reasons as to why the extent and stringency of social and environmental regulations may have increased over time. These include people’s propensity to give more weight to health, safety and other social and environmental elements of wellbeing as their income levels rise; and increased awareness of the negative side-effects that can accompany unfettered economic activity.

However, there are also some systematic incentives for governments to ‘over’ regulate, including to sometimes pursue overly ambitious objectives. The costs of regulation are diffuse and off-budget, and regulations in particular fields are often developed without consideration of cumulative burdens. The culture of some regulators itself tends to foster excessive regulation, and it has also been argued that society and government has become unduly risk averse. (Regulation Taskforce 2006)

This highlights the importance of reviewing the stock of existing regulation periodically, and carefully vetting proposals for new regulation, to ensure among other things that the underlying objectives are appropriate in view of the social, environmental, financial and other benefits and costs entailed. (However, as alluded to earlier, assessing the objectives, benefits and costs of the myriad of specific regulations that affect public infrastructure is beyond the scope of this inquiry.)

Improving approval processes

Unnecessary costs can also arise where the design, coordination and/or administration of regulations and requirements means that they are not the most cost-effective ways of achieving their underlying social and environmental objectives.

The Commission’s MPDAP inquiry found that, while the building blocks of a sound regulatory system are in place, there is still substantial scope to improve Australia’s development assessment and approval processes. It identified several problem areas including:

- unnecessary complexity and duplicative processes
- lengthy approval timeframes
- lack of regulatory certainty and transparency in decision making
- conflicting policy objectives

- inadequate consultation and enforcement
- regulatory outcomes falling short of their objectives.

The report proposed a wide-ranging reform agenda intended to help Australia secure the benefits of major developments while at the same time protect the nation's environmental, heritage and cultural assets (box 14.2). The reforms should benefit major public infrastructure projects along with other major projects.

Box 14.2 Reforming major project assessments and approvals

The Commission's proposed agenda includes:

- five steps to move towards a 'one project, one assessment, one decision' framework for environmental approvals, that includes strengthening bilateral assessment and approval agreements between the Commonwealth and the States and Territories
- limiting the use of 'stop-the-clock' provisions
- improving coordination between states and territories regulatory agencies
- institutional separation of environmental policy development from regulatory and enforcement functions
- enshrining the principle that Ministerial approval — unless a deemed approval — should not be reviewable other than on judicial review grounds
- establishing statutory timelines, together with appropriate safeguards, for key decision points in the development assessment and approvals process
- expanding the use of Strategic Assessments and Plans where practical to do so
- requiring that approval authorities publish reasons for their approval decisions and conditions
- improving third party opportunity for compliance actions.

Several submissions to the current inquiry referred to the earlier report and endorsed all or most of its recommendations. The Australian Industry Group (sub. 47, p. 25) stated:

Major projects of all sorts are currently subject to the potential for substantial delays and costs in order to comply with the tangle of State and Federal environmental regulation and approvals processes. Public infrastructure projects are no exception. The Commission's recent recommendations on Major Project Development Assessment Processes are very sensible, and Ai Group looks forward to continued action from all levels of government towards a much more efficient approach which maintains high standards while providing predictability and minimising costs.

Australian governments are currently considering the report's recommendations.

While major projects are generally approved at the state level and can effectively bypass local government planning, local governments have other relevant powers. These include granting permits (including ‘secondary approvals’) within their jurisdiction. They are also often responsible for planning and approval processes for the construction and use of smaller-scale projects or infrastructure, including local roads and hospitals.

Numerous issues arise in relation to smaller scale and secondary approvals (box 14.3), although many of the principles articulated in the MPDAP report are also relevant to these. The Commission has also identified ‘leading practices’ for such matters in its benchmarking reports on *Planning, Zoning and Development Assessments* (PC 2011b) and *The role of Local Government as Regulator* (PC 2012a).

Box 14.3 Local government approvals and planning issues

Secondary approval processes generally come into play at the periphery of a major construction project or in relation to smaller infrastructure projects. The processes can contribute to the costs of public infrastructure and affect usage of built infrastructure. For example, the construction of connecting roads from major highways or from ports or airports can require approval from the local council. Local governments’ power over secondary approvals may give it scope to extract ‘community contributions’ from the infrastructure provider. Another facet of this ‘last mile problem’ relates to the ongoing use of roads. The Australian Trucking association noted that a major concern of heavy vehicle operators — who are major users of ports, airports and highways — is their ability to access smaller, local roads (sub. 27, p. 9).

Often the incentives around infrastructure construction and usage can differ between local councils and state governments. For instance, while the construction of a new highway or port may benefit the state overall, the local government area is likely to endure external costs such as noise and pollution. Meanwhile, the infrastructure may not bring any new funding to the local government.

Similarly, local governments do not receive funds from heavy vehicle road charges when they allow greater access to local roads, and some have argued this makes granting heavy vehicle access a lower priority to local governments than residential works (HVC sub. 77, p. 15). Further problems can arise because local governments may have incentives to allow development near facilities they do not control. This may impinge on the use or future expansion of the facility. In this context, the Australian Airports Association (sub. 90) highlighted the need for ‘safeguarding’ mechanisms to ensure that the nature of developments allowed around airports (and associated demands for noise or other restrictions) do not unduly hamper airport operations.

Finally, primary approvals for smaller infrastructure projects may also have to deal with a more complex regulatory environment. One difference is the absence of so called ‘fast track’ mechanisms that are designed to coordinate the various licensing arrangements for major projects (PC 2013c). Planning frameworks at the local and state levels vary in complexity across states (PC 2011b, p. 64).

14.5 Federal safety accreditation

To be eligible to bid for most Commonwealth-funded projects, head contractors must be accredited under the Australian Government Building and Construction OHS Accreditation Scheme, run by the Federal Safety Commissioner (FSC).⁵⁸

While it might seem that safety accreditation arrangements could have little more than minor effects on infrastructure construction, some inquiry participants have argued that the FSC scheme is unnecessary, costly to comply with and can hamper or deter some businesses from bidding for Commonwealth-funded projects. In calling for a review of the scheme's requirements, for instance, the Victorian Civil Construction Industry Alliance said that they 'place a restrictive burden on contractors wishing to undertake works that are federally funded. The requirements add significant annual operating costs to SMEs that intermittently undertake these works.' (sub. 28. p. 11). And a number of international constructors have indicated that the FSC scheme can hamper efforts of firms without recognised experience in Australia to lead major infrastructure projects here (sub. 74).

While many other regulatory arrangements affecting major infrastructure projects have been subject to analysis (as discussed earlier), the FSC scheme issue has not been covered in such detail. This section thus examines the scheme and the key concerns raised.

Background to the scheme

The scheme commenced in 2006 and was part of the response to the Cole Royal Commission. It had found that the building and construction industry's safety record was unacceptable, and recommended that the government use its influence as a client and provider of capital to foster better performance.

To obtain accreditation, a builder or construction business must first have its OHS management systems separately certified as meeting an Australian standard (AS 4801: 2001) or its international equivalent; and then must be assessed by the FSC against various additional criteria (box 14.4). The FSC assesses applicants through

⁵⁸ The FSC accreditation requirement applies for projects that are directly funded by the Australian Government with a value of \$3 million or more, and to joint projects where Australian Government funding either accounts for at least half of the cost and exceeds \$5 million or exceeds \$10 million (and the head contract accounts for at least \$3 million). Where these thresholds are met, any builder who is not a subcontractor to another builder requires accreditation to work on the site.

desktop reviews and a number of onsite inspections of a project. While there is flexibility in the way businesses can meet the requirements, the FSC notes that:

The Scheme sets a high benchmark and some applicants may need several months to reach the OHS standards required for accreditation. (OFSC 2012b)

Box 14.4 Requirements for FSC accreditation

- Evidence of an OHS management system, certified to AS/NZS 4801:2001 or the equivalent international standard.
- Demonstrated ability to manage construction hazards and high risk activities.
- Record in relation to workplace safety.
- On-site audit results.
- Performance against the following focus points
 - i) demonstrated senior management commitment to OHS
 - ii) integration of safe design principles into the risk management process
 - iii) whole of project OHS consultation and communication
 - iv) demonstrated effective subcontractor OHS management arrangements across building and construction projects
 - v) whole of project performance measurement
 - vi) OHS training and competency to deal with safety risks.

Importantly, the FSC requirements are additional to the standard OHS regulations that apply to building work generally. Head contractors on Commonwealth-funded projects must still comply with state-based regulations and may face penalties or stop work notices on building sites if specific breaches occur. The aim of the FSC scheme is to complement normal OHS regulations, inspections and enforcement procedures by ‘... assessing and auditing how well builders systematically manage work health and safety (including risks and the cause of problems) to minimise the likelihood of incidents occurring.’ (Department of Employment 2014, p. 5)

Does the scheme act as a barrier to foreign firms?

One concern is that the FSC requirements may deter foreign construction firms from entering the Australian market, in turn reducing the level of competition. This may arise partly because the FSC requirements differ from those in other countries, so foreign firms — even if operating with sound safety management systems — may need to alter their processes to gain accreditation (although, of course, this difficulty also arises for local firms currently meeting only state-based OHS regulations and pre-qualification requirements). A further problem for foreign firms is that, before they have actually entered the Australian market, they will have no

domestic sites that demonstrate compliance with FSC requirements and thus are unable to be audited for that purpose.

Foreign firms that wish to compete for Commonwealth-funded projects have three options in these circumstances.

- They can opt for an onsite audit of an overseas project, and make whatever adjustments are necessary at that site to comply with FSC requirements.
- They can enter the Australian market by first undertaking a project funded privately or by state or local governments (that does not require FSC accreditation), but subsequently use that project to develop compliance with FSC requirements and gain accreditation.
- Instead of obtaining accreditation, foreign firms can seek to participate in a Commonwealth-funded project as part of a joint venture or alliance, provided their partner is accredited with the FSC (and the arrangement is approved by the FSC). Under this arrangement, the management of OHS onsite must be undertaken by the accredited partner, utilising its systems.

However, all of these options may still impose significant costs, delays or other difficulties for foreign constructors. And even where international firms seek to side-step the accreditation requirements by coupling with domestic firms, this may reduce the total number of bids on a project and/or diminish the scope for the international firm to apply its full expertise to the project. In some cases, international firms could be precluded from bidding at all simply because they are unable to find a firm with which to partner.

The upshot is that benefits of the expertise, and additional competitive pressure, that foreign firms could bring to the Australian infrastructure market may be delayed or denied. As Austrade submitted:

... a number of international companies have advised Austrade the process is cumbersome and tends to eliminate the possibility for international firms (without recognised experience in Australia) to lead public project consortiums in Australia. This is regardless of the depth and breadth of their international business (sub. 74. p. 20).

The full extent of these problems is unclear. The Commission understands that a large proportion of the international firms that apply for accreditation ultimately obtain it. However, little is known about how many foreign firms, faced with the prospect of accreditation, have declined to apply. Without reasonable information on this matter, it is difficult to gauge the degree to which the accreditation requirements act as a barrier to entry.

Even so, given the concerns of international contractors and the importance of maintaining competitive pressure in the infrastructure construction market, there would be merit in examining means of addressing these problems:

- One option might be for the FSC to ‘recognise’ the existing safety management system requirements for firms operating in countries with standards broadly comparable to Australia (effectively waiving the requirement for separate accreditation using the specific FSC criteria and procedures). However, the Commission understands that requirements in other countries are far less demanding than those in the FSC scheme.
- Another option might be for the FSC to provide ‘provisional’ accreditation to firms with appropriate safety records, but different safety management systems. Were such a firm successful in bidding for a Commonwealth-funded project, it would be expected to subsequently demonstrate compliance with FSC requirements, in part via a satisfactory onsite audit of the Australian project.

These and other ideas could be further developed and evaluated as part of a broader review of the current scheme (discussed below).

Are the compliance costs too high, and is the scheme necessary?

Aside from the particular problems faced by foreign firms, participants argued that the FSC accreditation requirement inflates costs for businesses, in a way that could penalise smaller contractors in particular. If contractors are participating in Commonwealth-funded projects infrequently, they may find it difficult to recoup the costs of obtaining and maintaining FSC accreditation. If the costs are too high, it may not be feasible for them to participate in these projects at all. This would diminish competition for these projects, as well as being problematic in its own right.

Some of the scheme’s costs are borne directly by the FSC, which collects no fees for the consideration of applications and for carrying out onsite audits. The costs borne by the constructor are those associated with changing safety systems to comply with FSC requirements, collecting information necessary to demonstrate ongoing compliance, and making time and staff available for onsite audits.

According to the Victorian Civil Construction Industry Alliance (sub. 28), the costs to businesses can amount to around \$150 000 to initially gain FSC accreditation, and then around \$120 000 a year to maintain it. As there are currently over 300 firms accredited by the FSC, these figures could translate into a total compliance cost of around \$40 million annually. However, estimating compliance costs can be

difficult, and the Commission would welcome further information on these matters.⁵⁹

The broader issue raised by some inquiry participants is whether there is a case for retaining a separate set of conditions for Commonwealth-funded projects at all — conditions that are not required for other projects (including those of the same scale) elsewhere in Australia. Along these lines, the Civil Contractors Federation argued:

[I]t seems unreasonable and unwarranted that an additional layer of safety requirement is applied to the requirements they are already subject to in order to work for State and Territory Governments, and in fact Australia's recognised AS-NZ 4801-2001 standard.

Likewise, the Victorian Civil Construction Industry Alliance submitted:

The Government should investigate the warrant for federally funded projects to meet a higher standard for OH&S than the Australian Standards for Safety (AS4801) which is the current industry standard and can be independently certified by a third party. The investigation should be conducted with a view to adopting AS4801 as the acceptable Standard for federally funded projects. This would provide a level playing field for all.

It should be noted that the Australian Government has indicated its intention to retain the FSC scheme, and it is included in the Bill to re-establish the ABCC.

It should also be noted that the FSC has sought to reduce the administrative burden for builders by progressing arrangements with states and territories to recognise the Commonwealth scheme. Thus, builders accredited under the Commonwealth scheme are automatically deemed to comply with the relevant work health and safety requirements in certain state/territory prequalification schemes. The current Review of the scheme (discussed below) is also exploring other means of reducing compliance costs.⁶⁰ However, given that the FSC requirements are much more onerous than other existing requirements, the federal accreditation scheme will still add to compliance costs.

⁵⁹ One difficulty arises because businesses would need to undertake some expenditure to comply with workplace health and safety laws (and potentially obtain AS4801 certification) in any event: these are potential costs whether the company is FSC-accredited or not. Separating these different cost components can be challenging. The VCCIA's estimates were based mainly on feedback from a member company which was asked, among other things, to estimate the direct costs it incurred in achieving FSC accreditation, over and above what was required to achieve AS4801 certification (J. Stewart., pers. comm. 2 March 2014). The participant has undertaken to provide additional information on the compliance costs following this draft report.

⁶⁰ As part of examining means of reducing compliance costs, the Review is also considering whether AS4801 certification should continue to be a *prerequisite* from FSC accreditation. However, the issues paper for the review does not countenance *replacing* the FSC accreditation requirements with the (less onerous) requirement that firms have AS4801 certification.

Removing the requirement for FSC accreditation, and relying on other existing workplace health and safety regulation or pre-qualification requirements, would of course address concerns about the specific FSC requirements causing barriers to entry for foreign firms or small contractors, as well as reducing the compliance costs associated with accreditation. In supporting this option, the Civil Contractors Federation argued that the FSC's resources could be usefully redirected towards other means of improving OHS outcomes (sub. 34).

Equally, were it found that the FSC scheme confers net benefits and is more cost-effective than alternatives, there could be a case for expanding its reach.

Reviewing the scheme

As noted earlier, some of the above matters are likely to be considered in a review of the FSC scheme, which has just commenced. The Review is being undertaken by the Department of Employment in consultation with an advisory panel comprising representatives of industry associations, the Australian Council of Trade Unions, the FSC and government agencies that procure building works. The Review released a discussion paper in late February 2014. It is to report to the Minister for Employment by June 2014. Ideally, the Review's report will be released publicly soon after.

The scope of the Review is 'to modernise and streamline the Scheme while not reducing safety outcomes', and it will examine various means of reducing compliance costs, among other things.

However, as presently cast, it appears that the Review will not evaluate:

- whether any safety, productivity or other benefits arising from the scheme exceed the costs entailed⁶¹
- whether existing OHS regulations or alternative certification or accreditation standards (including AS 4801) would be likely to generate appropriate safety outcomes more cost-effectively

⁶¹ The discussion paper does, however, report some 'background' data showing a reduction in serious injuries and fatalities in the construction industry since the commencement of the scheme. It also points to a number of indicators suggesting that accredited companies have higher safety outcomes and improve their safety performance following accreditation, although it also notes that it is not possible to isolate the contribution of the scheme from other variables. (Department of Employment 2014, pp. 8–9). The FSC has also pointed to a range of (incidental) benefits for businesses that it claims might arise from accreditation (OFSC 2012).

-
- options such as ‘recognition’ of the existing safety management system requirements for firms operating in countries with standards broadly comparable to Australia, or ‘provisional accreditation’ for firms with appropriate safety records or accreditation.

In view of the concerns of international contractors and the importance of maintaining competitive pressure in the infrastructure construction market, the Commission considers that the Review should examine the third of these matters, with a view to recommending measures to improve access to Commonwealth-funded projects for firms not presently operating in Australia.

DRAFT RECOMMENDATION 14.1

The current Review of the Australian Government Building and Construction OHS Accreditation Scheme should examine options such as ‘recognition’ and ‘provisional accreditation’, with a view to the implementation of measures to improve access to Commonwealth-funded projects for firms not presently operating in Australia.

It is less clear cut whether, and by what means, the first and second points above should be examined at this time. These points go to the costs and benefits of retaining the FSC scheme. As noted, the Australian Government is currently committed to its retention, and the present departmental Review is focused on making changes within the current scheme’s broad settings.

Examining the merits of the scheme, and of alternatives to it, would be a different analytical challenge and might best be undertaken in a transparent review process that is independent of the agency that oversees the scheme. One option would be to first await the report of the current Review and then allow the FSC scheme, with any improvements made in response to the Review’s recommendations, to operate for a period. This would enable current processes to take effect and potentially provide a better basis for any subsequent assessment of the benefits and costs of the scheme, and how they compare to other options. Alternatively, were it decided that the scheme’s compliance costs are unduly high and unlikely to be significantly reduced by implementing the Review’s recommendations, there would be a case for a more immediate assessment of the merits of maintaining the separate Commonwealth scheme.

14.6 Regulation affecting quarries

A further regulatory issue raised by inquiry participants, and not examined closely in the Commission's MPDAP report, is the effect of social and environmental regulations and related requirements on the cost and supply of quarried materials.

Rock, sand, gravel and other quarry outputs are key inputs for many infrastructure projects, and variations in the price of these products may have a considerable effect on construction costs. Drawing on data for Victoria, Macromonitors has estimated that concrete, asphalt and aggregates — largely consisting of quarry products — comprise 32 per cent of total infrastructure costs (on average, across a range of infrastructure types), and will be responsible for more than a third of anticipated cost increases in infrastructure projects between 2012 and 2022 (sub. 17. p. 3). Lend Lease noted that the cost of quarry products had already increased by 60 per cent over the last decade (sub. 46. p. 26).

There are three components of the price of quarried materials. Primarily there is the cost of extraction. Because materials sourced from quarries are heavy and bulky, and often sourced some distance from a job-site, there is also a substantial transport component. According to the Cement Concrete & Aggregates Australia (CCAA) (sub. 17), transportation can account for as much as one quarter of the total costs of material. Finally, quarry owners also need to recoup the costs of obtaining a Work Authority and complying with other regulations over the working life of the quarry.

The presence of substantial transport costs would ordinarily create the potential for geographic-based market power, with quarries close to project sites potentially able to restrict supply and lift prices, while still remaining competitive against more distant suppliers. However, to date the Commission has not seen any evidence of quarry operators acting to influence the price of their products in this way.

Of greater concern to participants is the multitude of regulations that affect quarries, and how they are administered. The regulations in question cover issues such as land use, waste disposal, site remediation, environmental offsets, public safety, OHS, noise and transport, and it is important that appropriate outcomes in these areas are not compromised. However, there may be scope to remove unnecessary regulatory burdens. While recognising that there are valid public interests in regulating in these areas, the Construction Material Processors Association (CMPA) has argued much of the regulation is excessively stringent and inflexible, and is likely to increase costs and even result in a shortfall of quarry outputs in the future. CMPA (2009, 2011) documents provide a number of cases studies of regulatory 'difficulties' encountered by quarry operators in seeking approvals to establish or expand their operations that, taken at face value, appear to involve onerous requirements and inconsistency, duplication, and significant cost and delay.

A related concern is that some quarries are being closed, and insufficient new sites or capacity may be being activated, particularly in or near cities. A lack of quarries near areas of major construction work has the potential to inflate the costs of infrastructure. As the CCAA noted:

The efficiency of the supply chain for heavy construction materials is largely determined by location, as transportation equates to approximately 20 to 25% of the total cost of materials. The high-bulk, low-value nature of the materials means that transportation costs have a significant impact and the closer the materials are to their market the less impact transportation has on the cost.

