ACCC SUBMISSION TO THE PRODUCTIVITY COMMISSION ON ECONOMIC REGULATION OF HARBOUR TOWAGE AND RELATED SERVICES

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Executive Summary

Under the Prices Surveillance (PS) Act *1983,* the Australian Competition and Consumer Commission (ACCC) is charged with the responsibility of assessing price notifications by harbour towage operators in the ports of Sydney (Port Botany and Port Jackson), Melbourne, Brisbane, Adelaide, Fremantle and Newcastle. With recent trends of industry rationalisation, the declaration now applies solely to the towage subsidiary companies of Adsteam Marine Limited (Adsteam).

In addition various State Governments regulate towage price setting, through the respective port authorities of the smaller regional ports. These are controlled through towage licence conditions.

Service quality and operational standards are also regulated by port authorities, which set guidelines for towage use and ordering by pilots. The Bureau of Transport Economics (BTE) monitors harbour towage service quality standards at the major container terminal ports and the results are published quarterly in Waterline.

Harbour towage services at the above ports have been declared services under the PS Act since August 1991. The appropriateness of the harbour towage declaration was reviewed in a 1995 public inquiry conducted by the ACCC, as part of a two-year review process of all of the declarations [1]under the PS Act, conducted by the Prices Surveillance Authority (PSA) and later the ACCC.

In its 1995 public inquiry report, the ACCC recommended to the Government, that price surveillance of harbour towage rates be replaced by prices monitoring under s27A of PS Act 1983. [2] While the Government revoked the majority of the declarations under the PS Act in response to the review, it chose not to revoke the harbour towage declaration. At the time many commentators, including the Industry Commission (IC) appeared to accept that the market structure and performance of the Australian harbour towage industry warranted continued prices surveillance. [3] Since that time the industry has become even more concentrated with several firms exiting the industry and several mergers, including between the largest two independent operators. On this ground, the case for continued price surveillance might have become even stronger.

In September 1996, Government placed a 3-year expiry date on the harbour towage declaration and three years later in September 1999, the Government decided to extend it for a further 3 years to 19 September 2002.

The ACCC welcomes this inquiry into economic regulation of harbour towage. It is timely, the declaration should be reviewed in a public and transparent manner before its expiry in September 2002 and the harbour towage industry structure and performance

[1] With the exception of that for Australia Post.

[2] Australian Competition and Consumer Commission, (1995), Inquiry into the Harbour Towage Declaration p 84.

[3] Industry Commission, (1994), What future for prices surveillance?, Table 4.1, p 84.

should be investigated in a thorough and detailed way. During the course of the recent Adsteam price notification to raise towage rates for several port operations, interested parties requested both the Government and the ACCC to hold a public inquiry into harbour towage to consider more deeply several issues of concern.

The ACCC believes that the available evidence is consistent with its experience and that there is a prima facie case for economic regulation.

On some issues there is a need for further research. These include the economics of international and domestic harbour towage charter and second hand markets, and the associated market evidence. This is to bring the level of debate about issues, including the rationale for economic regulation of harbour towage beyond that of assertions and counter assertions between differing parties.

The ACCC argues the case for continued, albeit effective regulation of prices setting of the towage operators in the above major ports. This is on the grounds that the Australian towage market is characterised as a natural monopoly, with single providers in each port, with the exception of Dampier [4]and Kwinana. There is very little scope for inter-port competition, weak contestability, little opportunity for users to substitute away from towage usage and own price inelastic demand for towage services.

The single towage operator, Adsteam, which operates in 32 ports around Australia, is not subject to significant competitive discipline on its pricing neither from existing competitors nor from potential entrants. In its assessment of Adsteam's recent price notification the ACCC found that it was making acceptable rates of return, and that increases in towage rates were not warranted. Adsteam also does not appear to have been hindered by price regulation from investing in tugs. The company has commissioned twelve new tugs in the last 10 years at a total cost of about $85 million. [5]

Given the above characteristics of the market and also given the current ineffectiveness of the PS declaration in terms of its enforceability in constraining unjustified price rises, other pro-competitive regulatory solutions should be explored. These include a wider employment of competitive tendering and of the two alternatives exclusive and non- exclusive contracts. These solutions however present complexities and difficulties of their own. The overall economic regulatory framework may become fragmented and inconsistent, and result in higher regulatory costs for the towage incumbents in dealing with a multitude of State based or locally based regulators (the port authorities). (Section 3.1.2)

There is a perception among some industry participants [6]that competitive tendering for the market with the alternative options of exclusive and non-exclusive licences is a panacea for any current market failure in this industry. However, before any widespread adoption of competitive tendering is recommended, the ACCC is concerned

[4] 2 major towage operators and 2 smaller operators with a full complement of about 12 tugs service the port of Dampier.

[5] Adsteam Marine (2001), Submission to the ACCC on towage prices at Brisbane, Port Jackson, Port Botany, Melbourne and Adelaide, Appendix B.

[6] Cole D (2000), Reforming Australia 's Towage Industry, Australasian Ships and Ports Vol 12 No 3 February 2000 p 29,
LLDCN Doubts that exclusive licences will last long Thursday February 8 2001 p 6

that the potential costs and risks associated with this solution is examined and a balanced judgement made.

There are important issues regarding the question of the design and who is the designer of competitive tenders in order to achieve an efficient outcome (eg best cost / service quality mix bidder wins the bid) as well as minimising risks of tacit bidder collusion or predation by a strong bidder. The incentives of towage companies, and port authorities need to be examined, especially if there are actual ownership links between. For example, Adsteam currently have a 14 per cent stake in Flinders Port Corporation. [7]

Careful examination of the terms of the towage licences that are adopted is also required. There is currently a robust debate [8]about the advantages and disadvantages of exclusive tendering and its alternative non-exclusive licences, where the latter guarantee the entire port towage market to the successful bidder for the term of the licence. Two State Governments have moved in the direction of facilitating the use of exclusive licences for ports within their State boundaries. (Section 3.1.2)

Another problem associated with the port authority having total control, in a policy sense, of setting towage licensing conditions is that they may lack incentives to make provision for salvage capable tugs within the precinct of a particular port. Salvage capable tugs have higher capital and operating costs than harbour tugs, therefore any tug company that bids for a licence to provide a salvage tug is cost penalised in relation to a tug company that wishes to provide harbour tugs. Salvage operations do not relate to the operation of any particular port and so there is no incentive for port authorities [9]to allow for salvage tugs if they believe that another port authority will do it for them. [10]

This leads to a free rider problem in that if all port authorities adopt the same stance with the result that no towage company provides salvage capability in any port leading to a serious weakening of Australia's capacity to respond to marine accidents. [11] Therefore, it is imperative that auctions are carefully designed to address these issues and there appears to be still a significant role for economic regulation for harbour towage. (Section 3.3)

The ACCC believes that if there is a demonstrated case for economic regulation of towage, then the regulator should be able to effectively implement its decisions. Adsteam has increased its towage rates in spite of the ACCC's assessment that rises

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[7] LLDCN $186m for Ports Corp SA Thursday October 18 2001 p 1

[8] LLDCN op cit p 6,
LLDCN Bunbury decision shifts mood in towage market Thursday February 8 2001 p 7
Cole D (2000) op cit p 29

[9] Indeed the port authority may be under pressure from shipping lines / shippers not to allow for salvage capability within a tender, because of the higher costs will likely flow into higher towage charges for harbour operations.

[10] LLDCN Better control over salvage assets needed: operator Thursday February 21 2002 p 2

[11] The incoming Labour Government in WA intervened in the tender process for towage services for the Port of Fremantle, one of the major issues was the lack of provision for salvage capability contained within the contract
LLDCN National policy needed on emergency tugs: Frederick Monday August 27 2001 p 3
LLDCN WA Labour would review Fremantle tug bidding Monday February 5 2001 p 3

were not justified on two separate occasions. [12] This represents not only ineffective regulation of towage rates, but also imposes costs both upon the company (Adsteam) and the regulator (ACCC), since under the PS Act, the company is obliged to submit a price notification for the ACCC to assess. These events demonstrate the weakness of the PS Act, as a regulatory tool, which the ACCC has elsewhere argued, should be strengthened. [13]

The rest of this submission is structured as follows; Section 2 provides evidence on some selected aspects of the market structure, conduct and performance of the Australian harbour towage industry and develops the argument that price regulation of the industry should continue. These aspects are:

- natural monopoly structure on an individual port basis of the Australian harbour towage industry (2.1);
- history of entry and exit into Australian harbour towage markets (2.2);
- market barriers to entry (2.3);
- countervailing power of shipping lines / shippers (2.4); and
- harbour towage company profitability (2.5).

Where market information is problematic or evidence is weak, the submission will present both sides of the argument and request that the PC research these issues further so that more definitive answers may be arrived at. This in turn will provide a stronger base for decision-makers, on whether harbour towage should be subject to economic regulation and, if so the most appropriate form of regulation.

Section 3 outlines the current framework of economic regulation of harbour towage in Australia (3.1), discusses costs associated with the harbour towage declaration (3.2) and briefly discusses pro-competitive reforms in harbour towage (3.3).

Section 4 concludes that:

- Harbour towage at the major Australian container ports appears to be a natural monopoly.
- The industry has a history of high returns on investment.
- The monopoly provider in most Australian ports, Adsteam, is prepared to implement price increases even though it has been earning an above average rate of returns on investment for most of its towage operations in the declared ports.

[12] In 1998, Adsteam increased its towage rates by 15 per cent for Port Jackson, despite an earlier ACCC decision that the increases were not justified. In 2002, Adsteam increased rates by the proposed amounts for the ports of Sydney, Brisbane, Melbourne and Adelaide, despite an ACCC assessment that the increases were not warranted.

[13] ACCC (2000), Submission to Productivity Commission Review of the Prices Surveillance Act 1983.

- The declaration under the PS Act has not resulted in price suppression, nor reduced incentives to invest for the declared companies. It has recently proved to be ineffective in constraining towage price increases, therefore reducing incentives for the declared company, Adsteam, to reduce costs.

- Competitive tendering for the right to supply towage services may be a problematic solution to the natural monopoly structure of harbour towage. Similarly, it is not clear which alternative type of towage contract, non-exclusive or exclusive, is superior in terms of its potential effects on economic welfare.

These conclusions form a prima facie case for the continuation of some form (albeit effective) economic regulation. There are also advantages to administering such regulation on a national basis, rather than on a State by State or port by port basis. Such advantages include consistency of regulation across the industry and the development of regulatory expertise.

1.0 Introduction

This ACCC submission to the Productivity Commission Inquiry on Economic regulation of Harbour Towage Services examines several structure, conduct and performance aspects of the Australian harbour towage industry, within the field of its regulatory experience and expertise. These and other wider issues should be examined in a careful and through way before an encompassing regulatory solution may be found.

It also briefly describes the ACCC's role and that of other state based regulators. Finally, it examines the costs and the effectiveness of the current declaration under the PS Act 1983 and argues that the 'competition ' for the market approach of granting exclusive towage licences be carefully scrutinised before being adopted adoption as a solution to addressing the market power of towage companies.