... The Melbourne market has many quarries located in the metropolitan area and the average transport distance from quarry to concrete batch plant is 30 km, whereas, in Sydney, which has one remaining metropolitan quarry, the average transportation distance is 60 km. The delivery cost of material is 70% greater in Sydney than in Melbourne, which is solely attributable to the increase in haulage distance (sub. 17, p. 4)

The exhaustion of existing quarries and/or inability to establish new quarries close to end markets is likely to have increasingly significant ramifications, given the considerable growth expected in the populations of major Australian cities over the next 50 years — the populations of Sydney and Melbourne to exceed 7 million by 2060 (PC 2013a). Moreover, the Commission understands that disused quarries (or sections of quarries) are often used as disposal sites for rock and earth extracted from infrastructure projects. Where such disposal sites are unavailable nearby, further costs will be incurred in this element of infrastructure projects to transport waste material to more distance areas.

Both the CMPA and the CCAA called for improvements in regulatory processes and planning mechanisms to address the problems identified. The CCAA pointed to the report of a recent Victorian Parliamentary Commission *Inquiry into Greenfields Mineral Exploration and Project Development in Victoria*, along with the Commission's MPDAP report, as providing sound principles and recommendations to streamline planning mechanisms. It also called for measures to identify and protect 'key resource areas' to ensure a capacity to access new and existing resources.

Planning and other regulations affecting quarrying are administered in a different manner in different States, and often span multiple portfolios. Without coordination, it is possible that the cumulative burden of regulation could place the production of a key input for infrastructure projects at risk. As noted, this would have a significant impact on the costs of construction. While analysis of the various regulatory requirements and processes that affect quarrying is beyond the scope of this study, state governments may need to review the cumulative burden of regulation affecting quarrying and whether additional measures to address supply issues are warranted.

A Conduct of the inquiry

This appendix lists parties the Commission consulted with through:

- submissions received (table A.1)
- visits (table A.2)
- a roundtable (table A.3)

The Commission received the terms of reference for this inquiry on 13 November 2013. Following receipt of the terms of reference, the Commission placed notices in the press and on its website inviting public participation in the inquiry. Information about the inquiry was also circulated to people and organisations likely to have an interest in it. The Commission released an issues paper in November 2013 to assist inquiry participants with preparing their submissions. The Commission received 108 submissions.

A roundtable was held in Melbourne on 19 December 2013.

The Commission consulted with a range of organisations, individuals, industry bodies and government departments and agencies.

Table A.1 **Submissions received^a**

<i>Individual or organisation</i>	<i>Submission number</i>
Australian Competition and Consumer Commission (ACCC)	83
Air Conditioning and Mechanical Contractors' Association of Australia (AMCA)	19
AMP Capital	86, 99
Asciano, Aurizon, Australian Rail Track Corporation & Australasian Railway Association, The	56
Association of Mining & Exploration Companies (AMEC)	32
Assured Guaranty Ltd	29
Atlas Iron	93
Attorney-General's Department	101
Australasian College of Road Safety	18
Australasian Railway Association #	58
Australian Airports Association	90
Australian Automobile Association	65
Australian Constructors Association	72
Australian Council of Trade Unions (ACTU)	95
Australian Industry Group	47
Australian Information Industry Association	25
Australia Institute, The	85
Australian Logistics Council	48
Australian Property Institute	13
Australian Services Union	69
Australian Sustainable Built Environment Council	75
Australian Trade Commission (Austrade)	74
Australian Trucking Association #	27
Autodesk Asia #	24
Bianchi, Robert J & Drew, Michael E	33
Borland, Jeff	102
Bridge, Adrian *	11
Bus Industry Confederation	43
Business Council of Australia (BCA) #	39
BusinessSA	31
Cameron, Greg	6
CBUS #	67
Clean Energy Finance Corporation (CEFC)	109
Cement Concrete & Aggregates Australia #	17
Central NSW Councils (CENTROC)	37
Certain Planning Pty Ltd & Hopman Consulting Services Pty Ltd #	91
Chamber of Minerals & Energy of WA, The (CME) *	36
Chandler, David	63
Civil Contractors Federation	34

(Continued next page)

Table A.1 (continued)

<i>Individual or organisation</i>	<i>Submission number</i>
Cockatoo Network #	98
Combined Small Business Alliance of WA Inc	104
Committee for Melbourne	30
Consult Australia	23
Council of Capital City Lord Mayors #	73
Council of Mayors (SEQ)	38
Department of Infrastructure & Regional Development	64
de Valence, Gerard	16
Dial Before You Dig	5
Drew, Michael E & Bianchi, Robert J	33
Engineers Australia	26
Ergas, Henry	87
Financial Services Council (FSC) #	22
Gillard, I M	106
Goldberg, John Dr	84
Green Building Council of Australia	50
Hale, Chris Dr #	2
Hepburn, Gavin	57
Herbert Smith-Freehills #	68
Holman, Geoff	96
Hopman Consulting Services Pty Ltd & Certain Planning Pty Ltd	91
Housing Industry Association (HIA)	21
HVCI	77
IFM Investors	79
Independent Contractors Australia	100
Industry Super Australia	60
International Centre for Complex Project Management	105
Katz, Peter	45
Kolar Consulting	7
Laird, Philip	3
Lean Construction Institute of Australia	103
Lend Lease	46
Local Government Association of Queensland (LGAQ)	52
Macquarie Group Limited *	97
Makin, Anthony	4
Maritime Super #	15
Maroondah City Council	76
Master Builders Australia	88
McLeod Rail Pty Ltd	49
Menno Henneveld Consulting	62
Minerals Council of Australia	70

(Continued next page)

Table A.1 (continued)

<i>Individual or organisation</i>	<i>Submission number</i>
Mission Australia	14
Morandini, John	107
National Apprenticeships Program	9
National Growth Areas Alliance	41
National Public Lobby	80
NCOSS	20
Office of the Infrastructure Coordinator	78
Pottinger	8
Professionals Australia	10
Property Council of Australia	53
Regional Australia Institute #	92
Roads Australia #	66
Salini Australia Pty Ltd	1
Sinclair Knight Merz	108
Smart Infrastructure Facility — University of Wollongong	94
Spring, Ian	89
SMSF Professionals' Association of Australia	35
Stakehill Road Transport-oriented Urban Development Alliance (SR-TUDA)	59
Stanger, Aiden	71
Telstra	82
Transport Network Reform #	54
Transurban #	61
University of New South Wales	44
Urban Development Institute of Australia, The (UDIA)	40
Victorian Civil Construction Industry Alliance #	28
Victorian Government	81
Victorian Healthcare Association	12
Water Services Association of Australia	55
Westpac	51
Yilgarn Iron Producers Association	42

^a An asterisk (*) indicates that the submission contains confidential material NOT available to the public. A hash (#) indicates that the submission includes attachments.

Table A.2 Visits

*Organisation***Australian Capital Territory**

Australian Competition and Consumer Commission (ACCC)
 Acciona
 Australian Trade Commission (Austrade)
 Australian Constructors Association
 Australian Workers Union (AWU)
 Boston Consulting Group
 Bureau of Infrastructure, Transport & Regional Economics (BITRE)
 Construction, Forestry, Mining and Energy Union (CFMEU)
 Clayton Utz
 Department of Industry
 Department of Infrastructure & Regional Development
 Department of Treasury
 Engineers Australia
 Evans and Peck
 Fair Work Building and Construction
 Federal Safety Commissioner
 McLeod Rail
 Minerals Council of Australia
 National Apprenticeships Program
 Obrascon Huarte Lain (OHL)
 Perkins, Stephen (OECD International Transport Forum)
 Safe Work Australia
 URS Corporation

New South Wales

ATEC Rail Group
 Department of Premier & Cabinet
 Deutsche Bank Australia
 Infrastructure NSW
 Infrastructure Partnerships Australia
 Leightons
 Lend Lease
 MMA Civil Contractors
 NSW Treasury
 Reserve Bank of Australia
 Smart Infrastructure Facility — University of Wollongong
 Transport for NSW

Table A.2 (continued)

*Organisation***Queensland**

BMD Group
 Brisbane Airport Corporation
 Brisbane City Council
 Centre for Comparative Construction Research – Bond University
 Civil Contractors Federation
 Department of State Development, Infrastructure & Planning
 Local Government Association of Queensland
 Port Of Brisbane
 Queensland Building Services Authority
 Queensland Major Contractors Association
 Queensland Motorways

Victoria

Australian and New Zealand Banking Group
 Committee for Economic Development of Australia
 Construction Material Processors Association (CMPA)
 Department of Premier & Cabinet
 Department of Treasury & Finance
 Freebairn, John
 Fulton Hogan
 Heavy Vehicle Charging & Investment Reform (HVCI)
 King, Stephen
 Linking Melbourne Authority
 Lloyd, John
 Maddock, Rod
 Melbourne Airport
 Victorian Government

Western Australia

Brookfield Multiplex
 Chamber of Minerals & Energy WA, The (CME)
 Construction Contractors Association of WA
 Department of Metropolitan Redevelopment Authority
 Department of Planning
 Department of Premier and Cabinet
 Department of Transport
 Perth Airport

Table A.3 Roundtable participants

<i>Name of participant</i>	<i>Organisation</i>
Davies, Philip	AECOM
Evans, Jon	ANZ
Hall, Jessica	Department of Infrastructure & Regional Development
Kanowski, Steve	Department of State Development, Infrastructure & Planning
Maguire, Glenn	Evans & Peck
Hoskins, Richard	Hastings Funds Management
Hanna, Michael	IFM Investors
Roe, Paul	Infrastructure Australia
Lyon, Brendan	Infrastructure Partnerships Australia
Cain, James	M21 Consulting
Maddock, Rod	Monash University
Esposito, Simon	NAB
Frew, Leilani	NSW Treasury
Waller, Mike	Office of Living Victoria
Loos, Jason	Partnerships Victoria
Ergas, Henry	Smart Infrastructure Facility - University of Wollongong
Legg, Chris	Treasury (Australian Government)
Freebairn, John	University of Melbourne
Seiffert, Bob	Victorian Civil Construction Industry Alliance

DRAFT REPORT

This draft report is no longer open for consultation. For final outcomes of this project refer to the inquiry report.

Draft

B Australian and international public infrastructure case studies

This appendix examines a range of public infrastructure projects from Australia and overseas. There are a range of different models of delivery of public infrastructure projects, which vary in the degrees of public and private sector involvement (chapter 3).

The case studies in this appendix have been selected so as to cover a range of different delivery models, jurisdictions and sectors. They indicate that the Australian and international experience with delivering public infrastructure has been mixed. Some projects have been considered successful, others less so, and the reasons for this vary from project to project.

The Commission has, to the best of its ability, endeavoured to ensure these case studies are described accurately, but further clarification is sought from participants on the details of these case studies.

B.1 Road infrastructure

Case study 1: CityLink, Victoria

Background

CityLink is a privately owned and operated electronic toll road in Melbourne. It is 22 kilometres long and links major routes between Melbourne Airport, the port and the industrial centres in the city's south-east. It consists of two sections of roadway: the Western Link, which connects the Tullamarine Freeway to the West Gate Freeway, and the Southern Link, which connects the West Gate Freeway to the Monash Freeway. Construction of CityLink commenced in May 1996, and it opened at the end of 2000.

Project selection

As early as 1929, a proposal for a southern bypass of Melbourne's central business district (CBD) was put forward as part of a transport plan. The Melbourne Metropolitan Board of Works planning scheme in 1954 and the highway plan in 1957 both proposed an inner ring road around the CBD, a series of freeways to the east, south-east, north-west, as well as a number of bypasses. While most of the freeways on the outskirts of Melbourne were built by the late 1970s, freeways around the CBD were omitted due to community opposition and insufficient funds (Muhammad and Low 2006).

In the 1990s, various alternative strategic solutions were investigated to deal with growing traffic problems, and it was ultimately concluded by the Victorian Government that a link should be provided to circumvent the CBD (GHD 2011).

Delivery model

In May 1992, the Victorian Government invited businesses interested in building, owning and operating CityLink to submit a bid on a 'build-own-operate-transfer' basis. At the time construction commenced, CityLink was the largest such scheme in Australia. More generally, the Victorian Government has been active in using the public private partnership model (PPP).

Five proposals were received and two consortia shortlisted based on pre-determined selection criteria. These consortia — Transurban and CHART Roads — were announced in September 1992 (GHD 2011). The Transurban consortium comprised Transfield Construction and the Obayashi Corporation, and CHART Roads comprised Clough Engineering, John Holland Construction and Engineering, Roche Brothers and Theiss Contractors. The final brief was issued in 1994, requiring detailed traffic forecasting (although the tender conditions stated 'toll price and pricing mechanisms are to be negotiated at financial close'). The successful consortium for the CityLink Project spent \$28 million tendering for the project (PAEC (Vic) 2006).

Once the tender process was concluded and Transurban was announced as the preferred consortium, a contract was negotiated between the Minister for Roads and Ports on behalf of the State of Victoria and Transurban (published as schedule 1 to the *Melbourne City Link Act 1995*). Under this Act, the Victorian Government granted an exclusive licence to Transurban to design, build, finance, operate, levy tolls and maintain CityLink for 34 years (until 2034) (IPA 2006). When the contract expires, CityLink will be transferred to the Victorian Government. The concession

period was anticipated to provide a net return to shareholders of 17.5 per cent per annum (PAEC (Vic) 2006).

The majority of the risks associated with CityLink were transferred to Transurban, with compensation payable to Transurban for network changes made by the Victorian Government.

The design and construction of CityLink was undertaken by a joint venture between Transfield and Obayashi Corporation, under contract to Transurban. The design and construction of the Western Link was outsourced to Boulderstone Hornibrook Engineering and the supply of the electronic tolling system to Translink Systems, a company jointly owned by Transfield and Transroute of France (IPA 2006). To keep construction on schedule and ensure that each project element was built to specific standards, an independent reviewer was also appointed to the project.

The Melbourne CityLink Authority facilitated and oversaw the project. It also worked on land acquisition, provided advice on legislation, monitored design and construction, and provided risk management, public affairs commentary and community consultation (Muhammad and Low 2006). Following the opening of CityLink, the responsibilities of the Melbourne CityLink Authority were transferred to the Victorian Department of Infrastructure. From June 2004, VicRoads became responsible for the management of the CityLink contract, public safety on CityLink, the protection of state interests and assets, and the integration of traffic on the road network (Muhammad and Low 2006).

Funding for CityLink

Most of the funding for the project is through tolling. CityLink uses distance-based tolling which is indexed to the consumer price index. Current toll caps are \$6.93 for cars, \$9.24 for commercial vehicles during the day, and \$6.93 for commercial vehicles during the night.

Financing for CityLink

Transurban financed \$1.8 billion of construction costs using a mix of debt and equity, as follows:

- Initial equity included a public issue (\$63.5 million), and an institutional issue (\$206.5 million). Transfield and Obayashi provided around \$100 million. The balance of equity came from private investors (\$185 million), and a deferred equity component of \$55 million was contributed by Obayashi and Transroute (IPA 2006).

-
- \$1.3 billion of debt finance was comprised of both tranche A (\$1.2 billion with a 17 year maturity, primarily used during the construction phase), and tranche B (\$97.5 million to provide additional liquidity for the operational phase of the project) (IPA 2006).
 - This debt finance was raised from, and underwritten by, a syndicate of banks with 17–19 year loan maturities. These banks included each of Australia’s four largest banks, and several local subsidiaries of international banks. These lenders secured the debts through deeds of charge over Transurban’s assets and obligations (including toll revenues), and mortgages over project leases (GHD 2011).
 - CPI bonds of \$350 million provided long-term borrowings. Adverse movements in interest rates were protected against by using outstandings under the project debt facility to hedge through a series of floating to fixed interest rate swaps (IPA 2006).

The Victorian Government also agreed to fund certain state works (worth \$266 million) during the construction phase, to implement specific agreed traffic measures in favour of CityLink, and to amend various pieces of legislation to protect Transurban’s financial and legal position (Muhammad and Low 2006; PAEC (Vic) 2006). The ‘concession fees’, to be paid by Transurban, were to compensate the Victorian Government for the cost of acquiring the tollway land and undertaking associated works, which had cost around \$365 million.

However, an arrangement was subsequently negotiated where the government waived its right to receive these fees. In June 2005, the Victorian Government and Transurban agreed to upgrade the Tullamarine Calder interchange. Under a Deed of Assignment, the Victorian Government received \$150 million in two instalments. In exchange for these payments, the Government transferred back to Transurban concession notes it held with a face value of \$300 million. Design and construction of the interchange was completed by VicRoads (Omega Centre for Mega Projects in Transport 2008).

The Australian Government financially supported CityLink through significant tax concessions. These tax concessions helped Transurban to attract investors by offering tax-exempt returns on their investments during the four year construction period before the project began to earn money (Muhammad and Low 2006).

Outcomes

The estimated cost for CityLink was around \$1.8 billion, but the final cost was around \$2.1 billion (PAEC (Vic) 2006).

When CityLink first opened, traffic was around 90 per cent of the initial forecast. Initial patronage was impacted by technical problems with the automated tolling systems (which, for example, resulted in some accounts being charged before opening). After the initial technical problems were resolved, patronage increased but still tracked below forecast levels, although some sections with higher traffic levels compensated for others with lower levels; differences varied from 9 per cent above to 39 per cent below forecasts. After nine years of operation, in 2008 the gap between the projected and actual volume of traffic had closed to within 6 per cent (GHD 2011). Currently the road patronage exceeds forecasts, at around 750 000 tolls per day. More than 1.5 million vehicles (or over 35 per cent of Victoria's vehicles) are registered with CityLink.

Case study 2: Clem Jones tunnel (Clem 7), Queensland

Background to the project

The Clem Jones (Clem 7) project is around 6.5 kilometres long (including 4.7 kilometres of tunnels and associated road connections) and links five freeways and arterials on the north and south sides of the Brisbane river, while bypassing the CBD. Construction commenced in 2006 and was completed in 2010. It was also the first section of the new M7 motorway in Brisbane, which was completed when the AirportLink tunnel opened (in 2012).

The Clem Jones tunnel was the first local government PPP of its kind in Australia, and is the longest road tunnel in Australia.

Project selection

The Clem Jones tunnel is the first part of Brisbane City Council's 'TransApex' plan to construct five new roads — primarily tunnels — to form an inner city ringroad (Brisbane City Council 2010). In peak periods, motorists using the tunnel usually save between eight and ten minutes. Where there is a minor traffic incident on surface roads, time savings can be up to 20 minutes (Clem 7 nd).

Delivery model

The contract was a design-build-own-operate-finance-maintain model. The concession period was to be 45 years from financial close, ending in 2051.

Bids were received from two consortiums — Brisconnections and RiverCity Motorways. Each bid cost around \$20 million. Bids were assessed in terms of

engineering design, traffic benefits, environmental outcomes and value-for-money (Moir 2006).

The successful tenderer was announced in April 2006, and the Brisbane City Council entered into a contract with RiverCity Motorway Consortium, a publicly-traded company comprising Leighton Contractors, Boulderstone Hornibrook, Bilfinger Berger Concessions and ABN AMRO. In turn, RiverCity Motorways:

- contracted the design and construction of the tunnel to the Leighton Contractors and Boulderstone Bilfinger Berger Joint Venture (which entered into a number of subcontracts) (Dixon 2011; Hicks 2008)
- intended to outsource operations and maintenance to Brisbane Motorway Services (50 per cent owned by Leighton Services and 50 per cent owned by Bilfinger Berger Services), but retain flexibility to undertake the tolling and customer service obligations in-house (Hicks 2006).

The patronage risk was borne by RiverCity Motorways.

While Brisbane City Council was the proponent of the project, it signed a memorandum of understanding with the Queensland Government on how they would jointly deliver the project. Revenue was to be shared with Brisbane City Council from years 35 to 45.

Funding

The project was to be primarily funded through tolls. Tolls were intended to be \$3.30 for cars, \$4.95 for light commercial vehicles, and \$8.75 for heavy vehicles (Hicks 2006), indexed to the CPI for 30 years (DPT (Qld) 2005). However, patronage was considerably lower than forecast, which meant tolls were not imposed in line with this model (discussed below). Current toll prices are: \$2.36 (motorbike), \$4.72 (car), \$7.08 (light commercial vehicle), and \$12.50 (heavy commercial vehicle) (Clem7 nd).

Financing

The cost of the project was around \$3 billion, financed by a mix of debt and equity.

The senior debt structure utilised:

- a construction facility to roll into term facility at construction completion
- a council works tranche to be repaid by Council at construction completion

-
- an equity bridge facility to be drawn during construction and repaid with a deferred equity tranche to be provided by contractors at construction completion (Hicks 2006).

The debt structure had added protection to withstand significant downside scenarios, with a debt service reserve (three months), a ‘ramp-up’ reserve (seven months), and an equity contingency reserve (\$20 million), as well as performance bonds and provision for liquidated damages of up to 10 per cent in the design and construct contract (Hicks 2006).