2.0 Economic characteristics of Australian harbour towage markets.

The following five sections present a description of some aspects of the market characteristics of harbour towage in Australia. They also provide evidence to support economic regulation, and where evidence is inconclusive it directs the PC to investigate further.

2.1 Harbour towage a natural monopoly on a port basis?

A natural monopoly is defined as an industry, characterised by subadditivity of the representative firm's cost function.[14] Subaddivity of costs is a purely technical condition, which means that over the relevant range of industry output, production costs incurred by a single firm are less than that of any collection of firms producing a fraction of total industry output. Consequently, with the assumption that all prospective firms have the same cost function or one firm has a uniformly better technology then industry production costs will be minimised if the market is supplied by one firm. [15]

A sufficient condition for the existence of natural monopoly is that that the firm exhibits increasing economies of scale and / or scope over the relevant range of output.[16] This in turn is characterised by the existence of a large proportion of fixed costs and low marginal costs within the industry.

Fixed costs in harbour towage are the capital costs of the tug / tugs, crewing costs, and indirect costs such as administration and berthage. A recent example of the proportion of fixed costs is that for Howard Smith Towage (HST) operations at the Port of Melbourne in 1997-98 as shown in Table 2.1. This shows that the proportion of fixed costs is about 85 per cent, with a significant proportion of crewing costs.

Table 2.1: An example of cost components in harbour towage HST Port of Melbourne 1997-98.

Cost Component	Per cent of Total
Fixed Costs	**86.8**
- Tug Capital costs (depreciation)	11.9
- Crewing Costs	55.2
- Indirect & Other Costs	19.7
Operating costs	**13.2**
Total	**100.0**

Source: ACCC (1998) Preliminary Statement of Reasons in Response to HST's draft Notification under section 22 (2)(a) of the PS Act 1983, Table 3.1 p 26.

Crewing costs are fixed in the short term because the number of crews, rostered and non-rostered is set with reference to occupational health and safety considerations and the number of crew members allowed for a tug is prescribed by various state based maritime bodies.

Adsteam is a monopoly operator of harbour towage services at the majority of ports around Australia. With the recent takeover by Adsteam of Howard Smith Towage in March 2001, Adsteam

[14] Baumol, Panzar & Willig (1982) Contestable Markets and the Theory of Industry Structure p 17, Sharkey W Natural Monopoly (1988) in the new Palgrave Dictionary of Economics p 603.
[15] Sharkey (1988) op cit p 604
[16] Productivity Commission (2001) Telecommunications Competition Regulation Inquiry report No 16 p 24.

has emerged as the dominant towage operator in Australia. It completes a wave of rationalisations in the industry in the last ten years, where the number of industry participants has steadily decreased. As shown in Attachment A, Adsteam provides towage services in 32 ports around Australia. Furthermore, it is the single monopoly operator at **30** of these ports, including the major container ports of Adelaide, Brisbane, Sydney (Port Jackson and Port Botany), and Melbourne.

Even at the two ports where Adsteam is theoretically subject to price competition in a direct rivalrous sense, it is questionable whether the company actually competes for business. In the port of Dampier (WA), Adsteam through Stirling Harbour Services is a minor towage operator, with one small tug and it concentrates on towage work at the Dampier public wharf and on the North West Shelf. [17] At the outer harbour Fremantle, Kwinana, Adsteam through Kwinana Towage Services operates two large tugs, and Stirling Marine (an Adsteam subsidiary) employs three small tugs in competition with Total Harbour Services, which also operates three small tugs. The three small tugs of Stirling Marine compete in the small vessel market as well as line boats and mooring with Total Harbour Services. This represents about 5 per cent of the total market in Kwinana. [18]

The nearest rival in terms of size to Adsteam is North Western Shipping and Towage, which operate a fleet of 15 tugs, as a monopoly operator in all Tasmanian ports, (Hobart, Burnie, Devonport, Launceston (Bell Bay)) and Portland in Victoria. [19] Riverwijs, a subsidiary of Wijsmuller[20] operates two tugs at the port of Bunbury and a further four tugs at the port of Dampier. Western Maritime, a subsidiary company of Hamersley Iron operates four tugs at the port of Dampier and Total Harbour services operate three small tugs at Kwinana.

Over the past 10 years there has been a progressive consolidation of the industry to a more concentrated form. In 1988, three companies, Howard Smith, Adsteam and Brambles, either individually or in joint ventures had controlling interests in about 80% of tugs in Australia. McIIwraith McEacharn, P&O Australia, Stannard Brothers and several smaller operators accounted for the remaining 20% of the market. [21] By 1995, these three companies owned 67 per cent of tugs stationed at Australian ports. On the more reasonable basis of determining market share by proportion of tug jobs, in 1995, the ACCC estimated the market shares of towage operators in 15 selected ports. It found the combined market share of the above three companies (Brambles, Howard Smith and Adsteam) of the towage markets at these ports to be 87 per cent. [22] After the last periods of industry rationalisation in 1995 and 2001 the market share of one company, Adsteam, on the basis of tug jobs at these same ports is close to 100 per cent.

This latest wave of industry rationalisation within harbour towage during the past ten years (see table 2.1) has been the result of merging between or takeovers of operators on an inter-port basis, or a swapping of incumbent monopolists at particular ports, rather than a dilution of competition within the precincts of a particular port. In 1990, the PSA reported that in 46 out of 49 ports, a joint venture

[17] Pers comm, Dampier Port Authority
[18] Pers comm Harbour Master Fremantle Port Authority; the tugs are 10 ton bollard pull.
[19] Lloyd's List DCN Brambles severs towage connection Thursday February 21 2002 p 2

[20] Svitzer Wijsmuller is the largest towage company in the world. It belongs to the A. P. Moller group of companies alongside Maersk, the largest shipping line (liners) in the world. A P Moller , a Danish company is the largest ship builder in the world. The group has substantial interests in shipbuilding, liner shipping, stevedoring and, now, towage.
[21] Bureau of Transport and Communications Economics (1988) Harbour Towage Services in Australian Ports, Information Paper No 27 p 23
[22] ACCC (1995) op cit pp 38-39. The fifteen ports are Sydney/ Port Botany, Newcastle, Adelaide, Brisbane, Fremantle, Kwinana, Geelong, Westernport, Mackay, Gladstone, Townsville, Whyalla, Bunbury, and Port Kembla.

or a single operator provided towage operations. The only three ports that were served by two or more independent operators were Sydney (Port Jackson & Port Botany), Newcastle and Dampier. [23]

The natural monopoly market form for harbour towage has been established as the market typology for at least 10 years. The industry rationalisation that occurred in the 1960s and 1970s was in the main between towage operators, which operated in the same ports. For instance, in 1960 there were four operators at the Port of Melbourne. By 1973 this had fallen to one joint venture operator. [24] This wave of industry consolidation was driven by a fall in towage jobs, which in turn was due to a combination of factors such as declining vessel visits, improved vessel technology and increased average vessel size. [25]

Is harbour towage a natural monopoly market, within the precincts of a particular port, in that the cost-minimising market structure calls for a single seller over the relevant quantity range of towage services?

The market evidence in Australia points to a trend in single seller markets in harbour towage. The minimum number of tugs that service a port is largely determined by the size of the largest vessels that call at the port. However, the proportion of large vessels that actually call at the port may be small. [26] This contributes to low utilisation rates and high fixed capital costs for towage. With two towage operators in a port the low utilisation rates would be exacerbated. These factors point to the conclusion that harbour towage on a port basis is a natural monopoly and that with the exception of the port of Dampier, direct competition between towage companies in any port may not be sustainable in the longer term. It may result in the eventual business failure and exit of one of the firms.

2.2 Entry & Exit into Australian towage markets

Patterns of realised and attempted entry and exit into Australian harbour towage markets provide a good indication of the contestability of the industry. Recent exit and entry into Australian harbour towage markets since 1990 has continued with more instances of exit and failed attempted entry than successful entry. Attachment B details the history of exit and entry into various harbour towage markets over the period 1990 to 2002.

It is speculative as to why companies enter and exit harbour towage markets, and it is suggested that the PC ask some of the above companies about their general strategies with regard to towage. The following observations may be of relevance:

- both Hunter Towage Services and NPTS were making losses in their respective towage businesses at the Port of Newcastle, despite the former having a dedicated market of all of BHPT's coastal and international vessel calls to the port;

- Riverwijs is a subsidiary of the largest towage company in the world, Svitzer Wijsmuller, and like Adsteam, is a specialist towage provider;

- there has been a general trend within the marine area for companies, whose core business is elsewhere, to divest themselves of marine assets. Recently BHP Billiton has sold its Australian

[23] PSA (1990) Inquiry into Harbour Towage Charges p 8
[24] ibid
[25] BTCE (1988), op cit pp 9 – 10
[26] BTCE (1989) Harbour Towage An analysis of Industry Performance, Occasional paper 96 p 12

and New Zealand break bulk stevedoring interests. [27] BHP has also recently contracted out its ship management for its coastal and international bulk fleet and sold its international breakbulk line ITML. [28] Brambles [29]and Woodside [30]have also sold their respective towage interests;

- Adsteam has established itself as a world's largest independent [31]international towage and barge operator, with recent takeovers of Howard Smith, [32]UK tug operator, Red Funnel [33] and a 50% buyout of US tug operator Northland;[34]

- the identity and number of potential entrants into towage markets who make bids or express interest in bidding for towage licences is usually commercially confidential. However, the identity of five of the six bidders for the licence to provide towage services at the Port of Bunbury is in the public domain. It shows a mix of different towage companies from small local towage companies who appear to desire to expand into new ports to one large multinational towage company who wishes to establish a presence in the Australian towage market;[35]and
- there is a recent announcement of a new start up towage service for the Port of Melbourne to be provided by Australian Maritime Services in competition with Adsteam Harbour in May 2002. The company will provide 2 Z Peller tugs, which it will charter from Hong Kong. The company has also announced further plans to introduce towage services in competition with Adsteam towage services in a further three ports, Fremantle, Brisbane and Sydney in the next 12 to 18 months. [36]

2.3 Market barriers to entry

Even if harbour towage is a demonstrated natural monopoly with respect to direct competition, the incumbent cannot exercise market power if the market can be considered contestable. [37]The market may be contestable if entry is relatively easy, with low barriers to entry.