There were three main sources for the equity that was raised:

- *Initial Public Offering (IPO)*: around \$691 million of equity was raised. The stapled securities were originally listed at \$1 each and were partly-paid (50 per cent of the value was paid at the initial public offering, and 50 per cent was paid after 12 months). The IPO gave priority to Queensland residents and provided a purchasing incentive program.
- *Dividend Reinvestment Plan*: distributions up to the end of the ‘ramp-up’ period were subject to a dividend reinvestment plan, which was underwritten by ABN AMRO Rothschild.
- *Deferred equity*: a tranche of \$155 million, subscribed by Leighton and Bilfinger Berger at the end of construction. The application price was the same as the IPO and the obligation was secured by a letter of credit (Hicks 2006).

Outcomes

The project was delivered on budget and almost seven months ahead of schedule (Dixon 2011). It cost around \$3 billion and was completed in 2010 (Clem 7 nd).

Patronage was lower than originally forecast. In the Brisbane City Council briefing (Maunsell 2005), the consultant forecast around 60 000 vehicles a day would use the tunnel in 2010, when tolls were to be introduced. In the investor briefing (Hicks 2006; 2008), the consultant forecast that patronage would be, on average, 100 000 cars per day in 2010, increasing to over 130 000 per day in 2025.

When the tunnel opened in 2010, without tolls, traffic was running at around 60 000 vehicles per weekday for the three week toll-free period, but:

... the first week of tolls at \$3.50 for cars saw weekday traffic at only 20 600 [per weekday] and stayed around that level. The toll was cut to \$2.00 at the end of June and traffic rose to 27 600 [per weekday]. By September, traffic was reported at 28 400 per weekday ... Tolls have since been raised to \$3.00 and traffic is [in 2011] running [at] 22 000 to 23 000 [per weekday]. (Samuel 2011)

As a result of lower than forecasted patronage, the \$1.3 billion in short-term loans were not renewed and, unable to refinance its debt, RiverCity Motorways was put into receivership in 2011, 11 months after the tunnel opened. Share prices dropped from \$1 in 2006 to \$0.019 by the time Queensland Motorways acquired it for \$618 million (Queensland Motorways is currently owned by the Queensland Investment Corporation, which is a Queensland Government body) (Samuel 2011).

Subsequently, a class action against engineering consultant AECOM Australia Pty Ltd (the organisation that prepared the traffic forecasts) was commenced by retail equity investors. The investors claimed the traffic forecasts were misleading, and that they failed to disclose that the traffic forecasts provided to Brisbane City Council 18 months earlier were significantly lower than the forecasts provided to the investors (Maurice Blackburn 2012).

This project is an example of demand risk being transferred to private investors and not being borne by the government.

The Brisbane City Council has continued to progress its 'TransApex' plan, with the construction of AirportLink, Legacy Way (which are both tunnels) and the Go Between Bridge.

Case study 3: WestConnex (and the sale of Port Kembla and Port Botany), New South Wales

Background

WestConnex is a group of projects, including capacity improvements on existing roads and new sections of motorway, extending the M4 to Sydney Airport, and duplicating the existing M5 East (Infrastructure NSW 2013).

Project selection

WestConnex was designed to address a number of perceived gaps in Sydney's motorway network, including: the missing link in the east-west 'spine' created by the M4 terminating at North Strathfield; congestion, low travel speeds and unreliable travel times on the M4, M5 East, Parramatta Roads and in the Sydney Airport/Port Botany precinct that delay freight, public transport and add cost to business; and poor urban amenity along Parramatta Road due to heavy traffic volumes and congestion. This project was seen as particularly important given that Sydney's west is an important employment and population hub which is predicted to experience significant future growth (WestConnex 2013c).

Infrastructure NSW identified WestConnex as the state's highest priority project in the NSW State Infrastructure Strategy.

The WestConnex proposal was developed by Infrastructure NSW after a number of investigations and consultations by transport and urban planners on the best way to fix the perceived issues with Sydney's road network, and then submitted to the NSW Government.

Delivery model

The tender process has not been concluded, so the delivery model has not been finalised.

The NSW Government created the WestConnex Delivery Authority in 2013, which reports to the NSW Minister for Roads and Ports (WestConnex 2014a). In addition, the NSW Department of Premier and Cabinet chairs a Customer Requirements Group intended to provide a 'whole of Government interface' (WestConnex 2013c).

The risk allocation proposed by the NSW Government is as follows. The NSW Government has taken on the risk of planning and environmental approvals, project specifications and performance requirements, project funding risk, and the greenfields patronage risk (prior to sale). It is planned that the private sector will take on the design, construction, commissioning, maintenance, operations, tolling services, and brownfields patronage risk (post-sale). The project is to be delivered in three stages over ten years (WestConnex 2013c).

Before the tender process, the NSW Government conducted an industry engagement process to involve industry in the design of the project at an early stage (WestConnex 2013c). For example, Hassell has been appointed to carry out the urban design work, and Ernst and Young and Parsons Brinkerhoff will look at network design targets, among other things.

The Sydney Motorways Project Office is also working with consortiums led by Ferrovial Agroman and Leighton Contractors to develop design aspects along Parramatta Road (WestConnex 2013b).

By January 2014, six construction companies and joint ventures had lodged expressions of interest to build the first section of WestConnex (WestConnex 2014b). These were:

- Laing O'Rourke-Ferrovial Agroman joint venture
- Lend Lease Engineering

-
- McConnell Dowell-OHL joint venture
 - Rizzani De Eccher-Leighton joint venture
 - Salini-Impregilo joint venture
 - Thiess.

Construction of Stage 1 is expected to commence in 2015 and be completed by 2019 (WestConnex 2013c).

Funding

The WestConnex business case was based around a tolling strategy that contains the following principles and indicative tolls.

- A minimum toll (around \$1.50 to \$1.80) will apply to mitigate underpricing of short trips. The maximum toll will be \$7.35, consistent with the M7. Indicative average tolls will be between \$2.40 and \$3.00 for each of the three stages, and the overall average toll will be \$4.50.
- The toll will be distance-based, meaning that longer trips are more expensive.
- Cars will pay one-third of the heavy truck toll.

Initial modelling indicated that around 75 per cent of the funding for WestConnex could be sourced from user charges. This would leave the requirement for further funding of around \$2 to \$3 billion, which would need to come from the NSW Government and Australian Government. The NSW Government plans to privatise stages of the project that have high revenue-capital expenditure ratios when construction is complete, with the proceeds to be 'recycled' into the later stages of the scheme (discussed below) (Infrastructure NSW 2013; WestConnex 2013c).

Financing

WestConnex is expected to cost around \$11 billion to build (WestConnex 2013a). In terms of selecting a financing model, Infrastructure NSW (2013, p. 6) commented:

The WestConnex scheme will be, by a large margin, the most expensive motorway development for Sydney to date and will require substantial financing and funding resources. With the varying success of recent public private partnerships (PPPs) in Australia and the post global financial crisis (GFC) environment, it is clear that new and innovative ways of delivering motorway projects will be required. It is likely that WestConnex will require a blend of private and public financing. WestConnex can be delivered within ten years, dependant on a viable financing and funding model.

Broadly, the financing strategy is intended to be as follows.

- Assuming that stage 1 (Parramatta to Haberfield) will be predominantly financed by the NSW Government and Australian Government, the NSW Government will make a \$1.8 billion contribution over the next four years, and the Australian Government will provide \$1.5 billion over the next four years.
- As tolls are introduced on WestConnex and traffic volumes are established:
 - non-recourse private sector debt will be raised against this toll revenue to help finance subsequent stages
 - the NSW Government's equity investment will be sold, with proceeds recycled to support construction of Stages 2 and 3.
- The NSW Government will retain ownership of Stages 2 and 3 until after project completion (WestConnex 2013c).

The WestConnex Delivery Authority (2013c) noted that PPP models could also be applied in conjunction with this financing model, and that this is being considered as part of the further development of the financing and procurement strategy described above.

The NSW Government's \$1.8 billion contribution towards the cost of delivering Stage 1 of the WestConnex motorway scheme is to be provided by the Restart NSW fund.

The Restart NSW fund was established to fund a range of high priority future infrastructure projects in New South Wales. Infrastructure NSW is responsible for independently assessing projects and making recommendations to the NSW Government on use of the funds. In April 2012, the NSW Government announced that terms had been reached for the long term lease of Port Botany and Port Kembla. Following a six-month competitive bidding process, the 99 year lease was awarded to the NSW Ports Consortium for around \$5 billion, with net proceeds of around \$4 billion to be allocated to Restart NSW, the NSW Government's infrastructure fund. The NSW Ports Consortium is mostly comprised of superannuation funds, including Industry Funds Management, Australian Super, and Tawreed Investments Limited (a wholly-owned subsidiary of the Abu Dhabi Investment Authority) (NSW Treasury nd).

In the 2013-14 NSW State Budget, the NSW Government approved the allocation of \$3 billion funding from Restart NSW for priority infrastructure, including \$1.8 billion for WestConnex (Infrastructure NSW nd).

Case study 4: LBJ Express, United States

Background

The LBJ Express project involves rebuilding, expanding, and introducing new toll lanes on one of the busiest and most congested highways in North Texas. The project is the largest greenfields toll road in the United States, with a total length of 26.6 kilometres, of which 21.4 kilometres will be tolled (TxDOT 2014). Once it is complete, drivers will have the choice of driving on general purpose lanes at no cost or opting for new tolled ‘express lanes’.

Project selection

The goal of the LBJ Express project is to relieve severe congestion by almost doubling the existing roadway capacity. It will have four main untolled lanes each way, two to three continuous frontage roads in each direction, and three toll lanes in each direction (TxDOT 2014).

In March 2006, the Texas Transportation Commission called for qualifications to tender for the PPP contract, known as the Comprehensive Development Agreement.

Delivery model

The contract is a design-build-finance-operate-maintain contract, entered into in September 2009 by the Texas Department of Transport and the LBJ Infrastructure Group (comprised of Cintra US, Meridiam Infrastructure Finance, and the Dallas Police and Fire Pension System). The term of the concession is 52 years. The Texas Department of Transport owns the project. The North Texas Tollway Authority will provide toll collection services (TxDOT 2014).

Construction began in early 2011, with an anticipated substantial completion date of 2016. Construction is being carried out by Spanish contractor Ferrovial Agroman, and its Texas subsidiary W.W. Webber (Sharn 2010). The project is being designed and built concurrently, which is expected to reduce construction time by several years (TxDOT 2014).

Funding

Some lanes on the LBJ Express are to be tolled. The tolls will use dynamic pricing designed to keep traffic moving at 80 kilometres per hour (TxDOT 2014). It is estimated that tolls will initially be US\$0.09 per kilometre in low traffic and

US\$0.31 per kilometre at, but peak period charges could be as high as US\$0.47 per kilometre peak (TxDOT 2014). The LBJ Express currently carries 270 000 vehicles per day, but this is expected to increase to 500 000 vehicles per day by 2020 (Sharn 2010).

Financing

The total investment cost of the project is expected to be US\$3.1 billion. Total construction cost is expected to be US\$2.6 billion, raised as follows:

- US\$490 million from the Texas Department of Transport
- US\$664 million equity from the LBJ Infrastructure Group, divided between Cintra (51.0 per cent), Meridam (42.4 per cent) and the Dallas Police and Fire Pension System (6.6 per cent) (the first pension fund to invest directly in infrastructure development in the United States)
- US\$615 million of 30 year, tax-exempt private activity bonds
- US\$850 million under the federal Transportation Infrastructure Finance and Innovation Act (TIFIA) loan program (Sharn 2010; TxDOT 2014).

Outcomes

In early 2014, the project was more than 65 per cent complete, and phase one of the toll lanes, as well as several frontage roads and general purpose lanes opened in December 2013 (TxDOT 2014). The project is expected to be completed by 2016.

The redesign of the LBJ Express managed lanes project in Dallas by Cintra reportedly reduced construction costs by US\$970 million while achieving the same end goals. The public sector had allocated US\$700 million in public funds for LBJ Express, but, as a result of the project structure and efficiencies in development and operations, the required subsidy was only US\$489 million.

Cintra is an infrastructure developer and long-term investor, that remains involved in both the delivery and operation of all its toll roads. Cintra ‘invests equity into all its projects, operates and maintains all assets using in-house resources, and exercises close supervision and control during the delivery stage, to ensure each project is well-constructed and fit for its purpose’ (OECD 2013, p. 201).

The OECD International Transport Forum (2013) commented that, while the LBJ Express had an initial scope that was economically unfeasible, feedback provided by the private sector allowed for its successful development. Thus, ‘this is the type of project that brings the biggest benefits from PPP contracting but, by

number, such schemes represent a small proportion of the transport PPP projects contracted around the world to date' (OECD 2013, p. 21).

B.2 Rail infrastructure

Case study 5: Channel Tunnel Rail Link (HS1), United Kingdom

Background

The Channel Tunnel Rail Link Project (now known as High Speed 1, or HS1) involved constructing a 106 kilometre high speed railway linking St Pancras Station, London to the Channel Tunnel Rail (a rail tunnel between France and the United Kingdom, which opened in 1994), and operating the British arm of the Eurostar international train service (Eurostar UK) along this route.

The project commenced in 1996 and was completed in 2007.

Project selection

The project was perceived as necessary to increase the speed of the existing train and the frequency of trains between London and Paris, which on the existing line was limited to four trains per hour in each direction (Hansen 2010).

HS1 was suggested by (the then state-owned) British Rail in 1988. A modified proposal gained government support in 1991. After some amendments, enabling legislation was passed by the UK Parliament in 1996 (Butcher 2010).

Delivery model

Consistent with other heavy railway infrastructure projects, the project used a design-build-finance-manage contract (Hansen 2010). The concession period was 90 years (until 2086). Construction was to start in 1998, once the finance had been raised, and the line was to be opened in 2003. The way risk was shared varied as the financing arrangements evolved (see below), but throughout, the Department of Transport was keen not to bear the construction risk (CPAHC 2006).

A tender process was commenced in 1994 by the Department of Transport. Bidders were required to compete for design, construction and management of the rail link, as well as the amount of public sector financial contribution they would require (which might include a domestic capacity charge) (Butcher 2010).

The Department awarded London and Continental Railways (LCR) the contract to build the rail link and run the Eurostar International Train Service. The shareholders of LCR were a number of engineering consultants (Arup, Bechtel, Halcrow and Systra), a subsidiary of the state-owned French power distribution company EDF, the private British transport provider National Express, the public French railway operator SNCF, and the investment bank UBS. LCR managed the project through its property division and three subsidiaries (Hansen 2010).

Funding

The original contract envisaged that LCR would draw on revenue from Eurostar (which was running the newly-opened Channel Tunnel Rail) to service the private debt raised and provide a return for its shareholders. In bidding for the deal in 1996, LCR forecast that passenger numbers on the Channel Tunnel Rail (which opened in 1994) would reach 9.5 million in 1996-97 and 21.4 million by 2004. Patronage of the Channel Tunnel Rail was important to this project, because the purpose of HS1 was to provide a new rail line that connected the Channel Tunnel to London. Actual numbers were substantially below this, which proved problematic for LCR in obtaining finance (see below).

In later refinancing deals, the UK Government guaranteed debt repayments.

Financing

Total investment costs were £5.8 billion (Butcher 2011). The original financing arrangement involved £1.8 billion in government grants, with the rest borrowed by LCR, secured on future revenue from Eurostar UK (NAO UK 2001). Prior to being floated, LCR had £60 million in equity and £430 million of short-term bank loans — the rest of the finance was to be raised through a stockmarket float and the issue of debt.

However, LCR failed to raise the finance needed because the forecasts for Eurostar traffic and revenues proved overly optimistic, and Eurostar was losing money heavily (Perkins 2013). LCR asked instead for an additional £1.2 billion in government grants. The government refused, but opted to restructure the contract rather than terminate it (the first restructure) (NAO UK 2001).

The terms of the 1998 restructure divided the HS1 rail link into two sections. Railtrack (the owner of the other tracks on the rail network) would purchase section 1 when it was completed, with an option to purchase section 2. In return, Railtrack committed to operate the whole route and the main station (NAO

UK 2001). The UK Government guaranteed LCR's remaining borrowing requirement (£3.75 billion in bonds). The Department of Transport also agreed to lend money directly to LCR to cover operational expenses several years after completion (originally estimated to be £140 million but later estimates suggested it would be closer to £1.2 billion). LCR also put in place facilities to draw, if needed, up to £700 million of debt from a consortium of commercial banks and other sources (guaranteed by Railtrack). The Department of Transport also took a small shareholding in the company (which entitled it to receive at least 35 per cent of the pre-tax cash flow and proceeds after 2020) (Hansen 2010; NAO UK 2001).

Between 1998 and the end of 2003, LCR raised around £6.2 billion of debt in the capital markets to fund construction of sections 1 and 2 of HS1, operation and maintenance of section 1, and Eurostar UK's concurrent losses (NAO UK 2005b).

In 2001, Railtrack announced that it would not purchase Section 2 due to financial problems and withdrew from the deal. This triggered another restructuring (the second restructure), under which LCR would be backed by the Department of Transport, Bechtel and a group of insurers in sharing construction risk for section 2 (known as the Cost Overrun Protection Program). LCR paid Bechtel and the insurers £87 million to bear £315 million of the first £600 million of any construction cost overruns (CPAHC 2006; NAO UK 2005b).

Under this deal, section 1 would also remain owned by Railtrack, and LCR would own section 2, but the two sections would have common management by Railtrack (CPAHC 2006). However, due to further financial problems at Railtrack, Railtrack's interest in HS1 was subsequently sold back to LCR, who later sold operation of the completed line to Network Rail, Railtrack's (government-owned) successor (Butcher 2011).

Outcomes

The whole project was completed in 2007 at a total cost of £5.8 billion (£6.2 billion including additions). The project was completed within the extended time and budget envelope made available at refinancing, but 11 months behind original target completion date, and 18 per cent over original target cost (Perkins 2013).

Passenger numbers were 5.1 million in 1996-97 (46 per cent below forecast) and 7.3 million in 2004 (66 per cent below forecast). Thus, while revenues increased over time, they remained substantially below forecasts. In 2006, a report to the UK Government concluded that it was likely the Department of Transport would have to lend more than the previously estimated £260 million to LCR to cover future cash shortfalls (NAO UK 2001).

In May 2009, LCR became insolvent and ownership of the project was transferred to the UK Government, together with debt of around £5.1 billion. In 2010, the Government awarded a concession to operate the line for 30 years to Borealis Infrastructure and Ontario Teachers' Pension Plan for £2.1 billion, with the line to be maintained to standards set by the Office of Rail Regulation (Perkins 2013). Network Rail operates and maintains the stations and infrastructure under this contract.

The UK Government is currently progressing a second high speed rail line (HS2) running north from London to the English Midlands, North West England, Yorkshire, and potentially North East England and the Central Belt of Scotland.

B.3 Utilities

Case study 6: Adelaide Desalination Plant, South Australia

Background

The Adelaide Desalination Plant is a seawater desalination plant at Lonsdale, south of Adelaide, that uses a technique known as reverse osmosis.

Adelaide's other main sources of water are dams in the Mount Lofty Ranges catchment and diversions from the Murray River. Adelaide has sourced water from the Murray River for many years. On average, the Murray River has provided about 40 per cent of Adelaide's mains water, and in a drought year this has been as high as 90 per cent.

In recent drought years, extra seasonal allocations have been purchased from irrigators to meet urban demand shortfalls. During 2008-09, 106 gigalitres (GL) of temporary water was purchased for critical human needs, and a further 60 GL was purchased in 2009-10.

Project selection

In December 2007, the SA Government announced that a 50 GL per year seawater desalination plant would be constructed to provide additional water for Adelaide in preference to relying on rural-urban trade — that is, to replace the water purchased from the Murray-Darling basin (PC 2011a).

However, the Australian Government wanted the capacity of the desalination plant to be doubled to 100 GL per year (or 50 per cent of Adelaide's annual water

requirement) (Abigroup nd). It appears that this was at least partly motivated by the objective of reducing Adelaide's dependence on the Murray River, thereby securing environmental water to help meet the anticipated requirements of the Murray-Darling Basin Plan (PC 2011a). The SA Government agreed to this (discussed later).

Delivery model

The project was delivered through a design-build-operate-maintain contract. A shortlist of bidders was selected as part of the Early Contractor Involvement process (SA Government nd).

A competitive procurement process was conducted. Expressions of interest were advertised in July 2008 and received in August 2008. Two tenderers were shortlisted and invited to submit detailed proposals (South Australian Water Corporation 2010). SA Water evaluated the proposals and selected a preferred respondent (AdelaideAqua 2009).

The contract was awarded in March 2009 to AdelaideAqua — a consortium comprising McConnell Dowell Constructors, Abigroup Contractors, ACCIONA Aqua and TRILITY (AdelaideAqua 2009).