The question of how contestable the Australian harbour towage market is a matter of debate. The argument that has been advanced by the ACCC / PSA [38]and is in the Federal court (Bunbury decision) [39]is that there are large sunk costs in harbour towage markets and therefore the market is weakly contestable. [40]

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[27] LLDCN Toll buys BHP Billiton stevedoring Thursday 18 April 2002 p 2
[28] Lloyd's List DCN Gearbulk buys ITML operation, Monday December 10 2001 p 1
[29] Lloyd's List DCN op cit p 2
[30] Lloyd's List DCN Riverwijs dismisses Dampier towage talk Friday February 2 2001 p 1
[31] Independent of a larger another marine / shipping company
[32] LLDCN Adsteam: Minnow swallows major, Monday 19 March 2001, p 1
[33] LLDCN Adsteam buys UK Tug operator Monday 3 December 2001 p 3
[34] LLDCN Adsteam's US deals had USA Coast Guard Approval Thursday 18 April 2002 p 3
[35] Five of the six bidders are Total Marine Group which, have towage interests at Kwinana (WA);
Brambles Marine, who at the time owned North Western Towage with towage interests in Portland (Vic) and the Northern Tasmanian ports;
Riverwijs subsidiary of Dutch giant Wijsmuller and Riverside Marine;
Mackenzie Tug Services Pty Ltd, which have towage interests at Port Esperance (WA); and
Stirling Harbour Services, a subsidiary of Adsteam Marine and the previous incumbent at Port of Bunbury. Stirling Harbour Services Pty Ltd v Bunbury Port Authority 1st February 2000 paragraph 28.

[36] LLDCN News Wire Services New Towage Operator to start in Melbourne next month 18 April 2002
[37] E Bailey (1981) Contestability and the Design of Regulatory and Antitrust policy AER Vol 71, 2, pp 178-183
[38] ACCC (1995) op cit p 43,
PSA (1990) op cit p 12
[39] Stirling Harbour Services v Bunbury Port Authority (2000) paragraph 117
[40] H Demsetz (1968) Why Regulate Utilities Journal of Law and Economics 11, pp 55-65

These sunk costs have two components. Firstly, the capital cost of tugs, which can range from $6 million to $10 million. These costs may be significant when compared to the size of towage markets in Australia.

Secondly, how transferable are tugs between towage markets? Therefore how high are entry and exit costs? The ACCC was informed during the course of the recent towage notification that those entry and exit costs to harbour towage markets were high due to an imperfect international second hand and charter market for tugs. The international second hand / towage charter market is very specialised and very small. Unlike the charter markets for bulk and container vessels, international towage charter rates are not publicised. Nor does there appear to be a large and well-traded market for tugs. Market inquiries by the ACCC revealed that international towage companies do not often have surplus tugs available for charter. This implies that a potential entrant would need to pay a premium to acquire tugs. On the other hand prices can fall sharply if a company is forced to divest of a tug.

Strategic considerations also play a role in that the incumbent towage operator is very unlikely to provide surplus tugs, if available, for charter or sale to potential entrants into its towage markets. [41] This essentially determines that in the short term (up to 12 months) a potential new entrant into an Australian port sources its tugs from overseas. Furthermore, the transactions costs of transporting tugs between markets around the world can be considerable. According to information provided to the recent Queensland Government review of its harbour towage regulatory framework, the costs of re-positioning a single tug from overseas to Australia or from Australia to overseas towage markets could be up to $400,000. [42]

Another factor is that tugs are typically built for Australian conditions and this further reduces the transferability of tugs and increases the cost of transfer of tugs between Australian and overseas towage markets. According to recent evidence presented to the Queensland review, the cost of upgrading a tug to conform to Australian design specifications can be up to $500,000.[43]

On the other hand, it has been noted that there is currently a global convergence in standards of tug specifications and tug technologies as well as tug crew training. [44]This may imply that the capital specific nature of domestic tugs may represent less of a barrier to entry in future.

It is important that the significance of these factors contributing to the level of sunk costs is examined and clear evidence on these issues presented.

Furthermore, the issue of the significance of sunk costs is important in reaching conclusions about the incumbent towage companies' ability to limit price and to credibly threaten price predation to ward off potential entrants. If sunk costs are indeed low, a strategy of predatory pricing is not credible for three reasons. First, it inflicts little damage to an entrant as the entrant can exit the market quickly and relatively costlessly. Secondly, as the incumbent can also move its assets relatively easily, reducing prices imposes a high opportunity cost on the incumbent operator. Finally,

[41] Gaston J (1996) Recycled Tugs, a blessing or a Curse? 14th International Tug and Salvage Convention Seattle p 1.
[42] Economic Associates (2001) National Competition Policy Review – Transport Infrastructure Act 1994 Harbour Towage Provisions p 23.
[43] Ibid.
[44] Rowlinson M (2002) All change in Harbour Towage A paper offered to International Harbour Masters Association 3rd biennial congress Cape Town 12 – 17 May 2002 p 8.

any attempt to raise rates to recoup losses will attract potential new entrants. [45] Similarly, attempts by the incumbent to set limit prices to signal to potential entrants that it has significant incumbency advantages (such as a lower cost structure) is not credible assuming low sunk costs. [46]

In addition to the existence of sunk costs, the incumbent may be demonstrably willing to vigorously defend its market position by reducing prices in the event of attempted market entry. Deep discounts to towage rates were observed when Hunter Towage Services entered the Newcastle towage market in competition with Newcastle Port Towage Services (a joint venture between Fenwick and Waratah) in 1994. Over the period when there were two rival towage operators in the Newcastle Port to December 1998, towage rates fell by 25 per cent. Also it could be argued that Howard Smith defended its monopoly status at Gladstone by incorporating a 12 per cent reduction in rates in its winning bid for the exclusive licence. [47]Similarly, Adsteam defended its monopoly incumbency at the Port of Fremantle with a tender bid incorporating a 15 per cent reduction in rates in March 2001. [48]

In conclusion, the Productivity Commission should research the issue of barriers to market entry. The available information suggests the level of sunk costs are relatively high and tugs are not easily transferable between tug markets.

Additionally, towage incumbents have in the past demonstrated their willingness to defend their market position in the face of potential or actual market entry by reducing prices. This could signal to potential entrants that post entry profits and prices are significantly lower than pre entry prices and profits and, consequently, represent a barrier by deterring entrants.

2.4 Countervailing power

Effective countervailing power by towage services customers (shipping lines, and ultimately shippers) can constrain market power of a monopoly towage provider.

There are two potential sources of countervailing power within towage markets in Australia. Firstly, there may be buyer power exercised by the shipping lines or their agents to negotiate rates with the towage company. Another source of countervailing power can arise from the port authorities.

The ultimate threat that a customer of towage services or a port authority can wield against a monopoly towage company is to vertically integrate and enter the towage market on their own accord. An example of this occurred in 1994, when BHPT in a joint venture with a number of Japanese shipping lines entered the Newcastle towage market in competition with the incumbent Waratah Towage. The threat of entry by shipping lines, by port authorities or by shippers into towage markets, while representing an ultimate barrier to the size of monopoly rents that incumbent towage companies can extract may not be credible at present. This is due to a number of reasons:

[45] Ergas H (2001) Stirling Harbour Services vs Bunbury port Authorty: A Review of Some Economic Issues p 10
[46] Ibid.
[47] Howard Smith disputes this and argues that the price decrease was part of an ongoing process of rate reductions reflecting improvements in capacity utilisation and efficiency. Howard Smith submission to Victorian Government on appropriate regulatory framework for Victorian towage industry, February 2000 p 8
[48] Fremantle Port Authority (2001) Significant Benefits for Shipping Lines in Fremantle Port Towage Decision Media Release 30 March 2001 p 1

- firstly, the current trend is for shipping lines and shippers to divest in towage assets in various ports, including bulk ports, around Australia. Entry by these companies into towage markets would represent a significant reversal of this trend;

- secondly, the port authorities follow the landlord model and do not currently own towage or stevedoring assets and have not to the ACCC's knowledge signalled a desire to enter these markets;

- finally, for the large container ports, the threat of entry of a shipping line into towage markets is less credible than for bulk ports owing to the more diffuse nature of liner demand for towage services. [49]

The PC is advised to examine the evidence for countervailing power of shipping lines within towage markets in Australia. Recent international trends in bulk and liner shipping has been toward employment of fewer, but larger vessels to enjoy the benefits of economies of scale, merging of shipping lines and formation of alliances. [50]This has affected Australian trades to some extent and it is expected that the greater concentration would enhance the buyer power of these units over ports and port services.

Both Adsteam and previously Howard Smith have stated that they are dealing with large and powerful interests and that tariffs are set[51]and quality standards maintained with regard to keeping the business of the shipping lines on an national basis. Internationally there is some evidence of buyer power being exercised by lines in determining the outcomes of attempted entry by towage companies into new markets. This has worked in favour of incumbent towage suppliers in some instances and in favour of the entrant in others.

For instance, in 1996, many customers initially supported the prospect of a new entrant Kotug, into the Antwerp towage market. However, after the entry and consequent falls in prices had been secured from the incumbent firm, the lines were reluctant to transfer business to Kotug, which subsequently exited. On the other hand, the privatisation of British Steel with an increased emphasis on cost centre management facilitated the entry of West Coast Towage into South Wales iron-ore ports. [52]

Against this in the Australian context is the absence of evidence of significant buyer power when the incumbent monopolist can increase its towage rates by significant amounts in a series of major ports in the face of opposition from the lines, as occurred in 2002 with Adsteam. Also there is no Part X immunity from potential section 45 of the TPA breaches afforded the shipping lines[53] to negotiate lower rates 'en bloc' to counteract the market power of towage companies in each port.

In its 1990 public inquiry the PSA presented evidence of towage pricing being effectively restrained by the buyer power of customers in several bulk ports. [54]On the basis of this evidence the PSA recommended not to declare towage operators in bulk ports for surveillance. [55] However, in one bulk

[49] A number of shipping lines may have to coordinate to set up a towage service and then attract their own vessels to use their towage service. Even this may not happen, as the associated shipping line is not obliged to use the towage service.
[50] Hoffman ,(1998), Concentration in Liner Shipping Its Causes and Impacts for Ports and Shipping Services in Developing Countries. Economic Commission for Latin America and the Caribbean May 1998
[51] Howard Smith (2000) op cit p 1, Adsteam (2001) op cit p 8
[52] Rowlinson M and Atkin R (2000) Competition in ship handling: a study of market turbulence in North European harbour towage Journal of Maritime Policy and Management Vol 27 No 3 p 277.
[53] As is the case with liner conferences having the ability to negotiate as a block with stevedoring companies.
[54] PSA (1990) op cit p 23
[55] PSA (1990) op cit p 56

port where it may be expected that there is a concentration of user interests[56] to balance the market power of the towage operator there has been a recent significant towage rate rise.[57] On the other hand, there is an example of a bulk port at which there has been steady on going towage rate decreases over the period 1989 to 2000. [58]

In its 1995 public inquiry the ACCC found that the countervailing power exercised by shipping lines was weak. [59]

The countervailing power of the shipping lines is expected to be less at the major ports where their proportion of the total towage business is correspondingly less than for a bulk port, because of the greater dispersion of shipping line interests.

Towage rates are published as a general tariff available to all lines that call at a particular port. In its recent price notification to the ACCC (2002), Adsteam provided examples of several lines that receive rebates below the published tariff. The rebates are applied on a global basis across all Adsteam-serviced ports at which the lines call, and they are related to total volume of towage business that the lines bring.

In the ports where the towage operator is declared, the operator is obliged to notify the ACCC if its wishes to raise rates. The evidence on price trends in section 3.2. suggests that the only instances of declines in nominal published towage rates during the period of declaration of the operators has been for operations at the ports of Newcastle, Brisbane and Fremantle.

In conclusion, the ACCC argues that currently the countervailing power of other parties such as shipping lines, shippers and port authorities is weak. The ultimate threat of by-pass is currently not credible as it would represent a reversal of current trends of divestment of towage assets for shipping lines and disinvestment of marine assets by shippers. Further the by-pass option is likely to be a high cost option for a shipper / shipping line and reflect monopoly profits being earned by the incumbent service provider.

Adsteam offers rebates to selected shipping lines on a global basis over all ports rather than for select ports and it is based on volumes that the shipping line brings to Adsteam overall. This suggests that the bargaining power of individual lines to negotiate rebates on the basis of significance of its towage business in a particular port is weak. Finally, Adsteam raised its towage rates by significant amounts in 2002 in face of customer opposition.

2.5 Trends in Rate of Return for Harbour Towage

The ACCC's analysis of Australian towage companies for the purposes of assessing price notifications is that there is a history of above normal returns. [60]

[56] Comalco are the most significant user of the port of Weipa.
[57] In February 2002, Adsteam increased its towage charges at Weipa by 23.5 per cent.
[58] Rates were reduced on 6 occasions for the Port of Gladstone between January 1989 to January 2000.
[59] ACCC (1995) op cit p 60.
[60] For example, see (1) ACCC, A Statement of Reasons for the Final Decision on the Howard Smith Towage Notification for the Port of Melbourne, February 1999 and (2) ACCC (2002) Adsteam Marine notification Statement of reasons The latter document is available from the Commission's web-site at http://www.accc.gov.au/fs-transport.htm

Where a business holds market power, the exercise of this power may be expressed through rates of return on investment that are higher than could be expected given the riskiness of the underlying business. The Commission's 1995 inquiry into harbour towage services found that:

> On balance, taking all factors into account, the Commission does not consider that the level of risk in the towage industry, compared with other industries, is sufficient to justify the relatively high level of profitability which harbour towage operators are currently experiencing.[61]

Measurement of rates of return on Australian harbour towage businesses is complicated by a lack of publicly available information. In the past, port-by-port businesses have been conducted through (Pty Ltd) companies whose public financial reporting requirements are limited. Further, the towage operations of the two largest operators over the last decade, Adsteam and Howard Smith, have represented only a proportion of each firm's total business activities. Therefore, while corporate rates of return can be measured by referring to, for example, Adsteam's share price or annual financial reports; it is impossible to derive a rate of return measurement on a port-by-port basis.

Attempts to measure rates of return as reflected in publicly listed share prices are also complicated where, as in Adsteam's case, the company has achieved its market position through the acquisition of existing businesses. In such circumstances it is possible that extraordinary rates of return in the existing businesses are capitalised in the purchase price.

Adsteam, in its most recent notification to the Commission, relied on a measure of market value of tugs to derive a "capital charge" that was substituted for accounting depreciation to represent a required return on tugs employed. Adsteam's contention was that a benchmark percentage could be applied to the market value of a tug in order to derive an annual charge for which that tug could be leased. Inquiries conducted by the Commission suggested however that leasing rates for tugboats were not readily observable. Indeed, as discussed above, even the international market for tugs upon which the notional leasing charge is presumedly based appears to be thinly traded and may therefore be of limited use in establishing efficient asset costs.

In its Statement of Reasons for its decision on Adsteam's 2002 price notification, the Commission outlined its concerns with the rates of return that were implied for the ports under consideration – Adelaide, Brisbane, Melbourne and Sydney. The Commission…

> …found that Adsteam's revenue at all ports following imposition of the proposed price increases would exceed the revenue requirements for a towage operator in a competitive market. Indeed, the prices in place over the year ended 30 June 2001 (*ie. without the proposed increases)* would have allowed for revenues either approximately equal to or above economic costs.[62]

The Commission's experience gained from its assessment of price notifications over the past decade suggests that the harbour towage operations of declared firms have exhibited above normal rates of return. The persistence of such returns over such a period may point to the use of market power in the setting of prices.

[61] ACCC, Inquiry into the Harbour Towage Declaration, December 1995, p.77.
[62] ACCC (2002), Adsteam Marine Price Notification – Statement of Reasons, pp.13-14.

3.0 Economic Regulation of Harbour Towage Operators

The following section outlines the current regulatory framework under which towage companies operate in Australia. Section 3.2 will discuss the regulatory costs of the harbour towage declaration under section 21 of the PS Act 1983.

3.1 Economic Regulatory Framework for Harbour Towage Industry

3.1.1 ACCC Regulatory Role

The ACCC has a regulatory role under the Prices Surveillance Act 1983. Harbour towage remains one of the few industries, which is declared for surveillance under section 21 of the PS Act. As a result of on going industry consolidation Adsteam and its towage subsidiary companies are now the only declared harbour towage companies.

Under the Act, Adsteam is obliged to notify the ACCC whenever it wishes to increase towage rates[63] for its operations at the major ports, Adelaide, Brisbane, Fremantle, Melbourne, Newcastle, and Sydney (Port Jackson and Port Botany).

The harbour towage declaration has been in place since August 1991, and it has been subject to one public inquiry by the ACCC in late 1995 and one departmental review by Treasury in September 1999. The ACCC recommended to the Government that the harbour towage industry be subject to prices monitoring under section 27A of the PS Act 1983. However, in response to the ACCC public inquiry, in August 1996, the Government placed a three-year sunset on the declaration for surveillance and in September 1999 extended the declaration for a further 3 years. The current declaration expires on 19 September 2002.

In the event that the declared towage company submits a price notification, within a period of 21 days or more (subject to the company's agreement), the ACCC will assess the notification taking into account movements in unit costs, company profitability, incentives for investment and employment and efficiency of the cost base. On the basis of the submitted information on costs, rates and profit movements, the ACCC assesses whether the proposed rate increases are justified. However, the ACCC's decisions are not binding upon the declared company Adsteam. After a period of seven days following an ACCC decision, Adsteam can increase its rates by the proposed amount. Adsteam is the only declared company that has not voluntarily complied with the spirit of the PS Act and raised its rates regardless of the ACCC's decision. This occurred in 1998, when Adsteam increased its rates by 15 per cent for its towage operations at Port Jackson after the ACCC found that it was unjustified. More recently, in 2002, Adsteam raised its rates for its operations at the ports of Adelaide, Brisbane, Melbourne and Sydney (Port Jackson and Port Botany) after the ACCC found that the rate increases were unjustified.

There have been very few notifications submitted by towage operators under the PS Act within the last 10 years. Indeed there was a period of nearly five years in the mid 1990s when none of the declared towage operators submitted a price notification to the PSA / ACCC. [64]

[63] Adsteam is obliged to notify the ACCC when it wishes to raise its towage rates above the highest price of the previous 12 months.

Table 3.1 outlines the history of notifications and decisions by the PSA / ACCC.

Over the period of the declaration since August 1991, the ACCC and its predecessor the PSA have been approached a total of 12 times by the declared towage companies to assess price notifications. The ACCC and the PSA have assessed a total of 23 price notifications for proposed rate increases for towage operations located at individual ports. Several submissions, defined for the purposes of this report as pricing proposals, by declared towage operators have then comprised multiple price notifications covering a number of ports. For instance, the 2002 Adsteam submission to the ACCC comprised 5 separate price notifications proposing to increase rates at 5 ports. Thus there have been a total of 12 pricing proposals, comprising a total of 23 price notifications submitted to the two regulators since August 1991.

Table 3.1: Summary of notifications received under section 22 2 (a) of the Prices Surveillance Act

Date	Company	Location	Price increase proposed %	Actual %	Comments
February 1992	Waratah ^	Sydney	15.0	6.0#	See (a) and (b) below
		Newcastle	15.0	6.2#	See (a) below
		Botany	15.0	15.0#	
March 1992	Fenwick	Newcastle	7.5		Withdrawn insufficient information
March 1992	Fenwick	Sydney / Botany	12.5		Withdrawn insufficient information
April 1992	Adsteam	Adelaide	23.78	13.4	See (a) and (b) below
July 1992	Adsteam	Fremantle	15.0		Withdrawn insufficient information
October 1992	Adsteam	Fremantle	15.0	6.8	See (a) and (b) below
June 1997	Waratah^	Sydney / Jackson	15.0	-	See c) below
September 1997	Waratah^	Sydney / Jackson	15.0	15.0*	See c) below
March 1999	Howard Smith Towage	Melbourne	17.5	10.0	See (d) below
July 2000	Howard Smith Towage	Brisbane	7.94	7.94	See (e) below

[64] The Prices Surveillance Authority (PSA) and the Trade Practices Commission merged in November 1995 to form the Australian Competition and Consumer Commission (ACCC) which took responsibility for administering the PS Act 1983.

		Melbourne	8.08	8.08	See (e) below
	Waratah	Sydney / Jackson	7.26	7.26	See (e) below
		Sydney / Botany	7.55	7.55	See (e) below
		Newcastle	4.79	4.79	See (e) below
	Adsteam	Adelaide	6.84	6.84	See (e) below
		Fremantle	8.24	8.24	See (e) below
February 2002	Adsteam	Adelaide	15.8	15.8*	See (f) below
		Brisbane	11.7	11.7*	See (f) below
		Melbourne	23.4	23.4*	See (f) below
		Sydney / Botany	13.1	13.1*	See (e) below
		Sydney / Jackson	26.2	26.2*	See (f) below

Source: Price Notifications

* These increases were implemented by the towage company, however, in all of these cases the ACCC found that no rise in rates was justified see notes c) and f).

\# The towage company did not implement these increases since its competitor in these ports failed to secure a rate increase from the ACCC.

^ Waratah is a joint venture operation between Howard Smith Towage and Adsteam, managed by Adsteam

a) Objection was raised on the basis that the company proposed to recover redundancy costs over too short a time period. The PSA required an amortisation period of 3 years.

b) Objection was raised on the basis that the full impact of declining volumes on unit costs should not be included. The PSA allowed 50 per cent of declining volumes to be reflected in unit costs. In these ports, the PSA noted:

- Long term demand appears to be declining;
- The company concerned should review its capacity with the view to reducing costs; and
- In the case of Fremantle, it was noted that the magnitude of the decline in activity was exaggerated by the time period selected to make the comparison. The company chose a base period in which volumes were relatively high compared to the periods on either side of the base period.

c) Objection was raised on the basis of inconsistencies in the data provided, which were not resolved. Due to the high level of operational interaction between Port Jackson and Port Botany, the ACCC was not prepared to make a decision for any rate increase without certain requested cost and operational data concerning Port Botany.

d) Objection was raised on the inconsistent employment of accounting depreciation and market value of assets by the company. The ACCC also adjusted the market value of a new ocean going and salvage tug slightly downwards with a view that it was more expensive than that required to service the port of Melbourne.

e) Net rate increases allowed after application of the GST, assessed using criteria with reference to Part VB of Trade Practices Act.

f) Objection was raised on the grounds:

- that the company applied a target rate of return over total costs, including operating costs, instead of a target rate of return on and of capital (depreciation);

- the company also used the charter (leasing) cost of a tug to proxy the market valuation of a tug. The leasing cost also contains a rate of return component to which was applied another rate of return mark-up; and

- the ACCC assessed that the company's cost of capital and capital charges was such that if the price increases were implemented its revenues would exceed its economic costs and therefore no rate rises were justified.