Construction commenced in 2009 and was completed in 2012. The contractor will be responsible for the operation of the desalination plant for up to 20 years after the plant becomes operational — that is, until June 2031. The plant remains owned by SA Water.

Funding

The operating cost for running the plant at full capacity will be \$130 million per year, or \$1.30 per kilolitre (kL). Should the plant be shut down, the annual cost will be \$20 million, and will reduce further should the shutdown continue beyond 12 months.

The desalination plant is being funded through user charges. The environmental impact assessment published by the SA Government (Nd, p. 7) stated:

The cost of the proposed development [the desalination plant] will result in increases in water prices to customers. In December 2007, the Government announced that a new water pricing structure would be introduced. In addition, the new structure includes a new, third-tier targeting residential customers who use in excess of 520 kilolitres per annum. The new pricing structure is designed both to raise sufficient revenue to meet the costs of the water security initiatives discussed above [including the desalination

plant] and also to provide an incentive for residential customers to minimise their discretionary use of water.

On average, prices increased 26 per cent from July 2011 (PC 2011a).

Financing

The plant was built at a cost of \$1.83 billion (PC 2011a), financed from a combination of SA Government and Australian Government contributions, as follows:

- The SA Government made \$1274 million in contributions, and agreed to cover any additional costs incurred to complete the project.
- The Australian Government provided a grant of \$328 million, on certain conditions (discussed later) (SCFFR 2011).

Outcomes

The project was completed on time and within budget.

The conditions of the grant provided by the Australian Government distorted the SA Government's investment decision (PC 2011a). The Australian Government's grant of \$328 million was provided through the National Urban Water and Desalination Plan, most of which was on the condition that the plant's capacity be expanded from 50 to 100 GL per year.

The Productivity Commission's inquiry into urban water concluded that purchasing equivalent capacity from the Murray-Darling Basin would have been a cheaper option than building the desalination plant. Purchasing 105 GL of high reliability Victorian Murray entitlements from the Murray would have cost around \$190 million, with operating costs between \$0.20 and \$0.30 per kL. By contrast, the cost of the desalination plant was \$1.83 billion, with operating costs of \$1.30 per kL (at full capacity) (PC 2011a).

The Commission concluded, on the limited information available to it, that opting for purchasing water entitlements instead of proceeding with the desalination plant would have:

- generated capital savings of as much as \$1.6 billion
- produced substantial savings in operating costs
- significantly increased flexibility, given the option of selling surplus allocations to irrigators in some years (PC 2011a).

B.4 Social infrastructure

Case study 7: Darent Valley Hospital, United Kingdom

Background

The 400 bed Dartford and Gravesham Hospital in the Darent Valley in the United Kingdom was the first major hospital contract to be privately financed, as per the UK Government's policy at the time. The hospital now has approximately 463 inpatient beds (DVH UK nd).

In the United Kingdom, privately financed hospitals are paid for by 'trusts', which are National Health Service (NHS) providers of acute and specialised care, set up as corporate bodies separate from the Secretary of State (Hellowell and Pollock 2009).

Project selection

The project was intended to enable the Dartford and Gravesham community to relocate health services previously provided on three relatively old sites in need of major maintenance. There was also the view that, given the limited public capital available, the hospital was unlikely to have been built in the near future if it were not for the private finance (NAO UK 1999).

When the Dartford and Gravesham National Health Service Trust (NHS Trust) first prepared their business case in 1995, the West Kent Health Authority (the principal purchaser of the NHS Trust's services) had not yet developed a detailed strategy for health services in the area (the body had only been formed the previous year). The Regional Health Authority told the NHS Trust that, in its view, the hospital should not have more than 400 inpatient beds (75 fewer than provided by the existing hospitals), due to changes in clinical practices and improvements in medical technology. This was argued to be broadly consistent with the norms established in the Tomlinson Review of Acute Services in London (NAO UK 1999), but this reduction in beds was subsequently criticised.

In selecting the project, the NHS Trust compared the likely benefits and costs of the private finance with a public sector comparator, which was based on traditional procurement methods. It estimated the non-financial benefits of the private finance were likely to be greater than traditional procurement, because of: a timetable that would enable the hospital to be put into operation after 44 months (quicker than most publicly-financed hospitals), as well as design innovation (using a smaller space than normal) and the opportunity for the NHS Trust to concentrate on clinical services, rather than maintenance and support services. In financial terms, the NHS

Trust estimated that the private finance would deliver savings of £17.2 million (or 9 per cent) compared with traditional procurement, but this was subsequently found to be an overestimate of £12.1 million, due to errors in estimating the public sector comparator. After the errors were corrected, estimated savings were £5.1 million, or 3 per cent (NAO UK 1999).

Delivery model

The NHS Trust awarded the contract for the new hospital to a consortium then called Pentland (now known as The Hospital Company (Dartford) Limited) in 1997 (NAO UK 1999). This was the first national health services project conducted under the private finance initiative. The delivery model was a design-build-finance-maintain model. Pentland was required to design, construct and finance the hospital, and then to maintain it and provide support services for a period of up to 60 years. The clinical services in the hospital were provided by the NHS Trust (NAO UK 1999).

The NHS Trust sought to manage the procurement competitively and also to deliver a deal as soon as possible. While the NHS Trust awarded the deal in a short time frame (22 months), the final stages of the procurement were not fully competitive. Initially, there were four indicative bids. In April 1996, the NHS Trust invited Pentland and United Healthcare to make final bids, judging that the extra costs and time from including a third bidder would outweigh the potential benefits of increased competition. However, United Healthcare did not submit a final bid, commenting that the NHS Trust's timeframes did not make it feasible. Thus, only one bid from Pentland was received (NAO UK 1999).

The NHS Trust sought to address this absence of competition by benchmarking most of Pentland's costs, but the contract terms arose from a period of negotiation over 12 months, rather than through competitive bidding (NAO UK 1999).

In negotiating the contract, the NHS Trust had to address private sector caution about a new form of procurement, financiers' concerns about the legality of privately financed health contracts, and a wide range of technical issues that had not been tested before. In particular, the project played a key role in developing the necessary primary legislation and, as such, helped shape subsequent privately financed health projects (NAO UK 1999).

Funding

Hospital funding in the United Kingdom is conducted as follows. The NHS Trust pays an annual fee, or ‘unitary charge’, from the day the hospital opens until the end of the contract period. This is comprised of two elements — the availability charge, and the services charge. The NHS Trust may also have to pay a capital charge if they use public assets owned by the state, or pay rent if they lease buildings from the private sector (Hellowell and Pollock 2009).

When approving the NHS Trust’s Outline Business Case in 1995, the West Kent Health Authority calculated that a new hospital might at least be revenue neutral for the Health Authority and the NHS Trust. After Pentland’s bid was received, however, it became evident that additional financial support (ultimately assessed at £4 million a year) would be needed to meet the costs of the new hospital. The sources of this funding are as follows. Funding of £3 million per year is being provided by the West Kent Health Authority and the NHS Executive, and £1 million per year is being met by the NHS Trust (NAO UK 1999).

The Dartford and Gravesham hospital scheme was developed under the NHS internal market. Following the abolition of the market, the NHS Executive now requires Regional Offices (which succeeded Regional Health Authorities in April 1996) and key purchasers of health services (such as Health Authorities) to take a greater role in the planning of new hospitals. They now stipulate that a funding ceiling must be developed and agreed for each project by both the NHS Trust and the local Health Authority (NAO UK 1999).

Financing

The total value of the contract was expected to be £177.0 million, of which the total financing costs were expected to be £68.1 million (in present value terms). Since alternative financing through the bond market for privately financed health projects had not yet been developed, the terms of the financing were:

- £98.2 million of bank loans at 6.1 per cent interest
- £5.7 million, comprised of subordinated debt (85 per cent) and equity (15 per cent), raised from the contractors at an estimated 17 per cent interest rate
- £7.7 million, comprised of subordinated debt (85 per cent) and equity capital (15 per cent) from external investors at an estimated 17 per cent interest rate
- £21.9 million in cash from land sales (NAO UK 1999).

Two important contract conditions were as follows.

-
- The external investors would be repaid some or all of the paid-up value of their investment in the event of contract termination
 - The contractors and external investors would, if the project proceeded to plan, defer funding of £13 million until six months before the scheduled completion of the hospital, and instead bring forward the investment of bank finance (this arrangement improved the cash flows for Pentland) (NAO UK 1999).

The contract was refinanced in March 2003. The NHS Trust received an immediate lump sum of £1.5 million and a reduction of £2.0 million in its annual contract price over the remainder of the contract as a result of sharing in the refinancing benefits (£11.7 million of the £33.4 million) and agreeing to extend the contract period. Following this price reduction, the contract (including the provision of facilities management services) accounts for around £17.0 million of the NHS Trust's annual costs of £94.0 million. The expected total cost to the NHS Trust of the contract in present value terms, over the minimum period of the contract, at contract letting, prior to the refinancing and after the refinancing were around the same (NAO UK 2005a).

However, there were also new risks to the NHS Trust arising from the refinancing. The Trust agreed to extend the minimum contract period from 28 to 35 years, and to accept that the cost of terminating the contract might increase above the cost of the hospital to include some or all of the additional £46.0 million debt Pentland took on to generate the refinancing gains.

Pentland's shareholders benefited from the refinancing — after investing £17 million in the project, they received £37.0 million following the refinancing, within three years of the hospital coming into use. This large early benefit was not in Pentland's initial financial plans.

Further, a 15 per cent nominal discount rate was agreed for the purposes of calculating the refinancing gains, which meant that the benefits shareholders now expect (including the large early benefit they had already taken) was £51 million over the life of the contract (which is around a 60 per cent increase from the returns originally anticipated by the shareholders). The shareholders' internal rate of return is now 56 per cent. This high rate of return ON equity was subsequently criticised (NAO UK 2005a, 2006).

Outcomes

The NHS Trust received the new hospital two months early and for the price agreed in the contract.

In addition to providing the hospital, Pentland was also responsible for providing services such as catering, cleaning and portering, and did so with only occasional service lapses (which reduced the unitary charge they received). The pricing of the hospital and the services provided to the NHS Trust was in line with the original contract until the project was refinanced in March 2003.

However, the UK Public Accounts Committee (1999) criticised the contract because the NHS Trust did not estimate its costs correctly, which led to an additional £4 million a year in funding being required. The NHS Trust also did not detect significant errors in the public sector comparator, and did not quantify the full effect of changes in contract terms, which led to £12 million less in savings than originally anticipated. Another criticism was that the use of public finance was not considered as a serious option for the contract. The NHS Trust incurred advisers' costs of £2.4 million, which exceeded initial estimates by almost 700 per cent. Finally, there were concerns that gains made by equity investors were excessive, and the mechanisms by which these gains were made were not fully understood by the NHS Trust, particularly in procurement and refinancing. Guidance was subsequently issued which was intended to address many of the issues that had arisen in this first hospital contract awarded under the private finance initiative (NAO UK 1999).

Further, the additional unanticipated funding required for the hospital will have implications for other services in the district. Thus, when entering into long-term private finance commitments, the Public Accounts Committee recommended the implications for the spending plans of health authorities be considered (CPAHC 1999).

In 2012, seven NHS Trusts announced that they were experiencing difficulties in meeting payments required of them under private finance contracts. The UK Department of Health announced a £1.5 billion 'stability fund' which will provide grants to trusts to enable them to meet private finance repayments, and some trusts have been taken over by other NHS Trusts or private parties (Campbell 2012, 2013; NHS UK 2014).

Case study 8: Wiri prison, New Zealand

Background

The Wiri prison is a 960 bed men's prison facility at Wiri, Auckland, New Zealand, that is currently under construction.

Project selection

When the project was announced, the Wiri prison was intended to respond to increased demand for prison places, but the 2011 Justice Sector Forecasts projected a falling prison population. However, the NZ Treasury (2012) stated that, while the need for additional capacity was no longer a key driver, the case for Wiri could still be made, since:

- the Wiri prison would provide replacement capacity rather than additional capacity (enabling 683 ageing prisoner places to be decommissioned)
- the cost of building and operating the new prison was broadly equivalent to the cost of running and maintaining an ageing prison estate (over the 25 years of the contract)
- the Wiri PPP contract has been designed to ensure that the NZ Government receives a better service than the Department could provide for less than Prison Services' typical operating costs
- the Wiri PPP contract contained a range of mechanisms (including financial incentives and penalties) to drive significant improvements to the long-term performance of the prison services.

The prison will have 960 beds and employ 300 people.

Delivery model

The project was opened to tender late in 2010. The Department of Corrections awarded the contract in September 2012 to Secure Future, made up of Serco Group, John Laing, InfraRed, and the Accident Compensation Corporation. SecureFuture won preferred bidder status in March 2012, beating bids from G4S and Leighton Contractors (SecureFuture 2013).

The project is for a concession of 25 years, and the contract is a 'design, build, finance, operate and maintain' model. The maximum potential price of the project has been capped at \$900 million (NZ Department of Corrections nd).

Fletcher Construction will design and construct the prison, Serco will operate it, and Spotless will maintain it. Construction begun in 2012 and the new prison is expected to open in 2015. According to the Department of Corrections, the PPP procurement model will save the government 17 per cent, compared to a conventional procurement method (Department of Corrections 2010).

Funding

In 2010, the NZ Government set aside an operating contingency of \$8.6 million in 2013-14, \$67.6 million in 2015-16, and \$51.3 million in 2016-17 and further years to meet the costs of proceeding with the prison. However, from 2016-17 onwards, the costs of proceeding with Wiri exceed the funding set aside in the operating contingency, but these additional costs will be managed within the baselines of the Department of Corrections, assuming that the prison provides additional capacity. However, forecasts now indicate that the Wiri prison will provide replacement capacity (allowing 683 beds in ageing facilities to be shut down), and thus despite the one-off transaction costs of closing the facilities (estimated at NZ\$9.5 million), NZ Treasury expect that savings will be returned from the Department to the Crown (NZ Treasury 2012).

The prison operator will receive a financial incentive if it performs better than public sector run facilities at reducing the recidivism rate (the proportion of prisoners who return to prison within 24 months). Performance will be measured against a suite of indicators that can be monitored more immediately than recidivism. Monthly reductions to the contractors' revenue will occur if 'absolute' performance is not achieved, that is, if incidents such as escapes, assaults and self-harm occur (NZ Treasury 2012).

Financing

The finance required was NZ\$402 million. Of this, ANZ and the Bank of New Zealand each provided NZ\$134 million, and BOS International (Australia) provided NZ\$67 million. The debt takes the form of a construction facility for the three-year construction period, after which a \$335 million term loan with a four year tenor will commence. The consortium provided equity of NZ\$67 million. Each consortium partner supplied approximately 30 per cent of the equity, with the exception of Serco, which supplied 10 per cent (Infrastructure Journal 2012).

The project was initially expected to cost NZ\$298 million to build and fit out. More than 80 per cent of the total budget is for construction and site works. Of the remaining cost, 6 per cent will be spent on fitout, and 9 per cent will be spent on design, professional fees, and development consents. Approximately 643 workers will be employed during construction (sustaining an annual wage bill of NZ\$41.8 million). The operational cost (comprised of prisoner, facility and maintenance costs) will be NZ\$17.6 million (Department of Corrections 2010).

Outcomes

At the time of writing this report, construction was running on schedule, and work is due to be completed in early 2015 (NZ Department of Corrections and SecureFuture 2013).

B.5 Urban renewal

Case study 9: Denver station redevelopment, United States

Background

The Denver Union Station redevelopment project is the centrepiece of FasTracks, a US\$7.4 billion modernisation of the metropolitan transportation network in Denver, Colorado, comprised of:

- 197 kilometres of rail lines serving six new commuter and light rail lines and three extensions to existing light rail lines
- 29 kilometres of bus rapid transit lines
- 21 000 commuter car parking spaces
- redevelopment of the historic Denver Union Station (at a cost of US\$500 million) (Langley 2013).

Project selection

The Denver Union Station (DUS) project is intended to create a modern multi-modal transport hub and urban renewal precinct, and redevelopment of the DUS, built in the late 19th Century (Langley 2013). The station will connect the precinct to nearby sports stadia, the entertainment precinct, CBD, convention centre and the Platte River open space district. There is also a commercial and residential development program that will cover 16 hectares of former rail yards immediately west of Denver's existing CBD, and develop at least 125 400 square metres of retail, residential, hotel and commercial office space (Langley 2013).

The project was designed to rejuvenate the DUS precinct and to aid Denver's transition to a public transport city, given its low population density (Langley 2013).

Delivery model

The Denver Union Station Project Authority is a dedicated special purpose public transport and renewal authority which will develop the public infrastructure and public domain components within the DUS precinct, and hand them over to existing operating agencies upon their completion. The DUS redevelopment was undertaken through a design and build contract with the Kiewit Western Company and AECOM (Langley 2013).

Two private sector property development consortiums are developing five parcels of land within the 16 hectare improvement district. These private sector partners serve as master developers of the private components of the precinct and manage the Union Station Neighbourhood Company under a design-construct- operate contract (Langley 2013).

Funding

Roughly one-third of the funding for the DUS project will be from revenue generated from the expanded public transport network and value capture methods (estimated to be US\$135 million over 30 years, primarily from increases in property values within the urban renewal district surrounding the station). Any shortfalls in these revenues will be made up by loan guarantees of up to US\$8 million from the City and County of Denver (Langley 2013). Sources of tax revenue include:

- increases in property values within the tax increment funding district
- tax revenues from special taxing districts established for the project
- a lodgers' tax on hotels.

Funding was also provided from federal and state government grants, as follows:

- US\$9.3 million in Federal Transit Administration section 5309 bus grants
- US\$45.3 million in Federal Highway Administration grants (projects of national or regional significance)
- US\$28.4 million of US Recovery and Reinvestment Act stimulus funds
- US\$40.5 million in cash contributions from the Denver Transit Authority from revenues from the sales tax approved by voters for the project
- an estimated US\$40.0 million in proceeds from sale of land by the Denver Transit Authority
- US\$17.3 million from the Colorado Department of Transportation

-
- US\$2.5 million from the Denver Regional Council of Governments (DUSPA 2011).

Financing

The total contract value was US\$500 million, and this was publicly financed.

The US TIFIA program provides up to US\$10 in credit assistance for each dollar of federal funds for state and local transport infrastructure investments. This allows projects using tax increment funding and other innovative funding sources to secure favourable financing rates in the private market during early ramp-up periods for new projects (Langley 2013).

There were two sources of federal loans, as follows (DUSPA 2011):

- the US Federal Department of Transport approved a US\$145 million TIFIA loan
- a US\$155 million loan was provided through the Railroad Rehabilitation and Improvement Financing Program, administered through the Federal Railroad Administration.

The Denver Union Station Project Authority will be responsible for the repayments of these two loans. Since it is not empowered to raise revenue itself, it will receive revenue from various entities which it will direct towards loan repayments. This revenue will include payments from the transit authority (expected to benefit from increased fares), and tax-increment revenues (DUSPA 2011).

Outcomes

The commercial development has progressed ahead of schedule. As at June 2013, commercial development completed or under construction exceeded the forecasts in the initial feasibility study by 6 per cent, and approximately half of the residential dwellings estimated for the same year have already been completed or are under construction (as of June 2013). Further, there was no need to tap into the City's loan guarantee or justify the federal government's credit assistance program (Langley 2013).

The DUS is scheduled to open in May 2014.

DRAFT REPORT

This draft report is no longer open for consultation. For final outcomes of this project refer to the inquiry report.

Draft

C Building information modelling

In this appendix, background of the potential benefits to flow from the adoption of Building Information Modelling (BIM) is briefly discussed.

Proponents of BIM have suggested it has a number of significant benefits, including:

- improved information sharing
- time and cost savings
- improved quality
- greater transparency in decision making (ACG 2010).

Faster adoption of BIM has also been suggested to have the potential to yield significant economywide gains (box C.1).