With the exception of the two GST related pricing proposals (covering 7 ports), the PSA / ACCC has approved only one proposed towage rate increase in full. This was not however implemented due to fact that the PSA objected to the proposed price increases of its declared competitor, which subsequently did not increase rates for its operations in the same ports. For a further four pricing proposals, the ACCC approved lower than the proposed rate increases, of which only two were actually implemented by the declared company. For two pricing proposals, the ACCC found that no rate rise was justified. For both pricing proposals where the ACCC found that no rate increases were justified on various grounds, the declared company raised its rates by the proposed amount.

Three pricing proposals covering single ports were later withdrawn by the declared company and one pricing proposal was submitted a second time unchanged after the ACCC found that the proposed rate rises were unjustified.

The effects of the current regulatory regime of price surveillance on the market performance of the incumbent towage operators and on potential entrants are discussed in the following section (3.2).

The ACCC has a further regulatory role in harbour towage. Waratah Towage, a fully owned subsidiary of Adsteam, has provided the ACCC with an enforceable undertaking pursuant to submitted a section 87B of the Trade Practices Act *1974* for its operations at the port of Newcastle. This undertaking is in force for three years from 2 June 1999 and was given to the ACCC as a condition to its agreement to the merger between Hunter Towage Services and Waratah Towage in June 1999. Towage rates at the port of Newcastle have been frozen at the levels of 2 December 1998 over the past three years. [65] As part of the undertaking Waratah Towage has agreed to abide by the ACCC's decisions with respect to submitted price notifications for its Newcastle operations for so long as the company remains subject to the declaration for prices surveillance.

3.1.2 Other Regulators

Harbour towage operations at many of the regional ports (where there is no ACCC prices surveillance) [66]are also subject to various models of price and service regulation, which are underpinned by State Government statutes or regulations. Several port authorities issue licences for towage operators. These often contain price control mechanisms as well as setting service standards. Examples of these are Cairns, Townsville, Mackay, Gladstone, Esperance, Albany, Bunbury, and Geraldton. [67]

Licences may be granted on either an exclusive or non-exclusive basis. Only three port authorities have opted to grant exclusive licences in Australia. These are Bunbury, Gladstone and Townsville. The advantages and disadvantages of non-exclusive and exclusive licensing are briefly discussed in the section 3.3.

[65] In July 2000, the undertaking was varied to allow GST related towage rate increases for Newcastle by 4.79 per cent.
[66] With the exception of the port of Fremantle, where the incumbent towage operator is subject to a price freeze until December 2003 as part of its licence with the Fremantle Port Authority and also subject to declaration under the PS Act 1983.
[67] Adsteam (2001) Submission to ACCC on towage prices in Brisbane, Port Jackson, Port Botany, Melbourne and Adelaide p 12.

There have been recent reviews of state government regulatory arrangements of harbour towage in Victoria and Queensland.

In Victoria, harbour towage services at the ports of Geelong, Hastings and Portland are prescribed services for the purposes of the Port Services Act *1995* (Vic).

In December 1999 the Office of the Regulator General (ORG) reviewed port services pricing regulation in Victoria and recommended changes to existing regulatory arrangements for harbour towage. In its report the ORG stated that it would further consult with towage operators and port corporations about a preferred form of prices oversight from a list of three options:

- a franchise bidding arrangement;
- a service agreement between the port corporation and the towage operator; or
- a prices surveillance arrangement. [68]

In July 2000, the Victorian Government adopted the service charter model of regulation for the three Victorian ports. These service charters form part of the non-exclusive licences for towage operators. They are granted on the following conditions:

- the service agreement conforms with general principles and criteria developed in consultation with ORG;
- the service agreement includes a requirement to maintain a public register of tariffs;
- the service agreement requires that the towage operator gives prior notification of changes in tariffs to the port operator within a set notice period;
- the service agreement should require that the towage operator disclose relevant information to the port operator to justify proposed rate changes;
- the port operator undertakes to notify port users of proposed tariff changes and seek comment and to notify the ORG of the proposed tariff changes and provide relevant information; and
- the service agreement requires that the port operator regularly and publicly report on towage rates and performance standards.[69]

In October 2001, the Queensland Government released a draft of its final report, as part of the National Competition Policy Review, on the Harbour Towage Provisions of the Transport Infrastructure Act *1994*. Section 44 of that Act empowers certain Queensland port authorities [70]to authorise the operation of towage services. That is, the port authorities have the power to approve the operation of a towage service and attach conditions to an approval. The nature of the conditions that can be used is not specified nor constrained by the regulation. [71]It appears that conditions on pricing and the form of the licence (non- exclusive or exclusive) are set at the discretion of the port authority.

[68] Office of the Regulator General, Victoria Review of Port Services Regulation Final Report (1999) p xi
[69] ORG (1999) op cit p 117.
[70] Bundaberg, Cairns, Gladstone, Mackay and Townsville.
[71] Economic Associates (2001) National Competition Policy Review – Transport Infrastructure Act 1994 Harbour Towage Provisions p 3.

However, exclusive licence arrangements are in place for only the ports of Gladstone and Townsville.

The recent review recommended to the Queensland Government that section 44 be extended to all port authorities in the State. This is justified on the basis of weak contestability of the towage market in Queensland and the need for reliable towage services. It is also considered undesirable to extend the coverage or requirements in a piecemeal manner. [72]

In 1999, the West Australian Government instituted the Port Authorities Act which grants port authorities power to control entry into West Australian towage markets. Port authorities have the discretion to grant exclusive licences on prior approval of the Minister for Transport who must take into account the costs and benefits of the licence. [73]Only the Port of Bunbury has taken the option of granting exclusive licences.

The current framework of economic regulation of harbour towage is that the ACCC administers the PS Act and there is a declaration over towage services in the major capital city ports. State Governments regulate through vetting licence contracts as in the case of Victoria or by setting broad parameters in legislation about types of licences that may be offered by port authorities as is the case in Queensland and WA. Port authorities can control entry into towage markets located within their respective port precincts by offering licences. Usually both the level and path of changes in towage rates as well as service quality are stipulated in the licence conditions. With the exception of the Fremantle Port Authority (FPA), port corporations of the major capital city ports do not licence towage operations in their ports at all. Consequently, for only the Port of Fremantle is there is dual regulation of towage pricing by the ACCC and the FPA.

If the PS declaration is revoked, then an inconsistent patchwork of economic regulation of harbour towage through licence conditions across all of Australian ports may result. This may increase regulatory costs (transaction costs) for the declared subsidiaries of Adsteam, which would need to deal with a number of regulatory agencies rather than one.

3.2 Economic Regulatory costs of the current PS declaration of Harbour Towage

The costs of the market failure of the harbour towage market with regards to its relative performance should be compared with the costs of economic regulation, which corrects for the failure. The ACCC comments here only on the costs of the economic regulation that it administers under the PS Act.

The Productivity Commission in its draft public inquiry report into the Prices Surveillance Act 1983 (2001) identified the categories of regulatory costs associated with the operation of the Prices Surveillance Act 1983[74]. These are as follows:

- potential costs associated with uncertainty resulting from lack of transparency of ACCC regulatory processes;
- costs associated with timeliness of ACCC regulatory processes;
- compliance costs imposed on companies subject to a PS declaration and on other third parties;

[72] Economic Associates (2001) op cit p 38.
[73] loc cit, Economic Associates (2001) pp 3-4.
[74] PC (2001) Review of the Prices Surveillance Act 1983 Chapter 4.

- the impact of the PS declaration on profitability and investment; and
- the impact of the PS declaration on competition within the industry.

The harbour towage declarations under section 21 of the PS Act have continued in force since August 1991. Over that time the declared companies have submitted a total of 12 pricing proposals consisting of 23 price notifications to the ACCC/ PSA (see Table 3.1).

Of the 12 pricing proposals, 6 were submitted to the PSA over the six-month period February 1992 to October 1992. There were no pricing proposals submitted by any declared towage company from October 1992 to June 1997, and since June 1997 there has been a further 6 pricing proposals.

Transparency of review process

Firstly commenting upon the transparency of review processes of the last 6 pricing proposals. The Howard Smith price notification to increase towage rates for the Port of Melbourne was the first and only towage price notification to be assessed using the processes outlined the ACCC draft statement of Regulatory Approach to Price Notifications. This assessment was conducted in accordance with the draft statement (see Attachment C). A preliminary statement of reasons for the ACCC's decision with regard to the draft notification was published and placed on the ACCC's section 23 register as was its response to the formal notification in the form of a final statement of reasons. The ACCC 's position is that the approach as set out in the draft statement allows for an appropriate level of transparency. It is recognised however, that the declared companies are not bound to follow this approach. The other five pricing proposals were assessed in a transparent a manner given the constraints of the PS Act framework with the reasons for the decisions in each case being placed on the public register.

Timeliness of assessment of price notifications

Secondly, in regard to the timeliness of decision making by the ACCC in relation to assessing price notifications, section 22 (5) of the PS Act allows the ACCC 21 calendar days to reach a decision. This time may be extended by agreement with the declared company. Table 3.2 shows the time taken to complete the assessment of the last six-towage pricing proposals.

Table 3.2: Timeliness of ACCC Assessments of price notifications since June 1997.

Price Notification	Port	Date of submission	Date of decision	No of calendar days to complete	No of calendar days outside the statutory period	Extension granted
Waratah Towage price notification	Port Jackson	25 June 1997	16 July 1997	21 days	-	No
Waratah Towage price notification	Port Jackson	15 September 1997	16 October 1997	31 days	10 days	Yes
Howard Smith Towage (HST) price notification *	Melbourne	21 January 1999	17 February 1999	27 days	6 days	Yes
Howard Smith	Melbourne	4 June 2000	28 June 2000	24 days	3 days	Yes

	Brisbane					
Adsteam / Waratah Towage	Adelaide Fremantle Port Jackson Port Adelaide Newcastle	8 June 2000	28 June 2000	20 days	-	No
Adsteam # price notification	Port Jackson Port Botany Melbourne Adelaide Brisbane	30 January 2002	19 February 2002	21 days	-	No

Source: ACCC

* An earlier draft price notification was assessed by the ACCC

Adsteam initially submitted a price notification on 14 December 2001, which was ruled invalid as it did not contain a schedule of proposed prices for each individual towage operation. On 28 December 2001, Adsteam submitted a valid price notification and granted a 14-day extension to the ACCC to consider the proposals on 15 January 2002. This meant that the ACCC decision was required by 31 January 2002. On 30 January 2002, Adsteam withdrew its price notification and resubmitted it to the ACCC unchanged.

The Howard Smith price notification to increase charges for its operations at the Port of Melbourne was assessed according to the processes recommended in the draft statement of regulatory approach. This was conducted with the agreement of the declared towage company, Howard Smith, which had the option of formally notifying the ACCC under the PS Act at any time, in which case the ACCC would have had only 21 days to assess that notification. A period of greater than 21 days is required in order to consult and assess information from various sources, the towage companies, shipping lines, port authorities, pilots and other affected parties, and to adequately assess issues raised. Expert financial and economic consultancy advice may be sought by the ACCC on complex issues. [75]Additionally the ACCC prefers to release a draft decision on a pricing proposal before making a final decision in order to allow interested parties to comment on ACCC's findings.

The process of assessment of Howard Smith's pricing proposal was subject to a number of interruptions at Howard Smith's choosing. Howard Smith submitted a draft price notification on 18 August 1998 and restarted the assessment process by submitting a second substantially amended draft price notification on 24 September 1998. Later, Howard Smith delayed the process again with agreement from the ACCC for six weeks. The ACCC publicly released its preliminary statement of reasons in response to the Howard Smith draft price notification on 21 December 1998.

The assessment of the draft price notification involved substantial market inquiries involving interested parties such as individual shipping lines, the peak shipping line bodies, Liner Shipping Services (LSS) and the Australian Chamber of Shipping (ACOS), the Victorian Channels Authority, (VCA) and the Port Philip Sea Pilots Service. The Commission also received consultancy advice on accounting and industrial relations issues. The extensive consultation process culminated in a pre-decision conference on 28 January 1999. Its should be noted that the length of time associated with this particular assessment was influenced by some specific unusual circumstances. The ACCC's view is that in general a price notification that has been well-prepared and presented can be dealt under the approach outlined in a considerably shorter period of time.

[75] ACCC (2000) Submission to the Productivity Commission Review of the Prices Surveillance Act 1983 p 32.

Compliance costs

Compliance costs of the regulatory process are borne by various parties, including towage companies, shipping lines and other interested parties. These costs involve time and money spent on hiring consultants for advice and preparation of submissions to the ACCC. It can be noted that costs incurred by declared companies are often overstated. They need to be looked at over time and to be compared with the likely costs of alternative regulatory arrangements. There has been relatively few price notifications submitted to the regulators over the period of the declaration, consequently, the long term impact of the declaration on the costs of compliance for the towage companies is low.

Impact of the declaration on price trends of towage operators

The harbour towage declaration under section 21 of the PS Act 1983 obligates the declared towage company to notify the ACCC for any price increase above the highest price that is in place for the previous 12 months. The long-run impact of the harbour towage declaration on the declared company's profitability and its actual investment and incentives to invest depends on the long-run effect of the declaration on the trend in towage rates as set by the company. This in turn depends upon the number of times that the declared company raises its rates during the period of declaration and the magnitude of the rises. The declaration under the PS Act cannot require or enforce the company to reduce price. This implies that any declining trend in nominal prices is due to other factors such as direct competition or competition for a tender for the right to conduct towage business.

Table 3.3 shows the cumulative magnitudes of the nominal price increases allowed for or actually implemented by the declared towage companies over the period 1991 to 2002.

Table 3.3: Magnitude of cumulative increases in towage rates August 1991 to March 2002

Port	August 1991 to February 2002 No of implemented rate rises	Nominal cumulative rate rise % Aug 1991– December 2001	Nominal cumulative rate rise August 1991 – March 2002
Adelaide	3	21.1	40.3
Melbourne	3	18.9	46.7
Newcastle	1		
Brisbane	2	4.4	16.6
Fremantle *	2	-4.9	-4.9
Port Jackson	3	23.3	55.6
Port Botany	2	7.55	21.6
CPI**		27.0	28.1

Sources: ACCC notifications, ABS Catalogue No 6401.0

* Towage rates for the Port of Fremantle were reduced by 15 per cent in March 2001.

** CPI All groups weighted average 8 capital cities movement from September quarter 1991 to December quarter 2001 and All groups weighted average 8 capital cities movement from September 1991 to March 2002.

In real terms, towage rates for every declared operation at the above ports decreased over the period August 1991 to December 2001. However, taking the latest set of rate increases into account (March 2002), there are significant cumulative real rate increases for three operations, (Melbourne, Adelaide and Port Jackson), for the period August 1991 to March 2002.

Examination of the impact of the declaration upon trends in towage rates for the individual ports shows that for the port of Newcastle, decreases in nominal rates over the period are due to competition in the towage market over the period 1994 to 1998, rather than the declaration. Also the constraint on rate rises since 2 June 1999 for towage operations at the Port of Newcastle is due to a 3 year price freeze contained in an 87B undertaking under the TPA 1974, rather than the declaration under the PS Act.

Similarly for the port of Fremantle, the decrease in nominal towage rates over the period of declaration is due to a 15 per cent rate reduction enacted in March 2001 and 2.5 year freeze on rates to December 2003 following Adsteam's successful bid to renew its towage licence.

Towage operations at the ports of Brisbane and Port Botany exhibit low rates of increase in nominal prices from August 1991 to December 2001. There are instances of towage rate declines for the Port of Brisbane operations and the only increase in rates was due to pass through of the GST in June 2000. Over the 1991 to 2001 period, there was only one price notification (for GST pass-through) submitted by the declared towage operator at the Port of Brisbane.

For Port Botany, while the PSA approved a 15 per cent increase in rates in February 1992, the declared company (Waratah Towage) did not implement the increase. Waratah Towage submitted only 2 price notifications to the ACCC from August 1991 to December 2001. The increase in nominal towage rates was for GST pass through in June 2000 and there are no instances of towage rate declines below the maximum price for the entire period.

The declaration of towage operations at Port Botany and Brisbane did effectively cap towage rates for these ports from August 1991 to December 2001. However, the declared towage operators did not submit many price notifications to the PSA /ACCC and on one occasion did not implement a PSA approved increase.

For the three declared ports, (Port Adelaide, Port of Melbourne and Port Jackson) the nominal increases in towage rates are significantly higher than for the other four declared ports. For the cases of Port Adelaide and Port of Melbourne, the declared operator obtained PSA / ACCC approval for a 13.4 per cent increase in rates in April 1992 and a 10 per cent increase in rates in March 1999 respectively. [76]

For Port Jackson, the ACCC did not approve the 15 per cent increase in towage rates that was implemented by Waratah Towage in February 1998.

In March 2002, Adsteam increased towage rates by significant proportions ranging from 11 to 26 per cent for its operations at the ports of Adelaide, Brisbane, Melbourne, and the two Sydney ports. None of these rate increases were endorsed by the ACCC. These recent increases have resulted in significant real rates of cumulative increases in rates for several ports over the period of declaration (August 1991 to present). For Port Jackson the cumulative increase in nominal towage rates is almost double that for the CPI movement from (September 1991 to March 2002). Similarly, the

[76] In these cases the individual declared operators sought a 23.78 per cent and 17.5 per cent rise in rates respectively.

respective cumulative increases in nominal towage rates for the Ports of Melbourne and Adelaide are 66 per cent and 43 per cent greater than the CPI increase from September quarter 1991 to December quarter 2002.

Assessing the overall impact of the PS declaration on price trends within the harbour towage industry, the ACCC believes that it was effective in containing towage rate increases for several declared towage operations over the period August 1991 to December 2001. This resulted in declines in real towage rates. Also over that period the PSA / ACCC assessed as reasonable several other towage price rises for declared operators and effectively contained rate rises that might have been implemented in the absence of regulation, by approving lower rises than what was proposed.

However, there have been two instances when a declared towage company has ignored the ACCC and implemented towage price increases regardless of the ACCC's ruling. These increases have been of significant magnitude to contribute significantly to cumulative real towage price increases over the period of the declaration since August 1991, for operations in three ports. Furthermore, these cumulative real rate increases have been significant. Since that the declared towage company has now demonstrated a willingness to ignore the regulator on repeated occasions and in all probability will do so in future, this seriously undermines the effectiveness of the declaration in containing towage price increases.

Impact of PS declaration upon investment & profitability

Any regulatory cost of containment of rate increases on the regulated firm impacts on profitability and its incentives to invest. In its recent assessment of the price notification submitted by Adsteam (2002), the ACCC found that rates of return on individual towage operations at the five declared ports (Adelaide, Melbourne, Brisbane and the two Sydney Ports) to be at least adequate at existing pre-notification prices. It decided that the proposed price increases were inappropriate on the basis they would lead to excessive profits and consequent inefficiencies.

Whilst for some of the operations at the five port, rates of return have fallen in recent years, due to falling demand and gross revenue trends, rates of return on investment for these operations appear to have been even higher in the early to mid 1990s. Recent trends in towage demand for the five individual ports are summarised in the ACCC statement of reasons for the Adsteam decision. [77] Overall for several ports, rising or at least stable trends in towage demand for most ports contributed to buoyant revenue growth and to the high rates of return earned in the 1990s.

Both Howard Smith and Adsteam have made significant investments in replacement tugs over the last 10 years.

Adsteam has invested in a total of 12 tugs at a cost of about $85 million over the last 10 years. These occurred in two significant lumps. Five of the tugs were constructed in 1991 and 1992, while the remaining seven were built in 1999 and 2000. Eight of the tugs are employed in ports where towage operations are declared. [78]The number of tugs employed by Adsteam and Howard Smith (prior to the merger) in the declared ports has not substantially changed since 1995. This implies that the new tugs represent replacement investment rather than expansionary investment. [79]

[77] ACCC (2002) Statement of Reasons for Adsteam decision pp 17 – 20.
[78] Adsteam Marine (2001) op cit Appendix B p 50.
[79] The harbour towage market is not expanding.

If the declaration under the PS Act tightly constrained towage prices to affect rates of return, it would be expected that the declared towage companies would have 'degraded' their investment in tugs. Rather than investing in new Z Peller tugs with the latest technology they might charter second hand tugs. Towage companies may even spend more on refurbishment of existing tugs. This has not occurred, leading to the conclusion that the declaration has not constrained prices to a level where investment in assets has been deterred. In the case of Adsteam, recent ACCC pricing decisions have been ineffective and could not constrain towage rates to a level when Adsteam lost incentive to invest.

Impact of the PS declaration upon competition and contestability

The declaration under the PS Act 1983 may impact upon competition and contestability. Some observations about the effect of the harbour towage declaration follow:

- In the declared ports there has been only one instance of direct rivalry between towage competitors, that is for the Port of Newcastle. In this circumstance, Waratah Towage was declared under the PS Act, while its competitor Hunter Towage was not declared. Since, towage rates fell by a significant amount due to competition, Waratah's lack of ability to raise price and the resultant impact on its profitability, were due to competition rather than the declaration per se.

- There was no observed price competition between the rival tug companies, Fenwick and Waratah Towage at the Sydney ports and Newcastle, before their merger in late 1995. Both companies had similar 'public' price lists for towage services. Also both companies were subject to declaration under the PS Act 1983, and the failure of Fenwick to submit an appropriate case for a rate rise in 1992, led to Waratah's inability to implement a PSA-endorsed price rise at the same time for services at Port Botany.