Box C.1 Reported benefits from the accelerated adoption of BIM

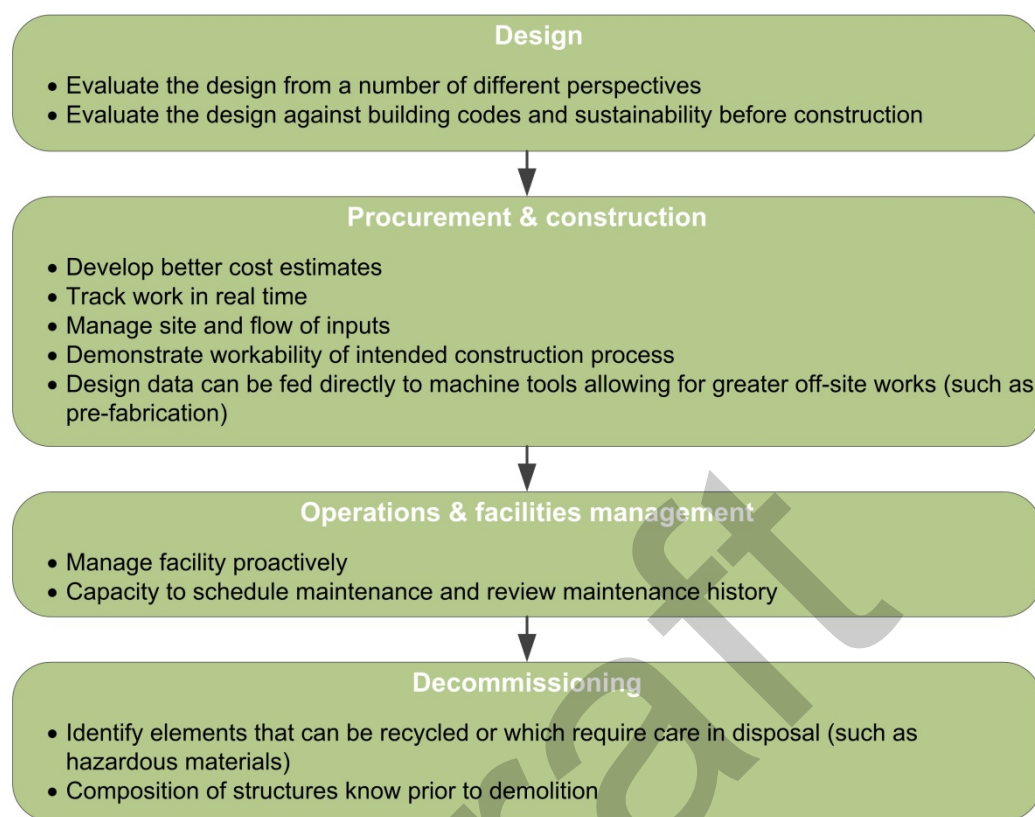
The Allen Consulting Group completed a study assessing the potential benefits to flow from an accelerated widespread adoption of BIM in Australia. Using a Computable General Equilibrium model, they found that:

- accelerated adoption of BIM would increase GDP growth by 0.2 basis points in 2011, by 2025, it was estimated that GDP growth would be 5 basis points higher
 - in net present value terms this represents a one-off increase in GDP in 2010 of between \$4.8 to \$7.6 billion.
- the benefit cost ratio of early adoption would be around 10 (assuming a \$500 million adoption cost)
- the NPV of the increase in private consumption between 2011 and 2025 (as a proxy for overall wellbeing in Australia) of around \$1.4 billion in 2010.

Source: ACG (2010, p. x).

BIM has the potential to be applied to various stage of a building's (or piece of infrastructure's) life cycle (figure C.1). As such, it can generate benefits beyond the tender process if applied from the initial design stage.

Figure C.1 **Application of BIM across the asset life cycle**



Source: Adapted from ACG (2010, p. 9).

BIM has most potential for complex construction. The key feature of BIM is that it provides a platform to explore the structure of objects and their relationship to each other. It also provides a means to incorporate scheduling of activities during the build phase (termed '4D' BIM) and allow for costing through the inclusion of cost data (termed '5D' BIM).

BIM can allow for any clashes in various design elements to be discovered prior to them occurring, reducing rework or rebuild costs. It also provides a means for constructors to better schedule their construction activities, helping to find ways to minimise site costs.

In terms of the construction phase alone, the use of BIM has been suggested to lead to savings from improving project design documentation. Cost savings can arise from reducing 'avoidance costs' (the costs of systems that are put in place to avoid errors generated from the paper based exchange of design elements); 'delay costs' (those imposed through waiting for information to be exchanged); and 'overlap costs' (caused where the same information has to be entered by multiple parties as they cannot work from the same model) (ACG 2010). It has been suggested that

between 60 to 90 per cent of project variations are the result of poor design documentation (CRC for Construction Innovation 2007).

On top of this, it has been reported that as much as 30 per cent of the construction cost of complex buildings is made up of costs resulting from coordination errors, incorrect materials and labour inefficiencies (generated by poor scheduling of activities) (Brown 2008; Construction Users Roundtable 2004). BIM has been argued to be a tool to reduce these. However, for such benefits to be realised, industry users would require the necessary project management skills to implement the schedules generated — an area where the skill set of principal contractors have been questioned (see Loosemore 2014).

The information provided by BIM also allows any potential tenderer to put forward more accurate costings for infrastructure projects. With the inclusion of both operations and facilities management and decommissioning into BIM, ‘whole of life’ costs can be considered at the tender stage. This would allow for the least whole of life cost tender to be selected, or at least consideration given to any tradeoff between upfront capital costs and potentially lower life costs.

In a review of the adoption of BIM in the United States for 32 major projects, it was found that BIM technology lead to:

- 7 per cent reduction in project time
- 10 per cent saving of the contract value through clash detection
- 40 per cent elimination of unbudgeted change
- 80 per cent reduction in the time taken to generate a cost estimate, with cost estimation accuracy within 3 per cent (Centre for Integrated Facility Engineering 2007).

Given the benefits that can stem from the use of BIM, some government clients have mandated its use for building and infrastructure works. In the UK, the Government has mandated the use of BIM for all projects by 2016 (UK Cabinet Office 2011). To facilitate this, the Government has played a co-ordination role in the development of standards.

However, given the benefits of BIM can be captured by market participants, there appears little justification for government involvement in the absence of major impediments to its adoption. As with all new technologies, some impediments to adoption exist. In the BIM context, these relate to:

- a lack of BIM object libraries
- a lack model building protocols

-
- legal and insurance impediments
 - a lack of standards for information sharing
 - skill gaps
 - adoption costs (ACG 2010, p. 40).

Such impediments would be expected to be overcome by the market if sufficient benefits existed in adopting the new technologies — its use in other markets without a regulatory mandate such as the United States and Hong Kong suggest these are not insurmountable.

But some have argued that the widespread adoption has been impeded by market failures and therefore a role for government may be warranted (ACG 2010). In particular, it has been suggested that:

- externalities exist — significant benefits accrue to third parties from the development of aspects such as object libraries and building protocols, however, the costs borne by any one firm in the development of these is greater than the income they can capture from any one project
- information asymmetries — firms do not invest in BIM because there is no evidence of the benefits and there is no evidence of the benefits because there is not widespread adoption of BIM (ACG 2006, p. 41).

Given the use of BIM internationally, it is unlikely that information asymmetries exist. To overcome the former, there could be scope for government involvement. In the UK, for example, the UK Cabinet Office co-ordinated the development of standards and other protocols (relating to legal and insurance matters and contracting with BIM) (Building Information Modelling (BIM) Task Group 2014; UK Cabinet Office 2011).

D EBAs: A small sample analysis

In this appendix, the details of the enterprise bargaining agreements (EBAs) analysed by the Commission and discussed in chapter 12 are provided. Given time constraints, for the draft report the analysis of the agreements has focused on a subset of terms and conditions within the EBA along with the outcomes for the nominal wage of the lowest paid construction worker. Further work is required to unpack differences relating to the drivers of the differences in the terms and conditions across the agreements.

D.1 The Sample

To understand the variations in pay and conditions negotiated in individual EBAs, the Commission has examined a sample of 31 individual agreements accessible from the Fair Work Commission website. The EBAs included in the sample are listed in table D.1, along with the parties to the agreements and the abbreviated title of the agreement that will be used throughout the remainder of this appendix.

Of these EBAs:

- 30 agreements were negotiated between an employer and a union (or unions), which had (or have) been assessed by Fair Work Australia to be entitled to represent the industrial interests of a majority of employees covered by the Agreement, and binding for all employees while the other agreement was negotiated between the employer directly with its employees
- 16 agreements were negotiated for a specific project (for example, the Dalrymple Bay Coal Terminal Expansion Project in Queensland) and 15 agreements were negotiated to cover all employees working for the employer in a specific jurisdiction (for example, all employees working for Leighton Contractors Pty Ltd in Victoria).

The sample is not balanced across commencement dates, jurisdictions, employees or unions. As such, the sample is unlikely to be representative for all elements examined. Where this is the case, such as with averages, caution should be taken in interpreting the results.

Table D.1 **Sample of EBAs**

In alphabetical order by title

<i>Title of agreement</i>	<i>Parties to the agreement</i>	<i>Abbreviated title of agreement</i>
Abigroup ACT Agreement 2008	Abigroup Contractors Pty Ltd, CFMEU	<i>Abigroup and CFMEU 2008 (ACT)</i>
<i>Abigroup, John Holland and the Australian Workers Union — Regional Rail Link Footscray to Sunshine Project Agreement 2011-2015</i>	Abigroup Contractors Pty Ltd John Holland Pty Ltd AWU	Abigroup, John Holland and AWU 2011 (Vic)
<i>Abigroup, John Holland and the Australian Workers' Union — Regional Rail Link Southern Cross Station to Footscray Junction Project 2012-2015</i>	Abigroup Contractors Pty Ltd John Holland Pty Ltd AWU	Abigroup, John Holland and AWU 2012 (Vic)
<i>Abigroup Leighton Joint Venture Certified Agreement 2003-2006</i>	Abigroup Contractors Pty Ltd Leighton Contractors Pty Ltd AWU CFMEU AMWU	Abigroup, Leighton, AWU, CFMEU and AMWU 2003 (NSW)
<i>Abseal Pty Ltd and CFMEU Victoria Desalination Project Agreement 2010</i>	Abseal Pty Ltd CFMEU	Abseal and CFMEU 2011 (Vic)
<i>Acciona Infrastructure Australia Pty Ltd Enterprise Agreement 2012</i>	Acciona Infrastructure Australia Pty Ltd AWU	Acciona and AWU 2012 (Qld/NT)
<i>Australian Concrete Pumping Logistics WA Pty Ltd Perth City Link Project Enterprise Agreement 2011-2014</i>	Australian Concrete Pumping Logistics WA Pty Ltd Employees in the State of WA on the Perth City Link Project	Australian Concrete and employees 2012 (WA)
<i>Bauer Foundations Australia Pty Ltd — Airport Link Project Agreement</i>	Bauer Foundations Australia Pty Ltd AWU	Bauer and AWU 2009 (Qld)
<i>Boulderstone and Leighton (Regional Rail Link Package E Werribee to Deer Park) Enterprise Agreement 2011-2015</i>	Boulderstone Pty Ltd Leighton Contractors Pty Ltd CFMEU RTBU	Boulderstone, Leighton, CFMEU and RTBU 2011 (Vic)
<i>Bouygues Laing O'Rourke Joint Venture Northern Link Tunnel Greenfields Agreement 2010</i>	Bouygues Travaux Publics SA Laing O'Rourke Australia Construction Pty Ltd AWU	Bouygues, Laing O'Rourke and AWU 2010 (Qld)
<i>Brisbane Airport Rail Link No 2 (Civil Works) The Michael Wilson Group Pty Ltd Certified Agreement 1999</i>	The Michael Wilson Group Pty Ltd Transfield Construction AWU CFMEU AFMEPKU	Michael Wilson, Transfield, AWU, CFMEU, AFMEPKU 1999 (Qld)
<i>CC Personnel and the Australian Workers Union Regional Rail Link Work Package C Alliance</i>	CC Personnel AWU	CC Personnel and AWU 2012 (Vic)

Table D.1 (continued)

<i>Title of agreement</i>	<i>Parties to the agreement</i>	<i>Abbreviated title of agreement</i>
<i>CFMEU and John Holland Pty Ltd Enterprise Agreement 2005-2008</i>	John Holland Pty Ltd CFMEU	John Holland and CFMEU 2005 (Tas)
<i>CFMEU and John Holland Pty Ltd Collective Agreement 2007</i>	John Holland Pty Ltd CFMEU	John Holland and CFMEU 2007 (Tas)
<i>Citilink Construction and CFMEU Building and Construction Collective Bargaining Agreement 2002-2005</i>	Citilink Construction Group Pty Ltd CFMEU	Citilink and CFMEU 2002 (Vic)
<i>Citilink Construction Group Pty Ltd/CFMEU Enterprise Agreement Expiring 31 March 2008</i>	Citilink Construction Group Pty Ltd CFMEU	Citilink and CFMEU 2005 (NSW)
<i>Citilink Construction Pty Ltd and the CFMEU Building and Construction Industry Enterprise Agreement 2005-2008</i>	Citilink Construction Group Pty Ltd CFMEU	Citilink and CFMEU 2005 (Vic)
<i>Dalrymple Bay Coal Terminal Expansion Project Partnership Agreement 2006 — John Holland Engineering Pty Ltd</i>	John Holland Pty Ltd AWU AMWU CEPU	John Holland and AWU, AMWU, CEPU 2006 (Qld)
<i>Dowell's Building Services Pty Ltd Legacy Way Enterprise Agreement</i>	Dowell's Building Services Pty Ltd AWU	Dowell's and AWU 2011 (Qld)
<i>Fulton Hogan and John Holland and the Australian Worker's Union — Regional Rail Link Deer Park to West Werribee Junction Project Agreement 2011-2015</i>	Fulton Hogan Construction Pty Ltd John Holland Pty Ltd AWU	Fulton Hogan, John Holland and AWU 2011 (Vic)
<i>Grocon Constructors QLD Pty Ltd CFMEU Collective Agreement 2008-2011</i>	Grocon Constructors Pty Ltd CFMEU	Grocon and CFMEU 2008 (Qld)
<i>Grocon Constructors Pty Ltd CFMEU Collective Agreement 2011-2014</i>	Grocon Constructors Pty Ltd CFMEU	Grocon and CFMEU 2011 (NSW)
<i>Leighton Contractors Pty Limited and CFMEU Building and Construction (Victoria) Agreement 2008-2011</i>	Leighton Contractors Pty Ltd CFMEU	Leighton and CFMEU 2008 (Vic)
<i>Leighton Contractors and the CFMEU Building and Industry Enterprise Agreement 2012-2015</i>	Leighton Contractors Pty Ltd CFMEU	Leighton and CFMEU 2012 (Vic)
<i>Leighton Contractors NSW/ACT Civil Projects CFMEU, AWU and AMWU Enterprise Agreement 2009-2012</i>	Leighton Contractors Pty Ltd AWU CFMEU AMWU	Leighton, AWU, CFMEU and AMWU 2009 (NSW/ACT)
<i>Leighton Contractors (NSW/ACT) Civil Projects CFMEU, AWU and AMWU Enterprise Agreement 2012-2016</i>	Leighton Contractors Pty Ltd AWU CFMEU AMWU	Leighton, AWU, CFMEU and AMWU 2012 (NSW/ACT)

Table D.1 (continued)

<i>Title of agreement</i>	<i>Parties to the agreement</i>	<i>Abbreviated title of agreement</i>
<i>Leighton Contractors Pty Limited and CFMEU South Australia Enterprise Agreement 2011-2015</i>	Leighton Contractors Pty Ltd CFMEU	Leighton and CFMEU 2011 (SA)
<i>Thiess Degremont ('TD') and AMWU, AWU, CEPU and CFMEU Victorian Desalination Project Greenfields Agreement 2009</i>	Thiess Pty Ltd Degremont Pty Ltd AWU CFMEU AMWU CEPU	Thiess, Degremont, AWU, CFMEU, AMWU, CEPU 2009a (Vic)
<i>Thiess Degremont ('TD') and AMWU, AWU, CEPU and CFMEU Victorian Desalination Project Greenfields Agreement 2009</i>	Thiess Pty Ltd Degremont Pty Ltd AWU CFMEU AMWU CEPU	Thiess, Degremont, AWU, CFMEU, AMWU, CEPU 2009b (Vic)
<i>Thiess Balfour Beatty Regional Rail Link Work Package C</i>	AWU	Thiess, Balfour Beatty 2011 (Vic)

Source: Commission analysis.

D.2 The Analysis

The focus of this analysis is on key differences in the specific provisions, terms and conditions that were, or could have been, incorporated in the EBAs listed in table D.1.

EBAs can be difficult to compare and contrast — particularly in relation to the conduct, roles and powers of the various actors in the workplace. In particular, the provisions, terms and conditions contained within individual EBAs can be diverse and wide ranging. The extent to which EBAs vary in their coverage is evident from differences in the length of the individual agreement documents — in this sample, document length ranged from 21 pages (Bauer and AWU 2009 (Qld)) to 200 pages (Thiess, Degremont, AWU, CFMEU, AMWU, CEPU 2009b (Vic)). In addition, each individual EBA may interact in complex and diverse ways with an extensive array of laws, regulations and awards. Where an EBA is silent on terms and conditions, these may be specified in supplementary legal instruments that must be read in conjunction with the agreement. To retain focus on differences across EBAs (rather than differences in other legal instruments), this analysis has focused on provisions, terms and conditions that were expressly included in a reasonable number of the EBAs in the sample.

Some of the provisions, terms and conditions were largely uniform across the EBAs included in the sample. In particular, most EBAs provided:

- ordinary working hours of 36 hours per week with 8 hours worked each day and 0.8 hours on all days worked accruing towards a Rostered Day Off (RDO)
- overtime rates at time and a half for the first two worked on weekdays (in excess of the 40 hour week) and Saturday mornings, and double time otherwise
- four weeks annual per week with an additional week for shift workers and 17.5 per cent leave loading
- loading for casual workers of 25 per cent on their ordinary pay rate as prescribed in the EBA.

Again, to retain a focus on key differences, where the EBAs included in this sample were generally similar, these provisions, terms and conditions have not been analysed any further.

D.3 Dimensions of diversity across EBAs

Some dimensions of the diversity across nominal pay rates for the lowest paid employee, conditions and terms contained within individual EBAs is presented in table D.2. These include living away from home allowances (LAFHA), redundancy payments and travel entitlements among others.

Other comparisons have focused on the nominal wage rates of the lowest paid construction worker in each EBA. These have then be grouped by various characteristics to see if, on an indicative basis, differences in EBA terms and conditions can be traced to particular factors with results presented in figures D.1 through to D.6.

Table D.2 Diversity in EBAs — selected provisions^a

Agreement	Weekly wage \$/wk	Night Shift loading	Income protection \$/wk	Super-annuation \$/wk	Redun-dancy \$/wk	LAFHA \$/wk	Travel \$/day	Meal \$/meal	Site \$/hr	First aid \$/wk	Wage increase %pa	Jump up clause	Job Security/ Continuity	Union right of access
New South Wales														
Abigroup, Leighton, AWU, CFMEU and AMWU 2003–2006 (Road)	634.68	1.5	na	90.00	85.00	338.60	20.00	19.00	4.00	1.56	4	✓	✓	✓
Citilink and CFMEU 2005–2008 (Various)	687.24	na	na	90.00	60.00	na	17.45	15.00	1.50	na	2	✓	x	✓
Grocon and CFMEU 2011–2014 (Various)	864.72	na	22.50	77.82	77.00	na	30.00	22.00	7.75	na	4.3	✓	✓	x
Leighton, AWU, CFMEU and AMWU 2012–2016 (Various)	914.40	1.5	25.00	135.00	120.00	450.00	35.00	22.00	4.50	3.00	5	✓	x	x

Table D.2 (continued)

<i>Agreement</i>	<i>Weekly wage \$/wk</i>	<i>Night Shift loading</i>	<i>Income protection \$/wk</i>	<i>Super-annuation \$/wk</i>	<i>Redun-dancy \$/wk</i>	<i>LAFHA \$/wk</i>	<i>Travel \$/day</i>	<i>Meal \$/meal</i>	<i>Site \$/hr</i>	<i>First aid \$/wk</i>	<i>Wage increase %pa</i>	<i>Jump up clause</i>	<i>Job Security/ Continuity</i>	<i>Union right of access</i>
New South Wales/ ACT														
Leighton, AWU, CFMEU and AMWU 2010–2012 (Various)	784.40	1.5	20.00	125.00	100.00	na	30.00	22.00	4.50	2.50	5	x	x	x
Victoria														
Abigroup, John Holland and AWU 2011–2015 (Rail)	1060.92	1.5	na	170.00	81.04	450.00	32.34	13.65	6.25	2.60	5	✓	x	x
Abigroup, John Holland and AWU 2012–2015 (Rail)	1060.92	1.5	20.00	144.60	80.00	510.00	31.10	13.65	4.50	2.35	5	✓	x	x
Abseal and CFMEU 2011–2012 (Desal)	1277.75	2	33.00	149.86	64.40	700.00	40.00	11.77	5.00	3.97	2.5	✓	✓	✓

Table D.2 (continued)

<i>Agreement</i>	<i>Weekly wage \$/wk</i>	<i>Night Shift loading</i>	<i>Income protection \$/wk</i>	<i>Super-annuation \$/wk</i>	<i>Redun- dancy \$/wk</i>	<i>LAFHA \$/wk</i>	<i>Travel \$/wk</i>	<i>Meal \$/meal</i>	<i>Site \$/hr</i>	<i>First aid \$/wk</i>	<i>Wage increase %pa</i>	<i>Jump up clause</i>	<i>Job Security/ Continuity</i>	<i>Union right of access</i>
Victoria (cont.)														
Boulderstone, Leighton, CFMEU and RTBU 2011–2015 (Rail)	1060.92	1.5	19.40	144.60	77.60	750.00	33.95	13.65	4.50	2.60	5.5	x	x	x
CC Personnel and AWU 2012–2015 (Rail)	1042.55	2	20.00	164.00	76.90	500.00	31.10	12.50	5.90	2.35	5	x	x	x
Citilink and CFMEU 2002–2005 (Various)	715.92	na	4.90	95.00	na	na	22.50	na	3.15	na	4	✓	✓	✓
Citilink and CFMEU 2005–2008 (Various)	806.76	2	7.00	110.00	na	na	24.55	na	3.30	na	4.25	x	x	x
Fulton Hogan, John Holland and AWU 2011–2015 (Rail)	1060.92	1.5	na	170.00	81.04	450.00	32.34	13.65	5.00	2.60	5	✓	x	x

Table D.2 (continued)

<i>Agreement</i>	<i>Weekly wage \$/wk</i>	<i>Night Shift loading</i>	<i>Income protection \$/wk</i>	<i>Super-annuation \$/wk</i>	<i>Redun- dancy \$/wk</i>	<i>LAFHA \$/wk</i>	<i>Travel \$/day</i>	<i>Meal \$/meal</i>	<i>Site \$/hr</i>	<i>First aid \$/wk</i>	<i>Wage increase %pa</i>	<i>Jump up clause</i>	<i>Job Security/ Continuity</i>	<i>Union right of access</i>
Victoria (cont)														
Leighton and CFMEU 2008–2011 (Various)	976.13	2	8.50	145.00	na	na	29.60	na	3.65	na	5	✓	x	x
Leighton and CFMEU 2012–2015 (Various)	1113.84	2	na	155.00	na	750.00	33.95	15.00	3.30	na	5	✓	✓	x
Thiess, Degremont, AWU, CFMEU, AMWU, CEPU 2010–2012 (Desal)	1277.75	2	8.25	149.86	64.40	na	40.00	11.77	5.00	3.97	5	✓	✓	✓
Thiess, Degremont, AWU, CFMEU, AMWU, CEPU 2010–2013 (Desal)	1277.75	2	8.25	149.86	64.40	700.00	40.00	11.77	5.00	3.97	5	✓	✓	✓

Table D.2 (continued)

<i>Agreement</i>	<i>Weekly wage \$/wk</i>	<i>Night Shift loading</i>	<i>Income protection \$/wk</i>	<i>Super-annuation \$/wk</i>	<i>Redun- dancy \$/wk</i>	<i>LAFHA \$/wk</i>	<i>Travel \$/day</i>	<i>Meal \$/meal</i>	<i>Site \$/hr</i>	<i>First aid \$/wk</i>	<i>Wage increase %pa</i>	<i>Jump up clause</i>	<i>Job Security/ Continuity</i>	<i>Union right of access</i>
Victoria (cont)														
Thiess, Balfour Beatty 2011–2015 (Rail)	1042.55	1.5	5.00	160.00	78.80	500.00	32.65	12.20	5.90	2.35	5	x	x	x
Queensland														
Bauer and AWU 2009–2013 (Rail)	1045.00	1.25	15.00	94.05	na	na	37.00	10.50	na	2.64	5	x	x	x
Bouygues, Laing O'Rourke and AWU 2010–2014 (Road)	1149.48	1.3	na	160.00	80.00	450.00	40.00	11.25	na	4.50	5	✓	x	x
Michael Wilson, Transfield, AWU, CFMEU, AFMEPKU 1999–2001 (Rail)	583.80	1.25	na	58.00	45.00	275.00	18.80	8.50	1.57	2.05	2.5	x	x	✓

Table D.2 (continued)

Agreement	Weekly wage \$/wk	Night Shift loading	Income protection \$/wk	Super-annuation \$/wk	Redun-dancy \$/wk	LAFHA \$/wk	Travel \$/wk	Meal \$/meal	Site \$/day	First aid \$/wk	Wage increase %pa	Jump up clause	Job Security/ Continuity	Union right of access
Queensland (cont)														
John Holland and AWU, AMWU, CEPU 2006–2009 (Ports)	994.50	1.25	na	125.00	65.00	375.00	30.00	9.90	na	2.49	5	x	x	✓
Dowell's and AWU 2011–2015 (Road)	1055.75	1.3	20.00	164.00	80.00	500.00	40.00	25.00	na	4.50	5	✓	✓	x
Grocon and CFMEU 2008–2011 (Various)	860.21	Na	15.00	151.00	69.00	415.11	na	12.18	4.00	2.49	2.5	✓	✓	x
John Holland, CFMEU, AMWU, CEPU 2006–2009 (Desal)	1070.95	1.25	na	125.00	65.00	375.00	30.00	10.50	na	2.67	5	x	x	x

Table D.2 (continued)

<i>Agreement</i>	<i>Weekly wage \$/wk</i>	<i>Night Shift loading</i>	<i>Income protection \$/wk</i>	<i>Super-annuation \$/wk</i>	<i>Redun-dancy \$/wk</i>	<i>LAFHA \$/wk</i>	<i>Travel \$/day</i>	<i>Meal \$/meal</i>	<i>Site \$/hr</i>	<i>First aid \$/wk</i>	<i>Wage increase %pa</i>	<i>Jump up clause</i>	<i>Job Security/ Continuity</i>	<i>Union right of access</i>
Queensland/NT														
Acciona and AWU 2012–2014 (Various)	867.60	1.5	na	78.08	40.00	500.00	25.00	20.00	na	3.00	3.5	✓	✓	x
Western Australia														
Australian Concrete and employees 2012–2014 (Road)	1079.64	2	na	145.00	79.00	771.75	30.38	16.55	4.32	4.09	na	✓	✓	x
South Australia														
Leighton and CFMEU 2011–2015 (Various)	849.24	1.5	na	84.92	50.00	450.00	26.00	13.00	2.50	15.20	4.25	x	✓	x

Table D.2 (continued)

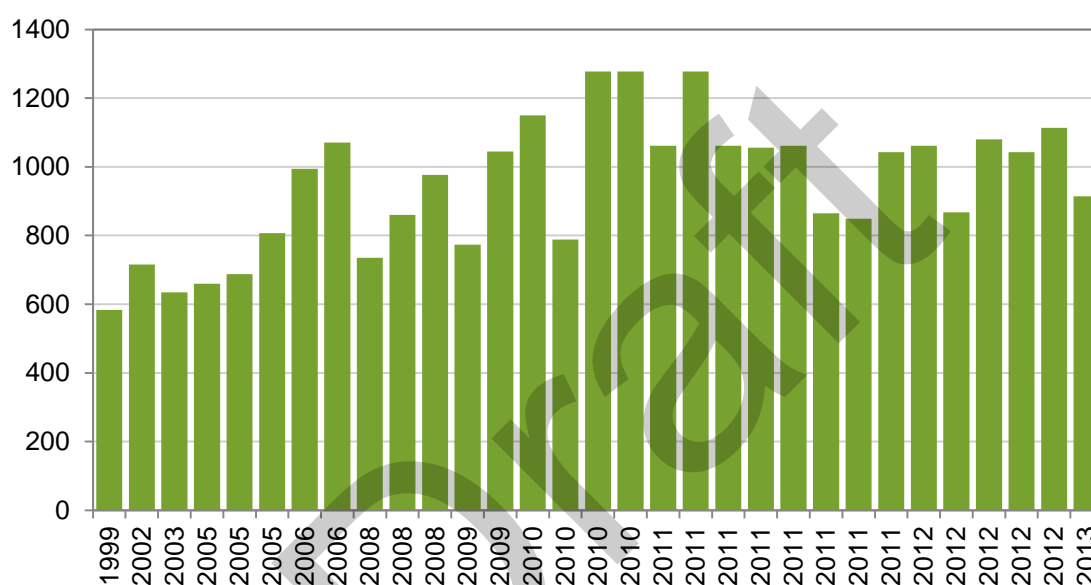
Agreement	Weekly wage \$/wk	Night Shift loading	Income protection \$/wk	Super-annuation \$/wk	Redun- dancy \$/wk	LAFHA \$/wk	Travel \$/day	Meal \$/meal	Site \$/hr	First aid \$/wk	Wage increase %pa	Jump up clause	Job Security/ Continuity	Union right of access
Tasmania														
John Holland and CFMEU 2005–2008 (Various)	659.3	na	na	59.34	40.00	na	20.00	15.00	1.25	na	6	x	x	x
John Holland and CFMEU 2008–2011 (Various)	735.30	1.5	na	66.18	45.00	356.50	13.60	24.00	2.20	2.05	5	✓	x	x
ACT														
Abigroup and CFMEU 2009–2011 (Various)	773.28	1.25	17.50	118.00	73.00	240.00	25.00	20.00	2.95	2.50	5	✓	x	x

^a It should not be assumed that all the amounts listed represent direct benefits to employees. For some, the payments will also include commissions paid to service providers, for example, as is likely to occur for income protection (AiG sub. 47).

Source: Commission analysis.

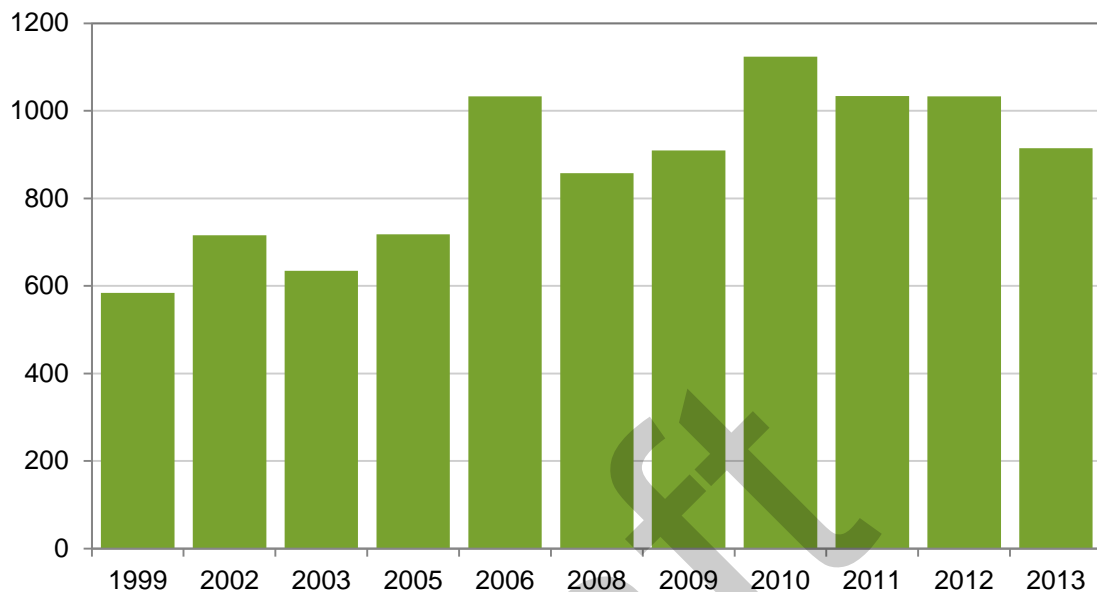
D.4 Differences in nominal wage rates for the lowest paid worker in each EBA

Figure D.1 **Nominal wage rate of lowest paid construction worker for each individual EBA, by commencement date**
\$ per week nominal



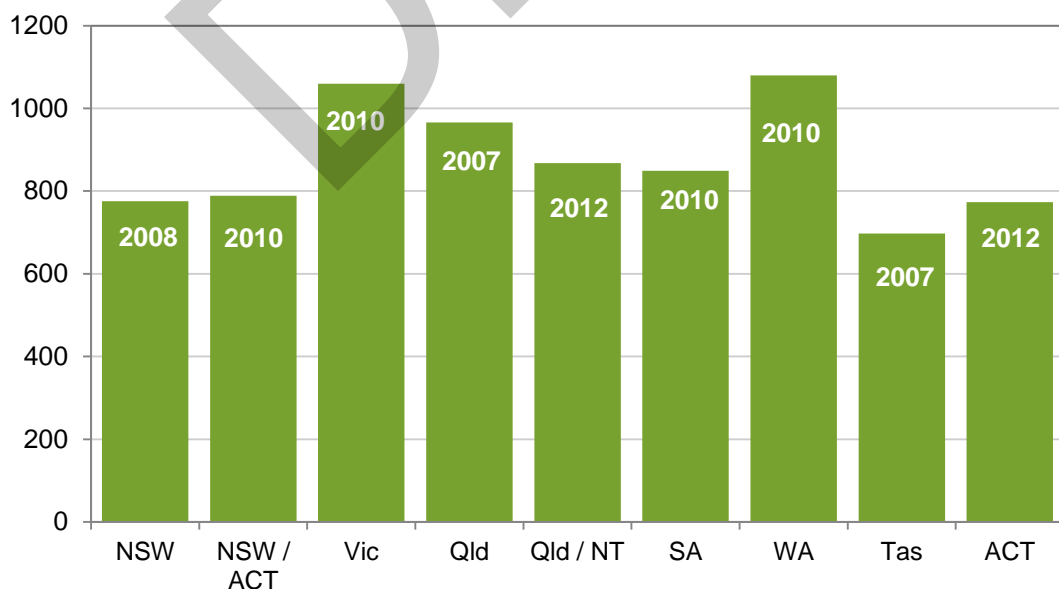
Source: Commission analysis.

Figure D.2 Average nominal wage rates for lowest paid worker for all EBAs, by commencement year
\$ per week nominal



Source: Commission analysis.

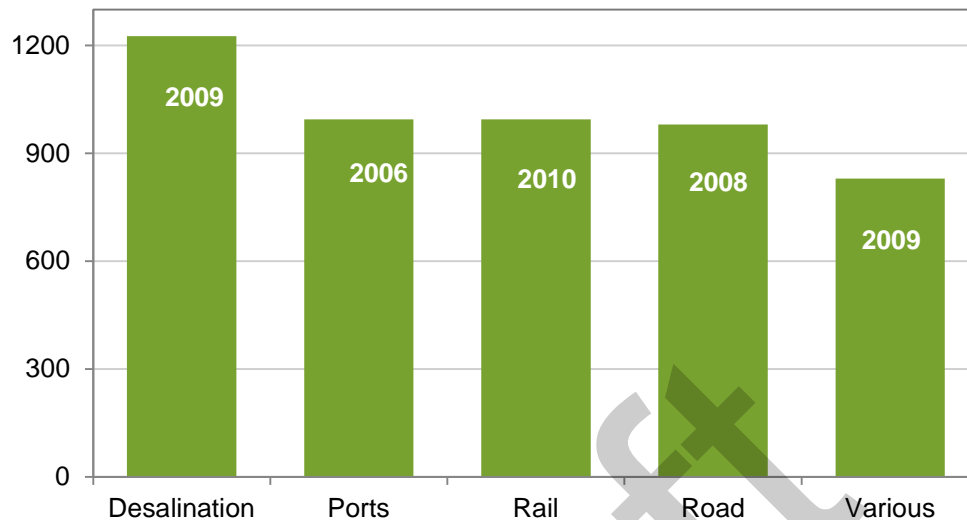
Figure D.3 Average nominal wage rates for lowest paid worker for all EBAs, by jurisdiction
\$ per week nominal, years indicate average year of commencement



Source: Commission analysis.

Figure D.4 Average nominal wage rates for lowest paid worker for all EBAs, by project type

\$ per week nominal, years indicate average year of commencement

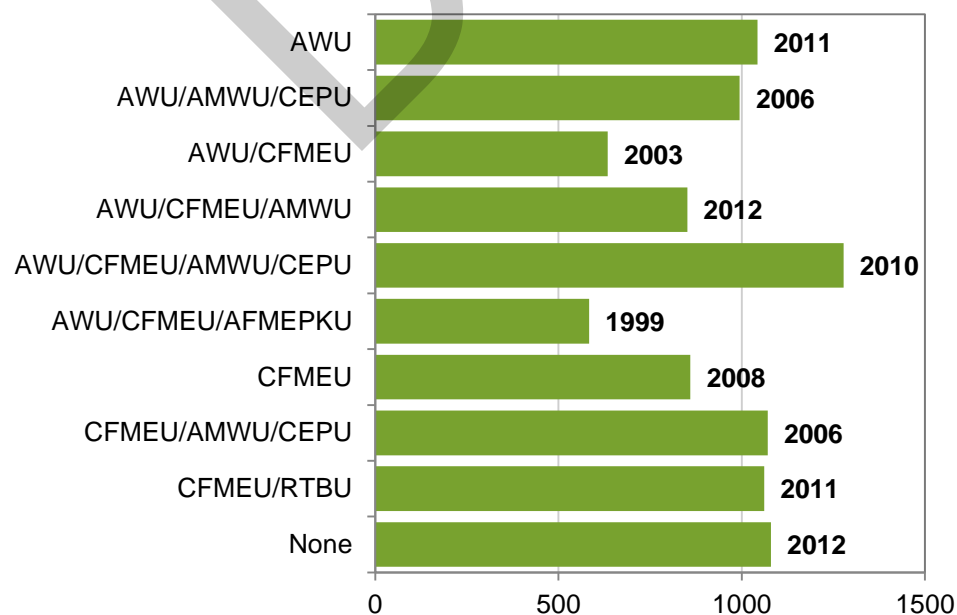


^a Various refers to EBAs that were generally for employees of a particular employer across any sites in a particular jurisdiction.

Source: Commission analysis.

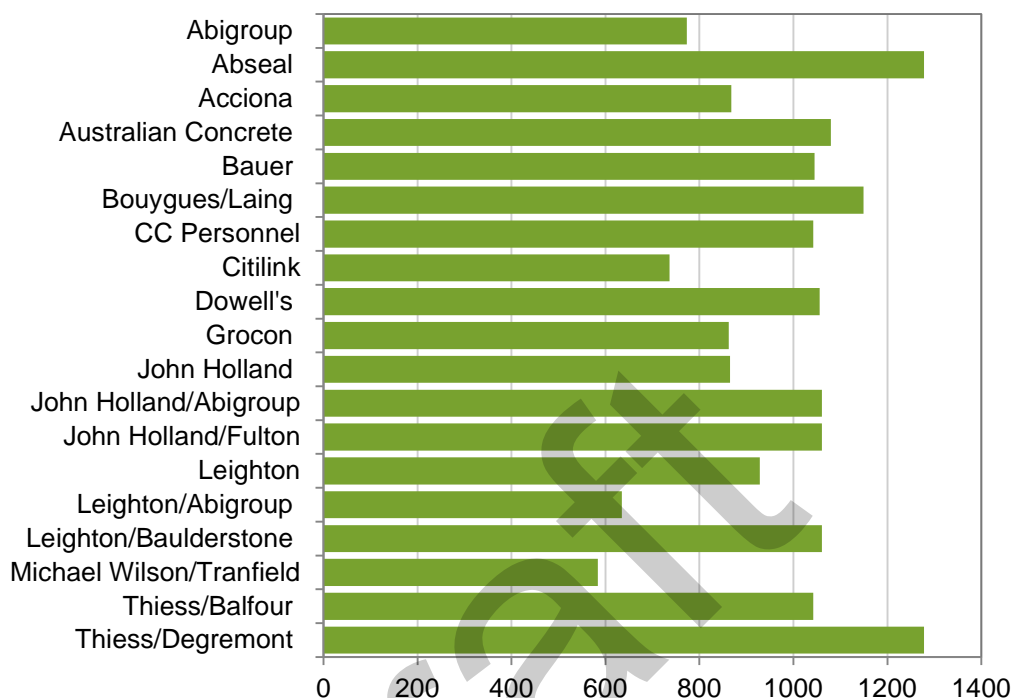
Figure D.5 Average nominal wage rates for lowest paid worker for all EBAs, by union involvement

\$ per week nominal, years indicate average year of commencement



Source: Commission analysis.

Figure D.6 Average nominal wage rates for lowest paid worker for all EBAs, by employer
\$ per week nominal



Source: Commission analysis.

D.5 How does an 'ordinary' construction worker fare?

Table D.3 sets out more detailed results for a construction worker on the lowest base wage given the specific provisions included in each individual EBAs. Two alternative scenarios are presented.

- In the first scenario, the worker also receives LAFHA.
- In the second scenario, the worker alternatively receives travel allowance.

Both include superannuation, redundancy and site allowances.

The lowest base wage was chosen as the point of comparison as this was consistently specified in all of the agreements. Other allowances apart from those specified above were not included either because there was not enough data contained in the EBAs themselves; or, in the case of meal allowances, were subject to additional requirements such as the worker doing overtime. Further for others, the amounts contained within the agreements also include commissions paid to service providers (for example, income protection (AiG sub. 47)).