- There has been little observed interest by potential entrants for the towage markets where the incumbent has been subject to declaration. Can this be construed as due to the existence of the declaration? As argued above the declaration did not lead to constrained profits for Adsteam for its individual towage operations. Where there was a demonstrated case for price increases as for operations at the Port of Melbourne, the Commission endorsed price rises. It may be speculated that the appearance of a new potential towage operator at the port of Melbourne and other ports where the incumbent is declared is due in part to the recent significant unendorsed increases in rates that have occurred. Furthermore, if, as natural monopolies, harbour towage is most efficiently provided by one operator at each port, then this latest potential entry could be regarded as inefficient.

Conclusions

- The regulatory costs of the current declaration upon the companies are low. In terms of the long term on going costs of assessing price notifications, there have been very few price notifications submitted by towage companies to the ACCC and its predecessor the PSA over the history of the declaration. Also, there has only been one public inquiry into harbour towage during the declaration period (in 1995).

- The assessment of a price notification does impose regulatory compliance costs on the declared company and on third parties. These may be however, overstated and need to be put in perspective with the costs over time of other regulatory options. The ACCC is transparent in its processes and its reporting of decisions and any processes longer than the 21 days statutory period is carried out in agreement with the declared company. The costs of a longer process need to be balanced against a more informed decision from the regulator based on industry consultation.

- The experience of Howard Smith and Adsteam has illustrated that any impact of declaration on profitability and incentives to invest of a declared company is not considerable. Adsteam has been found to have been earning above average returns before it submitted its latest price increase proposals to the ACCC in January 2002. Adsteam has also invested in 12 state of the art tugs with no evidence of asset degradation over the period of the declaration. Howard Smith Towage had also made significant investments in new Z Pellers before it merged with Adsteam in 2001.

3.3 Pro- competitive reforms in harbour towage

The Commission's recent experience with Adsteam, where price increases were notified and implemented even when assessed as unjustified, demonstrates that prices surveillance in its current form provides no effective restraint on a firm with significant market power. The Commission's fundamental concerns with the Prices Surveillance Act are set out the Commission's submission to the Productivity Commission's review of that Act.

To the extent that a natural monopoly is maintained at Australian ports, competition may be limited to competition for the market, rather than competition in the market. This implies that port authorities, to the extent that they control market entry, could influence competition for the market.

That port authorities at most of the major container ports have not introduced such tender processes is a matter that the Productivity Commission may wish to raise directly with those authorities. There are however some important considerations when tender processes are contemplated. Foremost is that the port authorities themselves need to have sufficient incentive to implement a tender process that will provides users of harbour towage services, such as shipping lines, with a product of an efficient price and quality. That is, the port authority may be only an indirect beneficiary of a tendering process.

Additionally, there may be tensions between competing incentives at port authorities that have an interest in harbour towage businesses. (For example, Adsteam owns a minority share of Flinders Ports, operators of South Australian ports, and also operates harbour towage services at those ports.)

Competitive tenders for the right to supply a towage market in a particular port for a number of years can be offered by the port authority on a non-exclusive or exclusive basis. The latter means that the port authority will not grant another licence to a rival towage company during the life of the current licence, thus guaranteeing the whole towage market to the successful bidder. There are only currently three towage licences granted on an exclusive basis for Australian ports. However, as discussed in section 3.1.2 there has been a trend in the policies of two State Governments to facilitate the employment of exclusive licences in several more ports. Exclusive licences offered by port authorities may have s 51 of the TPA 1974 immunity from prosecution for breaches of s 45 of the TPA 1974.

There are several advantages and disadvantages associated with the adoption of either type of towage licence and these depend upon the degree of contestability of the harbour towage market in the respective ports. Some of the merits and disadvantages associated with two alternatives are:

- Exclusive licences may encourage more potential bidders for a particular tender, than non-exclusive licences because there is no risk of entry of a direct rival during the term of the licence;

- if the towage market is small and direct competition is unsustainable then a non-exclusive licence will also result in a successful bidder capturing the entire market;

- since an exclusive licence eliminates any threat of entry during its contractual term, this may increase the market power of the incumbent in terms of its dealings with its customers and with the port authority itself.

A wider scale introduction of competitive tendering by the port authorities around Australia for the right to provide harbour towage services, either on an exclusive or a non exclusive basis, within the port precincts may also be considered. However, it has limitations as a regulatory solution to the natural monopoly characteristic of harbour towage markets.

Auctions, or competitive tenders, for the right to provide towage services can be used where markets (the right to provide towage services) are thin and there are few actual transactions to encourage new entry into towage markets. They also provide information to the seller (port authority) about the value of its asset, the right to sell towage services. The economic objective of the auction is to encourage efficient entry, that is the firm with the best mix of price and quality actually wins the auction at the same time reduces the risk of tacit collusion between bidders or predatory behaviour by strong bidders. Another objective is to maximise revenue for the seller.

Understanding of the market environment in which a competitive tender takes place for a towage licence or for a series of competitive tenders that may take place sequentially for various ports around the country is important in designing a 'best auction' format.

Auction theory is very complex and the economic welfare outcome of a particular design of competitive tender process is highly sensitive to the market environment and characteristics of the potential bidders and the seller. The market environment includes the number of bidders, the degree of capital (market) specific investments incurred by the incumbent towage company and the significance of its specific market operational knowledge of the port. The characteristics of the bidders include their relative degree of risk aversion and whether they can be regarded as strong or weak bidders. Finally the characteristic of the seller includes its incentives to minimise costs or to maximise trade throughput and its links with any associated towage company. If there are ownership links an auction could result in economic rents being shared between the port authority and the towage company.

Unfortunately, there is no one type of auction format, which unambiguously maximises economic efficiency by ensuring that the lowest cost / highest quality bidder wins and at the same time lessens risks of tacit collusion and predatory behaviour in bidding. (Attachment D: Menzies and Pitchford Tendering and Bidding for Access: A Regulator's Guide to Auctions)

Added to this there may be ramifications for economic efficiency resulting from sequential auctions for towage services across a range of ports. This may increase opportunities for tacit collusion

between bidders because there are multiple 'prizes' to be won. [80]It may also increase opportunities for predatory behaviour in bidding by a strong bidder, particularly, if the set of bidders at each auction is small and if it comprises basically the same members.

Several issues concerning the respective incentives of potential bidders, the incumbent monopolist and the port authority need to be studied closely, before competitive tendering is adopted as a regulatory solution. Examples of such questions are as follows:

- Which party has the responsibility of designing the auction and also setting the regulatory instruments with regard to price paths and quality of service that is a condition of the towage licence?

As discussed in section 3.1.2 the ACCC has concerns about regulatory inconsistencies that could develop if there was no national framework of economic regulation in place. This may indeed occur if a national regulatory framework is replaced by various regulatory conditions contained in a port towage licences with possibly some State Government oversight. Additionally regulatory costs (transactions costs) for harbour towage companies may rise because they would need to deal with a number of port authorities and regulatory jurisdictions.

- What is the potential economic impact of allowing a regime of economic regulation of towage, which is locally based instead of a national or state based regulatory regime?

The issue of the placement of salvage tugs around Australian ports has emerged as a topical issue for port authorities and for the incumbent towage company Adsteam. [81] Some port authorities notably the Port of Bunbury have recently displayed a reticence to include provision for salvage capable tugs in their respective ports and therefore bidders that offer salvage capability at higher capital cost automatically lose. If all port authorities adopt similar policies for the granting of towage licences, there is a potential case of market failure and that it may result in no salvage capacity being available on the Australian coast. More broadly based regulatory regimes are better placed to accommodate potential problems such as 'free rider' effects.

- What are the incentives for port authorities with regards to the provision of salvage tugs within their respective ports and is there a case for some form of intervention in the design of competitive tenders allowing for the use of salvage tugs?

Before adopting competitive tendering for harbour towage markets within individual port precincts, as a general panacea to the problem of natural monopoly markets with weak contestability it is important to examine the potential costs of such a policy and the incentives of the respective parties involved. The resulting regulatory framework may be inconsistent on a national basis and impose greater costs than the current regime due to greater transacting and it may not be able to deal with potential free rider problems that may emerge.

[80] Klemperer P (2000) What really matters in auction design at www.nuff.ox.ac.uk/economics

[81] LLDCN loc cit various.

4.0 Conclusion

This submission to the Productivity Commission examines five market related issues for harbour towage. Several conclusions emerge:

- Harbour towage at the major Australian container ports appears to be a natural monopoly.
- The industry has a history of high returns on investment.
- The monopoly provider in most Australian ports, Adsteam, is prepared to implement price increases even though it has been earning an above average rate of returns on investment for most of its towage operations in the declared ports.
- The declaration under the PS Act has not resulted in price suppression, nor reduced incentives to invest for the declared companies. It has recently proved to be ineffective in constraining towage price increases, therefore reducing incentives for the declared company, Adsteam, to reduce costs.
- Competitive tendering for the right to supply towage services may be a problematic solution to the natural monopoly structure of harbour towage. Similarly, it is not clear which alternative type of towage contract, non- exclusive or exclusive, is superior in terms of its potential effects on economic welfare.

These conclusions form a prima facie case for the continuation of some form (albeit effective) economic regulation. There are also advantages to administering such regulation on a national basis, rather than on a State by State or port by port basis. Such advantages include consistency of regulation across the industry and the development of regulatory expertise.

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Attachment A: Adsteam Marine: Harbour Towage Operations around Australia.