Table D.3 Comparing wages and allowances across agreement based on a representative work

\$ per week nominal

<i>Start year for agreement</i>	<i>Parties to agreement Project type (Jurisdiction)</i>	<i>Base Wage</i>	<i>Wage including superannuation, LAFHA, redundancy and site allowances</i>	<i>Wage including superannuation, travel, redundancy and site allowances</i>
1999	Michael Wilson/Transfield AWU/CFMEU/AFMEPKU Rail (Qld)	583.80	857.32	707.72
2002	Citilink CFMEU Various (Vic)	715.92		935.57
2003	Leighton/Abigroup AWU/CFMEU Road (NSW)	634.68	1027.28	878.68
2005	Citilink CFME Various (NSW)	687.24		839.96
2005	Citilink CFME Various (Vic)	806.76		1047.84
2005	John Holland CFMEU Various (Tas)	659.30		773.64
2006	John Holland AWU/AMWU/CEPU Ports (Qld)	994.50		
2006	John Holland CFMEU/AMWU/CEPU Desalination (Qld)	1070.95	1320.95	1210.95
2008	Leighton CFMEU Various (Vic)	976.13		1267.33
2008	Grocon CFMEU Various (Qld)	860.21	1268.32	
2008	John Holland CFMEU Various (Tas)	735.30	1104.82	887.48
2009	Bauer AWU Rail (Qld)	1045.00		
2009	Abigroup CFMEU Various (ACT)	773.28	1001.48	1009.98
2010	Leighton AWU/CFMEU/AMWU Various (NSW/ACT)	788.40		1090.40

Table D.3 (continued)

\$ per week nominal

<i>Start year of agreement</i>	<i>Parties to agreement Project type (Jurisdiction)</i>	<i>Base Wage</i>	<i>Wage including superannuation, LAFHA, redundancy and site allowances</i>	<i>Wage including superannuation, travel, redundancy and site allowances</i>
2010	Thiess/Degremont AWU/CFMEU/AMWU/CEPU Desalination (Vic)	1277.75	2007.89	1627.61
2010	Thiess/Degremont AWU/CFMEU/AMWU/CEPU Desalination (Vic)	1277.75	2007.89	1627.61
2010	Bouygues/Laing O'Rourke AWU Road (Qld)	1149.48		
2011	Grocon CFMEU Various (NSW)	864.72		1236.54
2011	John Holland/Abigroup AWU Rail (Vic)	1060.92	1565.92	1472.09
2011	Abseal CFMEU Desalination (Vic)	1277.75	2007.89	1627.61
2011	Leighton/Baulderstone CFMEU/RTBU Rail (Vic)	1060.92	1828.32	1384.50
2011	John Holland/Fulton Hogan AWU Rail (Vic)	1060.92	1520.92	1427.09
2011	Thiess/Balfour Beatty AWU Rail (Vic)	1042.55	1594.95	1431.28
2011	Dowell's AWU Road (Qld)	1055.75		
2011	Leighton CFMEU Various (SA)	849.24	1304.32	1037.16
2012	John Holland/Abigroup AWU Rail (Vic)	1060.92	1588.32	1383.07
2012	CC Personnel AWU Rail (Vic)	1042.55	1590.95	1434.50

Table D.3 (continued)

\$ per week nominal

<i>Start year of agreement</i>	<i>Parties to agreement Project type (Jurisdiction)</i>	<i>Base Wage</i>	<i>Wage including superannuation, LAFHA, redundancy and site allowances</i>	<i>Wage including superannuation, travel, redundancy and site allowances</i>
2012	Leighton CFMEU Various (Vic)	1113.84	1827.64	1404.62
2012	Acciona AWU Various (Qld/NT)	867.60	1289.52	958.18
2012	Australian Concrete No union Road (WA)	1079.64	1861.91	1395.35
2013	Leighton AWU/CFMEU/AMWU Various (NSW)	914.40	1391.4	1228.90

Sources: Commission analysis.

References

- ABCC (Office of the Australian Building and Construction Commissioner) 2010, *Sham Arrangements and the use of Labour Hire in the Building and Construction Industry*, Discussion Paper, December, Australian Government.
- 2011, *ABCC Sham Contracting Inquiry 2011*, November.
- ACCC (Australian Competition and Consumer Commission) 2008, *Merger Guidelines*, p. 72.
- 2014a, *Acquirer: John Holland Group Pty Ltd; Target: Transfield Construction Pty Ltd*, <http://registers.accc.gov.au/content/index.phtml/itemId/476631/fromItemId/751043> (accessed 24 February 2014).
- 2014b, *Cartels case studies & legal cases*, <http://www.accc.gov.au/business/anti-competitive-behaviour/cartels/cartels-case-studies-legal-cases> (accessed 24 February 2014).
- 2014c, *Court penalises Queensland construction companies for controlling tender prices*, <http://www.accc.gov.au/media-release/court-penalises-queensland-construction-companies-for-controlling-tender-prices> (accessed 24 February 2014).
- ACG (Allen Consulting Group) 2006, *Rural Water Use and the Environment: The Role of Market Mechanisms - Supplementary Information*, Productivity Commission Consultancy Report, Canberra.
- 2010, *Productivity in the Buildings Network: Assessing the Impacts of Building Information Models*.
- 2013, *Economic impact of construction industrial relations arrangements and investment in infrastructure*, Report to the Business Council of Australia, 6 March.
- AdelaideAqua 2009, *About AdelaideAqua*.

-
- AIG and Australian Constructors Association (Australian Industry Group) 2013, *Comments on the Draft Industrial Relations Implementation Guidelines to the New South Wales Code of Practice for Procurement: Building and Construction*, 28 February.
- Allan, D., Dungan, A. and Peetz, D. 2010, “Anomalies”, Damned “Anomalies” and Statistics: Construction Industry Productivity in Australia’, *Journal of Industrial Relations*, vol. 52, pp. 61–79.
- ANET (Australian National Engineering Taskforce) 2010, *ANET Engineers Survey*.
- ASIC (Australian Securities & Investments Commission) 2013, *Corporate Insolvencies*, September 2013, Sydney.
- ATO (Australian Tax Office) 2014, *Buidling and Construction: Frequently asked questions and answers*, http://www.ato.gov.au/Business/Building-and-construction/In-detail/Taxable-payments-reporting/Taxable-payments-reporting--building-and-construction-industry/?page=14#Frequently_asked_questions_and_answers (accessed 3 February 2014).
- AusIMM (The Australasian Institute of Mining and Metallurgy) 2013, *Submission to the Review of the Professional Engineers Act (QLD) 2002*.
- Australia Wide Personnel 2012, *Submission to the Senate Inquiry into the Shortage of Engineering and Related Employment Skills*, Submission, 2.
- Australian Business Apprenticeships Centre 2013, *Chris Bowen MP Announces Kickstart Extension to Key Industries*, <http://www.apprenticeshipscentre.com.au/News/Kickstart-extension> (accessed 24 January 2014).
- Australian Constructors Association 2013, *Construction Outlook May 2013*, Australian Industry Group.
- Australian Government 2013, *Australian Apprenticeships*, <http://www.australianapprenticeships.gov.au/> (accessed 19 February 2014).
- Australian Industry Group 2013, *Apprenticeships: Achieving Excellence*.
- Austroads 2013, *How to become a prequalified contractor under the Austroads National Prequalification System*, <http://www.austroads.com.au/project-delivery/prequalification> (accessed 23 December 2013).
- AWU (Australian Workers’ Union) 2010, *Resourcing the Future*, Submission to the National Resources Employment Taskforce.
- BCA (Business Council of Australia) 2012, *Pipeline or Pipe Dream? Securing Australia’s Investment Future*.
- 2013, *Securing Investment in Australia’s Future*, Report of the Costs Taskforce.

-
- Best, R. 2012, 'International comparisons of cost and productivity in construction: a bad example', *Australasian Journal of Construction Economics and Building*, vol. 12, no. 3, pp. 82–88.
- and Langston, C. 2005, 'International comparisons of construction industry performance: further investigations', *Queensland University of Technology Research Week International Conference: Conference Proceedings*, pp. 1–15.
- Blake Dawson Waldron Lawyers 2006, *Scope for Improvement: A survey of pressure points in Australia construction and infrastructure projects*.
- Board of Professional Engineers of Queensland 2012, *Review of the Professional Engineers Act 2002: Discussion Paper*.
- Brady, T. and Davies, A. 2010, 'From hero to hubris — Reconsidering the project management of Heathrow's Terminal 5', *International Journal of Project Management*, vol. 28, no. 2, pp. 151–57.
- , ——, Gann, D. and Rush, H. 2007, 'Learning to Manage Mega Projects: The case of BAA and Heathrow Terminal 5', *Project Perspectives*, vol. XXIX, pp. 32–39.
- Briggs, L. and McCabe, M. 2012, *Getting Home Safely: Inquiry into Compliance with Work Health and Safety Requirements in the ACT's Construction Industry*.
- Brisbane City Council 2010, *Northern Link Community Newsletter: Transapex ringroad*.
- Brown, K. 2008, *BIM: Implications for Government*, CRC Construction Innovation.
- BTRE (Bureau of Transport and Regional Economics) 2006, *Skill Shortages in Australia's Regions*, Working Paper, 68, Department of Transport and Regional Services.
- Building Information Modelling (BIM) Task Group 2014, *Work Streams and Work-packages*, <http://www.bimtaskgroup.org/work-streams-wps/> (accessed 14 January 2014).
- Butcher, L. 2010, *Railways: Channel Tunnel Rail Link (HS1)*, House of Commons Briefing Note, 24 March.
- 2011, *Railways: Channel Tunnel Rail Link Act 1996*, House of Commons Library Briefing Note, 24 March.
- Caldwell, N.D., Roehrich, J.K. and Davies, A.C. 2009, 'Procuring complex performance in construction: London Heathrow Terminal 5 and a Private Finance Initiative hospital', *Journal of Purchasing and Supply Management*, vol. 15, no. 3, pp. 178–186.

-
- Campbell, D. 2012, 'Hospital trusts offered 1.5 billion emergency fund to pay PFI bills', *The Guardian*, <http://www.theguardian.com/society/2012/feb/03/hospital-trusts-emergency-fund-pfi> (accessed 4 February 2014).
- 2013, 'Stafford hospital set to be taken over and lose several of its key services', *The Guardian*, <http://www.theguardian.com/society/2013/dec/18/stafford-hospital-taken-over-lose-key-services> (accessed 4 February 2014).
- Centre for Integrated Facility Engineering 2007, *BIM Guide for Spatial Program Validation*, Stanford University, California.
- CFMEU (Construction, Forestry, Mining and Energy Union) 2010, *The CFMEU's 10 Point Plan to Reduce Skill Shortages*.
- 2011, *Race to the Bottom: Sham Contracting in Australia's Construction Industry*, March.
- Chandler, D. 2013, 'Contestability maybe, but are we getting value for money?', *ConstructionEdge*, June.
- Chandler, D. 2013, *Turning around Australian Construction Productivity has a narrow window, maybe 5 years*, <http://constructionedge.com.au/wp-content/uploads/2013/10/Turning-around-Australian-Construction-Productivity-has-a-narrow-window.pdf> (accessed 20 February 2014).
- CIOB (The Chartered Institute of Building) 2013, *A report exploring corruption in the UK Construction Industry*, September.
- Clem 7 nd, *Facts, figures and milestones*, <http://www.clem7.com.au/content/2218/Facts-Figures-and-Milestones> (accessed 23 January 2014).
- Clem7 nd, *Using the Clem7*, <http://www.clem7.com.au/content/2145/Using-the-CLEM7> (accessed 21 February 2014).
- CMPA (Construction Material Processors Association) 2009, *An Unsustainable Future: the prohibitive costs of securing access to construction material resources in Victoria*, http://www.cmpavic.asn.au/files/Unsustainable_Future.pdf (accessed 17 January 2014).
- 2011, *In search of 'balanced regulation': submission to the Economic Develop and Infrastructure Committee: Parliament of Victoria*, <http://www.cmpavic.asn.au/downloads/F-PAS-159.pdf> (accessed 17 January 2014).
- COAG (Council of Australian Governments) 2013, *COAG Communique 13 December 2013*.
- Collins, B. 2012, *Independent Inquiry into Construction Industry Insolvency in NSW*, November, Sydney.

-
- Construction Users Roundtable 2004, *Collaboration, Integrated Information, and the Project Lifecycle in Building Design, Construction and Operation*.
- CPAHC (Committee of Public Accounts, House of Commons) 1999, *The PFI contract for the new Dartford and Gravesham hospital*, National Audit Office press notice, <http://collections.europarchive.org/tna/20061009151550/www.nao.org.uk/pn/9899423.htm> (accessed 4 February 2014).
- 2006, *The Channel Tunnel Rail Link*, Thirty-eighth report from the Committee of Public Accounts, 27 March, HC 727, Session 2005-06, <http://www.publications.parliament.uk/pa/cm200506/cmselect/cmpubacc/727/72702.htm> (accessed 17 January 2014).
- CRC for Construction Innovation 2007, *Business Drivers for BIM*.
- Croce, N., Green, R., Mills, B. and Toner, P. 1999, *Constructing the Future: A Study of Major Building Construction in Australia*, Employment Studies Centre, University of Newcastle.
- Cunningham, M. and Harb, D. 2012, 'Multifactor productivity at the sub-national level in Australia'.
- DAE (Deloitte Access Economics) 2013, *Investment Monitor: The Trouble with Transition*.
- Davies, Drew, Gann, D. and Douglas, T. nd, *Innovation in Megaprojects: Systems Integration at London Heathrow Terminal 5*, Harvard Business Review, <http://hbr.org/product/innovation-in-megaprojects-systems-integration-at-/an/CMR420-PDF-ENG?N=516173&Ntt=Information+systems> (accessed 15 January 2014).
- Deakin, S. and Koukiadaki, A. 2009, 'Governance Processes, Labour–Management Partnership and Employee Voice in the Construction of Heathrow Terminal 5', *Industrial Law Journal*, vol. 38, no. 4, pp. 365–389.
- Department of Corrections, N. 2010, *The economic impact of the proposed men's prison at Wiri*, Stage 1 Report, NZ Government.
- Department of Employment 2013, *Skill Shortage Research Methodology*.
- 2014, *A review to modernise the Office of the Federal Safety Commissioner and the Australian Government Building and Construction OHS Accreditation Scheme: Discussion Paper*, 24 February, http://docs.employment.gov.au/system/files/doc/other/scheme_review_discussion_paper_1.pdf (accessed 24 February 2014).

Department of Industry 2013a, *Australian Industry Participation National Framework*,
<http://www.industry.gov.au/industry/AustralianIndustryParticipation/Pages/AustralianIndustryParticipationNationalFramework.aspx> (accessed 23 December 2013).

— 2013b, *Industry Capability Network Limited*, <http://www.industry.gov.au/industry/AustralianIndustryParticipation/Pages/IndustryCapabilityNetworkLimited.aspx> (accessed 23 December 2013).

— 2013c, *Supplier Access to Major Projects (SAMP)*,
<http://www.industry.gov.au/industry/AustralianIndustryParticipation/Pages/SupplierAccessToMajorProjects.aspx> (accessed 23 December 2013).

Department of Infrastructure and Transport 2012a, *Infrastructure Planning and Delivery: Best Practice Case Studies Volume 2*, Canberra.

— 2012b, *Towards agreed expectations: Tender Strategies to improve Design and Construct infrastructure delivery outcomes*, Canberra.

— 2012c, *Traditional Contracting Reform Developing a National Approach: Traditional contracting of infrastructure Projects*, Consultation Paper, Canberra.

— 2013, *Exposure Draft: National Framework for Traditional Contracting of Infrastructure: The Guide*.

DIISRTE (Department of Industry, Innovation, Science, Research and Tertiary Education) 2013, *Decision Regulation Impact Statement: Strengthening Australian Industry Participation*, Canberra.

— 2012, *Independent Contractors: the essential handbook*, Australian Government.

Diss, K. 2013, 'Companies are scaling back graduate programs as the mining boom fades', *ABC News*, 11 September, <http://www.abc.net.au/news/2013-09-10/engineering-feature/4949360> (accessed 12 December 2013).

Dixon, S. 2011, *Clem 7: Rising above the challenge*, ACAA Technical Paper, pp. 1–16.

Vic DTF (Department of Treasury and Finance) 2009, *In Pursuit of Additional Value: A benchmarking study into alliancing in the Australian Public Sector*, Melbourne.

— 2013a, *Implementation Guidelines Practice Direction 2013/1 – Workplace Instrument Based Conduct*, Victorian Government.

— 2013b, *Implementation Guidelines to the Victorian Code of Practice for the Building and Construction Industry*, June, Melbourne.

-
- 2013c, *Model Tender and Contract Documentation: Implementation Guidelines to the Victorian Code of Practice for the Building and Construction Industry*, Melbourne.
- Duffield, C. 2009, *Performance Benchmark Study – Major Projects Victoria: Independent comparison of the delivery phase of projects*, The University of Melbourne, Melbourne.
- and Xu, M. 2010, *Performance Benchmark Study of Victorian Projects: August 2010: Comparison of the delivery phase of projects*, The University of Melbourne, Melbourne.
- DUSPA (Denver Union Station Project Authority) 2011, *Plan of Finance*, prepared for Federal Highway Administration TIFIA joint program office, February.
- Eastman, C.M. and Sacks, R. 2008, 'Relative productivity in the AEC industries in the United States for on-site and off-site activities', *Journal of construction engineering and management*, vol. 134, no. 7, pp. 517–526.
- Econtech 2007, *Economic Analysis of Building and Construction Industry Productivity*, 16 July, Report prepared for the Office of the Australian Building and Construction Commissioner.
- 2008, *Economic Analysis of building and construction industry productivity: 2008*, 30 July, Report prepared for the Office of the Australian Building and Construction Commissioner.
- Edkins, A. and Winch, G. 1999, *The Performance of the UK Construction Industry: An International Perspective*, Bartlett School of Graduate Studies, London.
- Elliott, S., Eichhorn, S., Stafford, N. and Phelan, L. 2012, *Working Arrangements in the Building and Construction Industry, Draft Report*, December, Prepared for Fair Work Building and Construction.
- Engineers Australia 2013, *The Engineering Profession: A Statistical Overview, 2013*.
- Ernst & Young 2011, *Infrastructure - Project Cost Benchmarking Study*, Report prepared for the NSW Department of Transport, Sydney.
- Evans and Peck 2011, *Delivering Large Scale Capital Projects in the Infrastructure Sector - A Baseline of Performance in Australia*, IBISWorld.
- EWRE&ERC (Senate Committee for Education, Employment and Workplace Relations) 2004, *Beyond Cole: The future of the construction industry: confrontation or co-operation?*, The Senate, Canberra.

-
- Fair Work Building and Construction 2013, *Industry Update: Apprentice Wages to Increase From 1 January 2014*, <http://www.fwbc.gov.au/apprentice-wages-increase-1-january-2014> (accessed 27 February 2014).
- Fair Work Ombudsman 2014, *Apprenticeships and Traineeships*, <http://www.fairwork.gov.au/industries/building-and-construction/apprenticeships-and-traineeships/pages/default.aspx> (accessed 24 February 2014).
- Fairbanks, P. 2014, 'Local 17 union racketeering trial begins: Five former leaders have day in court', United States, *Buffalo News*.
- Flyvbjerg, B. 2009, 'Survival of the unfittest: why the worst infrastructure gets built — and what we can do about it', *Oxford Review of Economic Policy*, vol. 25, no. 3, pp. 344–67.
- Frankland, W. and Hulme, P. 2008, 'T5A roof: the abutment first run study', *Proceedings of the ICE - Structures and Buildings*, vol. 161, no. 2, pp. 57–64.
- FWBC (Fair Work Building and Construction) 2013a, *2012-13 Annual Report*, Melbourne.
- 2013b, 'Penalties for breaches of workplace relations law rise by 54.5 per cent', *Industry Update*, vol. January.
- 2014a, *Our History*, <http://www.fwbc.gov.au/> (accessed 23 February 2014).
- 2014b, *Summaries of Fair Work Building & Construction's (FWBC) legal cases*.
- GHD 2011, *An investigation of the causes of over-optimistic patronage forecasts for selected recent toll road projects*, prepared for the Department of Infrastructure and Transport, 8 December.
- GHD Meyrick 2011, *Evidence Based Comparative Analysis of Major Infrastructure Construction Costs in Australia and Internationally*, prepared for Infrastructure Australia.
- GPSC3 (NSW Legislative Council General Purpose Standing Committee 3) 2012, *Rail infrastructure project costing in NSW (Inquiry)*, Sydney.
- Gyles, R. 1992, *Royal Commission into Productivity in the Building Industry in New South Wales*, NSW Government Printer, Sydney.
- Hadgkiss, N. 2013, 'Back to the future: Introducing the rule of law'.
- Hammond, F., Wolstenholme, A. and Fugeman, I. 2008, 'Heathrow Terminal 5: delivery strategy', *Proceedings of the ICE - Civil Engineering*, vol. 161, no. 5, pp. 10–15.

-
- Hampson, K. and Kwok, T. 1997, 'Strategic alliances in building construction : a tender evaluation tool for the public sector', *Journal of Construction Procurement*, vol. 3, no. 1, pp. 28–41.
- Hansen, I. 2010, 'Review of public-private partnerships in heavy railway infrastructure projects', Delft University of Technology, The Netherlands.
- Hellowell, M. and Pollock, A. 2009, 'Do PPPs in social infrastructure enhance the public interest? Evidence from England's National Health Services', *Australian Journal of Public Administration*, vol. 69, no. 1, pp. 23–34.
- Herbert Smith Freehills 2014, *Victorian Government victory in Construction Code appeal – building and construction industry awaits confirmation of Guidelines' future*, 4 February.
- HIA (Housing Industry Association) 2013, *Submission to the Senate Legislation Committee on Education and Employment on the Building and Construction Industry(Improving Productivity) Bill 2013 (Cth) and Building and Construction Industry (Consequential and Transitional Provisions) Bill 2013 (Cth)*, 22 November.
- Hicks, P. 2006, 'Analyst briefing, North-South bypass tunnel', RiverCity Motorways.
- 2008, 'Investor briefing: North-South bypass tunnel', RiverCity Motorways.
- Hirsch, B. 2003, *What Do Unions Do for Economic Performance?*, 892, IZA Discussion paper series.
- HM Treasury (United Kingdom) 2010, *Infrastructure Cost Review: Technical Report*.
- 2013, *Infrastructure Cost Review: annual report 2012-13*.
- IA (Infrastructure Australia) 2008, *Review of Major Infrastructure Delivery*, Report prepared by PricewaterhouseCoopers.
- 2012, *Efficiencies in Major Project Procurement: Benchmarks for Efficient Procurement of Major Infrastructure*, vol 1.
- IC (Industry Commission) 1991, *Construction Costs of Major Projects*, No. 8, 11 March, Industry Commission, Canberra.
- IFWG (Infrastructure Finance Working Group) 2012, *Infrastructure Finance and Funding Reform*, Canberra.
- Incolink 2013, *Fund 1 Employer Information*.
- Independent Contractors Association 2012, *It's a long way to fall, Mate!*, Submission to the Victorian CCCU Inquiry: Compliance with the law in the Victorian construction industry, October.

-
- Independent Economics 2012, *Economic Analysis of Building and Construction Industry Productivity, 2012 Report*, 27 February, Report prepared for Master Builders Australia, Canberra.
- 2013, *Economic Analysis of Building and Construction Industry Productivity: 2013 Update*, 26 August, Prepared for Master Builders Australia, Canberra.
- Independent Project Analysis 2012, *The Performance of Australian Industrial Projects*.
- Infrastructure Journal 2012, 'Full details for New Zealand's Wiri prison PPP', <http://www.ijonline.com/Articles/79842/ZWxpc2Uud2hbbGFuQHBjLmdvdi5hdXxkMGE3YzFiYy1jMTgxLTQxNDQtOTk4NS1iYzMwMzhkNjVhYWWM%3d?from=instantaccess> (accessed 5 February 2014).
- Infrastructure NSW 2013, *WestConnex: Sydney's next motorway priority*, NSW Government, <http://www.infrastructure.nsw.gov.au/about-insw.aspx> (accessed 4 February 2014).
- nd, *Restart NSW*, <http://www.insw.com/projects/restart-nsw.aspx> (accessed 5 February 2014).
- Infrastructure UK 2010, *Infrastructure Cost Review: Main Report*, HM Treasury, London.
- Institute of Public Works Engineering Australia NSW 2013, *The shortage of engineering and related employment skills*, Submission to the Skill Shortages in NSW Inquiry, 6.
- IPA (Infrastructure Partnerships Australia) 2006, *Case studies: CityLink, Melbourne*.
- 2007, *Performance of PPPs and Traditional Procurement in Australia*, Sydney.
- Kelly, A. 2013a, *Heavy Industry and Other Non-Building Construction in Australia*, September, IBISWorld, p. 42.
- 2013b, *Road and Bridge Construction in Australia*, October, IBISWorld, p. 40.
- King, W. 2007, *Roadblocks to Australia's prosperity*, Leighton Holdings.
- Knaus, C. 2012, 'Rushed concrete pour raises safety alarm', Canberra, *Canberra Times*.
- KPMG-Econtech 2010, *Economic Analysis of Building and Construction Industry Productivity: 2010 Report*, 26 July 2010, Prepared for Master Builders Australia.
- Langley, J. 2013, *Realising New Funding for Infrastructure and Urban Renewal: Capturing Value*, Consult Australia and Sinclair Knight Merz, Sydney.

-
- Langston, C. and Best, R. 2001, 'An investigation into the construction performance of high-rise commercial office buildings based on productivity and resource consumption', *International journal of construction management*, vol. 1, no. 1, pp. 57–76.
- Langston, C. 2012, 'Comparing international construction performance', *Mirvac School of Sustainable Development*, vol. Paper 150.
- Leighton Holdings 2014a, *Our History*, <http://www.leighton.com.au/who-we-are/our-history> (accessed 24 February 2014).
- 2014b, *Projects - Leighton Holdings*, <http://www.leighton.com.au/our-business/projects?query=&sort=metad&hide=> (accessed 19 February 2014).
- Lend Lease 2014a, *Lend Lease - Projects*, <http://www.lendlease.com/worldwide/projects> (accessed 19 February 2014).
- 2014b, *Our history*, <http://www.lendlease.com/worldwide/about-us/history-and-achievements> (accessed 24 February 2014).
- LGIS (Local Government Infrastructure Services) 2014, *About - LGIS*, <http://www.lgis.com.au/about> (accessed 13 February 2014).
- Loosemore, M. 2014, 'Construction productivity: a subcontractor's perspective', *tba*, vol. (in press).
- Martin, S. 2012, 'Costing Australian Passenger Rail Projects 2000-2012: How Much Did We Pay and What Did We Get?'
- Master Builders Association 2012, *Economic Analysis of Building and Construction Industry Productivity: 2012 Report*, Sydney, Australia.
- Maunsell 2005, *North-South bypass tunnel traffic and transport*, technical paper prepared for Brisbane City Council, January.
- Maurice Blackburn 2012, 'IMF and Maurice Blackburn launch \$150m class action on behalf of unit holders in Rivercity Motorway Group', [http://www.mauriceblackburn.com.au/news/press-releases-announcements/2012/imf-and-maurice-blackburn-launch-\\$150m-class-action-on-behalf-of-unitholders-in-rivercity-motorway-group.aspx](http://www.mauriceblackburn.com.au/news/press-releases-announcements/2012/imf-and-maurice-blackburn-launch-$150m-class-action-on-behalf-of-unitholders-in-rivercity-motorway-group.aspx) (accessed 16 January 2014).
- Mazzotta, C. 2007, 'To Build or Not to Build: What the little guys say'.
- MBA (Master Builders Australia) 2013, *Submission to the Senate Standing Education and Employment Legislation Committee: The Building and Construction Industry (Improving Productivity) Bill 2013 and the Building and Construction Industry (Consequential and Transitional Provisions) Bill 201*, 22 November, Canberra.

-
- 2014, *Submission to the Senate Standing Education and Employment References Committee The Building and Construction Industry (Improving Productivity) Bill 2013 and the Building and Construction Industry (Consequential and Transitional Provisions) Bill 2013*, 17 January.
- McDowell, J., Oliver, D., Persson, M., Fairbrother, R., Wetzlar, S., Buchanan, J. and Shipstone, T. 2011, *A Shared Responsibility: Apprenticeships for the 21st Century*.
- McKinsey Global Institute 2013, *Infrastructure productivity: How to save \$1 trillion a year*, https://www.mckinsey.com/~media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Urbanization/Infrastructure%20productivity/MGI_Infrastructure_Full_report_Jan2013.ashx (accessed 12 February 2014).
- Miller, G., Furneaux, C., Davis, P., Love, P. and O'Donnell, A. 2009, *Built Environment Procurement Practice: Impediments to Innovation and Opportunities for Changes*, Curtin University of Technology.
- Moore, M. 2011, 'VICTORIA : The Desalination Plant, Wonthaggi. Is this the Way to do Business?', presented at How Fair is Fair Work Australia, Melbourne, H.R. Nicholls Society.
- Muhammad, I. and Low, N. 2006, 'Mega projects in transport and development: background in Australian case studies — CityLink motorway expansion, Melbourne', presented at paper prepared for the Australasian Centre for the Governance and Management of Urban Transport, University of Melbourne.
- NAO UK (National Audit Office (UK)) 1999, *The PFI contract for the new Dartford and Gravesham Hospital*, Report by the Comptroller and Auditor-General, 19 May, HC 302.
- 2001, *Department of the Environment, Transport and the Regions: The Channel Tunnel Rail Link*, Report by the Comptroller and Auditor General, 28 March, HC 209.
- 2005a, *Darent Valley Hospital: the PFI contract in action*, Report by the Comptroller and Auditor-General, 10 February, HC 209.
- 2005b, *Department for Transport: Progress on the Channel Tunnel Rail Link*, Report by the Comptroller and Auditor-General, HC 77.
- 2006, *Update on PFI debt refinancing and the PFI equity market*, Report by the Comptroller and Auditor-General, 21 April, HC 1040.
- NBN Co 2013, *National Broadband Network: Strategic Review*, Sydney.
- NCVER (National Centre for Vocational Education Research) 2011, *Overview of the Australian Apprenticeship and Traineeship System*.

-
- NHS UK (National Health Service UK) 2014, *About Hinchingsbrooke Hospital NHS trust*, <http://www.hinchingsbrooke.nhs.uk/page/about-us/about-hinchingsbrooke-hospital-nhs-tr> (accessed 4 February 2014).
- North West Rail Link 2012a, *Industry Briefing*, Sydney.
- 2012b, *Industry Briefing: Operations, Trains and System Contract*, Sydney.
- NSW Auditor General 2007, *Signal Failures on the Metropolitan Rail Network: Railcorp*, Auditor-General's Report, Performance Audit, Sydney.
- NSW Government 2010, *NSW Government Procurement: Local Jobs First Plan*, Sydney.
- 2012, *State Training Services*, http://www.training.nsw.gov.au/training_providers/funding/ (accessed 24 January 2014).
- 2013, *Implementation Guidelines to the New South Wales Code of Practice for Procurement: Building and Construction*, 1 July.
- NSW Treasury nd, *Port Botany and Port Kembla Long-term Lease, Frequently Asked Questions*, http://www.treasury.nsw.gov.au/__data/assets/pdf_file/0005/23891/Ports_Transaction_FAQ_dnd.pdf (accessed 5 February 2014).
- NZ Department of Corrections nd, *Fact sheet: The proposed men's prison at Wiri*, NZ Government.
- NZ Treasury 2012, *Budget 2012 Information Release*.
- O'Grady, J. and McCabe, B. 2009, *Productivity in the Construction Industry: Concepts, Trends, and Measurement Issues*.
- O'Neill, S. 2003, *Building Industry Royal Commission: Background, Findings and Recommendations*, 30, Current Issues Brief, Department of the Parliamentary Library, Canberra.
- OECD (Organisation for Economic Co-operation and Development) 2013, *Better Regulation of Public-Private Partnerships for Transport Infrastructure*, International Transport Forum Roundtable report no. 151, Paris.
- Office of the Auditor General Western Australia 2012, *Major Capital Projects*, Perth.
- Office of the Federal Safety Commissioner 2012a, *Fact Sheet – An introduction to business productivity through improved OHS*, http://www.fsc.gov.au/sites/FSC/Resources/AZ/Documents/OFSCOHSandProductivityFactSheet_webaw.pdf (accessed 1 February 2014).
- 2012b, *Requirements*, <http://www.fsc.gov.au/sites/fsc/needaccredited/pages/requirements> (accessed 1 February 2014).

-
- Olomolaiye, P., Jayawardane, A. and Harris, F. 1998, *Construction Management Productivity*, Addison Wesley Longman.
- Omega Centre for Mega Projects in Transport 2008, *Project Profile Australia: CityLink, Melbourne*, Australasian Centre for the Governance and Management of Urban Transport, University of Melbourne.
- PAEC (Vic) (Victoria Public Accounts and Estimates Committee) 2006, *Report on private investment in public infrastructure*, 71st report to the Victorian Parliament, http://www.infrastructureaustralia.gov.au/publications/files/Private_Investment_in_Public_Infra_Vic_PAEC_Oct2006.pdf (accessed 16 January 2014).
- Parliament of Victoria and Public Accounts and Estimates Committee 2012, *Inquiry into Effective Decision Making for the Successful Delivery of Significant Infrastructure Projects*.
- PC (Productivity Commission) 1999, *Work Arrangements on Large Capital City Building Projects*, Labour Market Research Report, Productivity Commission, Canberra.
- 2011a, *Australia's Urban Water Sector*, Report no. 55, Canberra.
- 2011b, *Performance Benchmarking of Australian Business Regulation: Planning, Zoning and Development Assessments - Productivity Commission Research Report*, <http://www.pc.gov.au/projects/study/regulation-benchmarking/planning/report> (accessed 8 January 2014).
- 2012a, *Business Regulation Benchmarking: Role of Local Government*, Research report, Canberra.
- 2012b, *National Agreement Performance Information: National Agreement for Skills and Workforce Development*, Steering Committee for the Review of Government Service Provision.
- 2013a, *An Ageing Australia: Preparing for the Future*.
- 2013b, *Geographic Labour Mobility*, Inquiry Report.
- 2013c, *Major Project Development Assessment Processes*, Research Report, Canberra.
- Perkins, S. 2013, *Better regulation of public-private partnerships for transport infrastructure — summary and conclusions*, Discussion paper 06, International Transport Forum, OECD, Paris.
- Potts, K. 2008, 'From Heathrow Express to Heathrow Terminal 5: BAA's development of Supply Chain Management', *Construction Supply Chain Management*, Blackwell, Oxford.

-
- ProcurePoint 2008, *New South Wales Government Procurement System for Construction Procurement Practice Guide: Contracts used for Construction Projects*, Sydney.
- 2013, *Construction*, <http://www.procurepoint.nsw.gov.au/before-you-buy/prequalification-schemes-0/construction> (accessed 23 December 2013).
- Property Council of Australia 2012, *Measuring Supply Competitiveness*.
- Proverbs, D.G. and Faniran, O.O. 2001, 'International construction performance comparisons: a study of "European" and Australian contractors', *Engineering Construction and Architectural Management*, vol. 8, no. 4, pp. 284 – 291.
- PwC 2013a, *Reconstructing productivity: Productivity in the Construction Industry*, Productivity Scorecard, October.
- 2013b, *Reconstructing productivity: Productivity in the Construction Industry*, Productivity Scorecard, <http://www.pwc.com.au/consulting/assets/publications/Productivity-Scorecard-Oct13.pdf> (accessed 12 February 2014).
- 2012, *Mind the Gap: Solving the Skills Shortages in Resources*.
- Qld DoJ (Department of Justice and Attorney-General) 2013, *Implementation Guidelines to the Queensland Code of Practice for the Building and Construction Industry*, July, Queensland Government.
- Regan, M. 2012, 'Public infrastructure procurement: A comparative analysis of adversarial and non-adversarial contracting methods - Working for better procurement outcomes', *Public Infrastructure Bulletin*, vol. 1, no. 8, pp. 56–69.
- Regulation Taskforce 2006, *Rethinking Regulation: report of the Taskforce on reducing regulatory burdens on business*, January.
- Richardson, S. 2007, *What is a skill shortage?*, National Centre for Vocational Education Research (NCVER).
- SA Government nd, *Proposed Adelaide desalination plant*, Consolidated Environmental Impact Assessment, http://sa.gov.au/upload/franchise/Housing,%20property%20and%20land/PLG/Desalination_plant_consolidated_document.pdf (accessed 6 February 2014).
- Samuel, P. 2011, *Brisbane Australia's CLEM7 toll tunnel broke after 11 months operation — horrible traffic forecasts*, *Tollroads News*, 28 February.
- SCFFR (Standing Council on Federal Financial Relations) 2011, *Implementation Plan for Clinical Infrastructure at the Grafton Base Hospital*.
- SecureFuture 2013, *Men's prison at Wiri Progress Update*, Newsletter, August.

-
- Senate (Senate Committee for Education, Employment and Workplace Relations) 2012, *The Shortage of Engineering and Related Employment Skills*, Final Report, Canberra.
- Shah, C. and Burke, G. 2003, *Skill Shortages: Concepts, Measurement and Implications*, Working Paper, 52, Centre for the Economics of Education and Training, Monash University.
- Sharn, L. 2010, 'LBJ Managed Lanes, the ultimate greenfield test', Reinhardt, W. (ed), *Public Works Financing*, pp. 1–7.
- BIS Shrapnel 2009, *Australia and New Zealand Roads Capability Analysis 2009-2019*, Report for Austroads.
- Skills Australia 2011, *Major Projects Schedule of Resource Projects: Construction Workforce Estimates*, Australian Workforce and Productivity Agency.
- SkillsDMC 2012, *National Workforce Development Fund: Skilling Your Workforce*, Department of Industry, Innovation, Science, Research and Tertiary Education.
- and Civil Contractors Federation 2010, *Civil Construction Occupation Review Report*.
- South Australian Water Corporation 2010, *Adelaide desalination project — procurement process and documentation fact sheet*, SA government.
- Tasmanian Auditor-General 2009, *Contract management*, Auditor-General Special Report No. 81, Hobart.
- Tatum, C. 1986, 'Potential Mechanisms for Construction Innovation', *Journal of Construction Engineering and Management*, vol. 112, no. 2.
- Teicholz, P. 2013, *Labor-Productivity Declines in the Construction Industry: Causes and Remedies (Another Look)*, Viewpoint No. 67, AECbytes, http://www.aecbytes.com/viewpoint/2004/issue_4.html (accessed 26 February 2014).
- Toner, P. 2003, *An Evaluation of 'Economic Analysis of the Building and Construction Sector'*, Employment Studies Centre, University of Newcastle.
- Transport for NSW 2014, *northwestraillink*, <http://www.nwrail.transport.nsw.gov.au/The-Project/Tunnelling#4> (accessed 24 February 2014).
- Turner & Townsend 2012, *Airport Cost Benchmarking*.
- TxDOT (Texas Department of Transport) 2014, 'LBJ Express: Texas Department of Transport Project Tracker', *Dallas District*, pp. 1–2.
- UK Cabinet Office 2011, *Government Construction Strategy*.

-
- DVH UK (Darent Valley Hospital) nd, *About us*, <http://www.dvh.nhs.uk/about-us/darent-valley-hospital/> (accessed 4 February 2014).
- Urbis Australia 2013, *Review of Historic Urban Land Value Growth: East Coast Capital Cities*.
- De Valence, G. 2010, 'Innovation, Procurement and Construction Industry Development', *Australasian Journal of Construction Economics and Building*, vol. 10, no. 4, pp. 50 – 59.
- VicRoads (Roads Corporation of Victoria) 2014, *Pre-qualification Scheme*, <http://www.vicroads.vic.gov.au/Home/Moreinfoandservices/TendersAndSuppliers/PreQualificationScheme.htm> (accessed 24 February 2014).
- Victorian Auditor-General 2012, *Managing Major Projects*, Melbourne.
- Victorian Department of Infrastructure 1999, *Code of Practice for the Building and Construction Industry*, March, Victorian Government, Melbourne.
- Victorian Education and Training Committee 2010, *Inquiry into Skills Shortages in the Rail Industry*.
- WestConnex 2013a, *Biggest transport project in Australia to begin*, Media release, 19 September, http://www.westconnex.com.au/news/media_releases/media_releases_2013/20130919_biggest_transport_project_begins.html (accessed 5 February 2014).
- 2013b, *Expert appointed to develop WestConnex case*, Media release, 16 January, http://www.westconnex.com.au/news/media_releases/media_releases_2013/20130206_expert_appointed.html (accessed 5 February 2014).
- 2013c, *WestConnex industry engagement briefing*, http://www.westconnex.com.au/documents/westconnex_industry_engagement_briefing_oct2013.pdf (accessed 5 February 2014).
- 2014a, *About WestConnex Delivery Authority*, http://www.westconnex.com.au/about/about_westconnex_delivery_authority.html (accessed 4 February 2014).
- 2014b, *M4 widening attracts strong industry interest*, Media release, 24 January, http://www.westconnex.com.au/news/media_releases/media_releases_2014/20140129_strong_industry_interest.html (accessed 5 February 2014).
- Wiggins, J. 2013, *New bidding model draws contractors to East West Link*, Financial Review, http://www.afr.com/p/australia2-0/new_bidding_model_draws_contractors_JloNUfPyhiBqrY8nUo3lbP (accessed 15 January 2014).
- Wilcox, M. 2009, *Transition to Fair Work Australia for the Building and Construction Industry Report*, Australian Government.

-
- Wilkinson, J. 2013, *Construction Industry in NSW: Background to the Insolvency Inquiry*, e-brief 04/2013, May, NSW Parliamentary Research Service, Sydney.
- Williams, G. and McGarrity, N. 2008, 'The Investigatory Powers of the Australian Building and Construction Commission', *Australian Journal of Labour Law*, no. 21, pp. 244–279.
- Williams, I. 2008, 'Heathrow Terminal 5: tunnelled underground infrastructure', *Proceedings of the ICE - Civil Engineering*, vol. 161, no. 5, pp. 30–37.
- Yates, A. 2000, *The Future of Professional Engineers in the Public Service*, The Institution of Engineers, Australia.
- Young A., Wilkie, J., Ewing, R. and Rahman, J. 2008, 'International comparison of industry productivity', *Economic Roundup*, no. 3.

Draft