Port	Name of subsidiary company	Name of Tug	Year Built	Propulsion	Bollard Pull (tons)
Melbourne	Adsteam Harbour – Melbourne	NA	NA	NA	NA
Geelong		NA	NA	NA	NA
Westernport		NA	NA	NA	NA
Port Jackson	Waratah Towage	Wonga	1984	Z-Peller	49
Port Botany		Wallan	1986	Z-Peller	49
		Woona	1984	Z-Peller	47
		Wilga	1991	Z-Peller	47.5
		Weera	1982	Z-Peller	47
		Willara	1983	Z-Peller	47
		Wooree	1976	Twin Steering Nozzle	41
		Walli	1970	Twin Duck Peller	27
		Wombi	1978	Twin Steering Nozzle	41
		Ballina	1973	Voith Schneider	35
Newcastle	Hunter Towage Services	Warrawee	1985	Z-Peller	47
		Wato	1982	Z-Peller	47.5
		Watagan	1986	Z-Peller	47.5
		Mayfield	1990	Voith Schneider	48.5
		Carrington	1990	Voith Schneider	48.5
Port Kembla	Wallace Tugs	Kembla II	1975	Steering Nozzle	41
		Korimul	1982	Z-Peller	49
		Karoo	1991	Z-Peller	50
		Kuna	1991	Z-Peller	50
Eden	Charter Craft	Warringa	1976	Twin Screw	40.6
		Weela	1967	Single Screw	26
Brisbane	Adsteam Harbour – Brisbane	NA	NA	NA	NA
Cairns	North Queensland Marine Towage	Hamilton	1971	Twin Fixed Nozzle	27

		Babinda	1979	Twin Steering Nozzle	14.4
Townsville		Burdekin	1974	Twin Steering Nozzle	33
		Giru	1991	Z-Peller	47.3
Mackay		Challenger	1980	Z-Peller	51
		Lucinda	1975	Twin Steering Nozzle	27
		Nelia	1974	Twin Steering Nozzle	26.4
Gladstone	Gladstone Towage Services	NA	NA	NA	NA
Mourilyan		Otto Assman	1971	Twin Fixed Nozzle	31.8
Lucinda	Serviced by Mourilyan & Cairns				
Bundaberg		NA	NA	NA	NA
Weipa	Weipa Marine Services	NA	NA	NA	NA
Adelaide,	Ritch & Smith	Tingari	2000	Twin Steering Nozzle	60
Port Giles		Tusker	1983	Z-Peller	50
Port Stanvac		Tarpan	1984	Z-Peller	47
		Tapir	1977	Twin Steering Nozzle	40
Ardrossan		Mosman	1967	Fixed Prop	6?
Port Pirie		Tununda	1971	Twin Fixed Nozzle	33
Port Bonython		Taminga	1983	Z-Pellar	50
Whyalla		Turmoil	1972	Single Screw	30
Fremantle	Fremantle Tug Operators	Burra	2000	Z-Peller	62
		Wambin	1986	Z-Peller	60
		Wyong	1992	Z-Peller	47
Kwinana	Kwinana Towage Services	Bunbury	1999	Z-Peller	62
		Champion	1985	Z-Peller	51
Albany	Fremantle Tug Operators	Elgin	1986	Twin Aquamaster	42

		Wandilla	1970	Duck Peller	27
Cockatoo Island	Stirling Marine Services	Stirling Skate	1968	Twin Screw	12
Geraldton	Stirling Harbour Services	Beacon	1987	Z-Peller	30
		Pelseart	1987	Z-Peller	30
Dampier	Stirling Harbour Services	Wyola	1975	Twin Steering Nozzle	40
Darwin		NA	NA	NA	NA

Source: Adsteam Marine web site. http://www.adsteam.com.au/

Attachment B: Recent trends in harbour towage rationalisation 1990 – 2002

Entry	Exit	Rationalisation	Year
	McIIwraith McEachern sold its towage interests to Melbourne Tug Services (MTS)	This resulted in MTS (a 100% subsidiary of Howard Smith) as the monopoly provider in Melbourne / Geelong / Westernport	1991
BHP Transport (BHPT) entered Hay Point			1992
		Fenwick entered into a joint venture, NPTS with Waratah Towage, (a joint venture between Adsteam Marine and Howard Smith) at the Port of Newcastle	1993
Hunter Towage services, (a joint venture between BHP Transport and four Japanese shipping lines) entered into Newcastle market		Entered into competition with NPTS	1994
BHP Transport entered into Port Hedland			1994
	Fenwick (a subsidiary of Brambles) sold its towage interests in the Sydney Ports and Newcastle to Waratah Towage	Waratah Towage became the monopoly provider of towage services at the two Sydney ports	1996
	P&O Towage sold its towage interests in the ports of Geraldton and Kwinana to Stirling Harbour Services, (a joint venture between Howard Smith & Adsteam Marine)?		1996
	Brambles sold its towage interests at port Kembla to Waratah Towage		1995,1997?
Mackenzie Tugs entered the Port of Esperance market			1999

	Hunter Towage services sold its towage interests at the Port of Newcastle to Waratah Towage	Waratah Towage trading Hunter Towage Services becomes the sole towage operator at Newcastle	1999
Riverwijs, (a subsidiary of Wijsmuller) entered the towage market of Port Bunbury		Displaced the incumbent Stirling Harbour Services (a subsidiary of Howard Smith and Adsteam Marine)	2001
Riverwijs bought the towage interests of Woodside (Mermaid) at Port Dampier			2001
	Howard Smith sold its towage interests in the ports of Melbourne, Sydney, Fremantle, Brisbane, Newcastle, Gladstone, Weipa, Kembla, Cairns, Townsville etc to Adsteam Marine	This resulted in Adtseam Marine gaining 100% control over towage interests at Sydney, Brisbane, Newcastle, Melbourne, Fremantle and a number of smaller regional ports.	2001
	Brambles sold its controlling interest in North Western Towage back to its subsidiary	Brambles exited towage in the ports of Portland, Burnie, Launceston, Devonport and Hobart	2002

Sources: ACCC (1995) Inquiry into Harbour Towage Declaration p 41, LLDCN various

Attachment C: Draft Statement of Regulatory Approach to Price Notifications

Introduction

Given the changes that have occurred to declarations under s.21 of the *Prices Surveillance Act 1983* (PS Act) and to the economic environment in which notifications are being assessed, the ACCC considers it necessary to advise declared companies of the approach it intends to take in assessing cost based price notifications under section 22 of the Act.

The ACCC assesses notifications from declared companies using a cost based approach to surveillance[82] unless it has been directed by the Government to assess prices under a price cap, as is the case for newly privatised airports,[83] or it has reached agreement with the declared company on a price based approach to surveillance[84].

The approach outlined below draws on the ACCC's experience in assessing recent cost based notifications and outlines procedures proposed to overcome some difficulties encountered.

Pricing Guidelines

In 1987 the Prices Surveillance Authority (PSA) published *Guidelines for Pricing Restraint* as a guide to its approach to the statutory guidelines incorporated in the legislative criteria of s.17(3) of the Prices Surveillance Act (PS Act). These guidelines were developed in a period when the operation of the PS Act was part of the Government's Prices and Incomes Policy. That policy, and the Accord agreement with the Australian Council of Trade Unions, which underlay it, emphasised the need for all groups in the community to exercise income restraint to assist economic recovery. At the time general wage restraint was being exercised under the wage fixation principles established by the Australian Conciliation and Arbitration Commission. The Prices Surveillance Authority (PSA) then had the responsibility of promoting pricing restraint among public and private business enterprises in a matching effort directed to the reduction of inflation and other objectives.

The 1987 Guidelines reflect a particular cost based approach and largely follow the approach to surveillance applied by earlier pricing bodies, most notably the Prices Justification Tribunal. Under the Guidelines notifications were reviewed to ensure that price movements were related to cost movements between notifications. The period of time between notifications was often relatively short, with six or twelve months apart being quite typical.

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[82] This follows from the Unit Cost Direction under s.20 of the PS Act given by the Government in 1985. Under this direction the Commission is required to take into account the Government's policy of generally not supporting price increases in excess of movements in unit costs.

[83] The most recent declarations under s.21 of the PS Act relate to aeronautical services at newly privatised airports and require the ACCC to undertake its prices surveillance function by assessing proposed price increases in terms of CPI-X price caps set by the Government. The details relating to how the ACCC is to assess aeronautical charges at these airports are contained in special directions under s.20 of the PS Act.

[84] Price based approaches to surveillance have been used under the PS Act in industries other than airports. For example, priced based approaches, such as price caps, have been applied to declared firms in the cigarette, beer and petroleum industries. These approaches have been adopted through agreement between the declared companies concerned and the Commission in advance of formal notifications under section 22. Following agreement on price based approaches, price increases notified under section 22 of the PS Act, have then automatically been approved provided they are within the scope of the cap or price ceiling.

During this period there were 63 companies in 23 industries declared under s.21 (1) of the PS Act[85]. All the declared companies with the exception of Australia Post and Telecom were private sector companies, and the majority were in oligopolistic industries and final goods markets.

There has been a substantial reduction in the number of declarations under the PS Act. Declarations presently cover only 17 companies in six industries. The remaining declarations cover companies, which are in monopoly industries, and industries that provide inputs such as infrastructure services to other industries rather than final goods and services. Among other factors, the reduction has been associated with the removal of barriers to competition arising from policies such as tariff reductions and removal of legislative entry barriers and a switch in emphasis away from an incomes policy role for prices surveillance to a competition policy emphasis.

In March 1994 the PSA published a discussion paper "*Pricing Guidelines for Efficiency and Fairness*". The purpose of the draft was to provide updated guidelines to replace the *Guidelines for Pricing Restraint (6 August 1987).* Substantial changes had occurred in economic and political conditions since 1987 and the PSA's own practical experience in pricing matters had led to dissatisfaction with the 1987 Guidelines. The 1994 draft Guidelines remained in draft form.

The ACCC considers the 1987 Guidelines are inappropriate for the operation of the PS Act today. The economic environment has changed considerably. Inflation is not such a significant problem for the Government in the nineties in comparison to the mid 1980's. Wage fixing principles have moved away from central determination to an enterprise bargaining approach. The companies, which remain declared, raise more complex issues when they notify for price increases, except where they are covered by price caps. The 1987 Guidelines are therefore now considered no longer relevant.

The ACCC has rescinded the 1987 Guidelines for Pricing Restraint.

Interpretation of Section 17(3) of the PS Act

While the Commission has not developed new pricing guidelines it has considered the interpretation of the criteria in section 17(3) in light of the current economic environment. Under section 17(3) the Commission is required to have particular regard to the following considerations, subject to any directions under section 20:

> 17(3)(a) the need to maintain investment and employment, including the influence of profitability on investment and employment;
>
> 17(3)(b) the need to discourage a person who is in a position substantially to influence a market for goods or services from taking advantage of that power in setting prices; and
>
> 17(3)(c) the need to discourage cost increases arising from increases in wages and changes in conditions of employment inconsistent with principles established by relevant industrial tribunals.

Taking into account these criteria, the two general directions given to the Commission under section 20[86], and the economic climate of 1998, the Commission considers the following considerations are important in the assessment of notifications under s.22 (2)(a) of the PS Act.

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[85] Prices Surveillance Authority, *Annual Report* 1987-88, pp.39-40.

[86] The following general directions under s.20 of the PS Act are relevant:

S17 (3)(a) and S.17 (3)(b)

In relation to these criteria, an important consideration is that in an open and competitive market economy efficient provision of services underpins investment and employment opportunity. Investment and employment in the national economy will be promoted when firms produce goods or services efficiently and charge prices, which are at competitive levels.

Monopoly suppliers do not necessarily produce goods or services at efficient cost levels or at competitive prices. If higher than efficient prices are passed on to the competitive part of the economy, there is a resultant loss in allocative efficiency and potentially therefore in investment and employment opportunity.

Encouraging efficient pricing outcomes in line with more competitive conditions implies that price increases should *not* be in line with unit costs on top of a cost base, which is too high due to inefficiency or excessive margins.

Given this broad context, the Commission in assessing price notifications will direct its attention to:

- the efficiency of the cost base that the declared company is working from to earn a return; and
- the reasonableness of the rate of return that the declared company is seeking.

S.17 (3)(c)

S.17 (3)(c) may not be directly relevant now because recent changes to industrial relations legislation have led to movement from centralised price fixing to agreements negotiation at the enterprise level. The object of the Workplace Relations Act, which came into effect on 1 January 1997 was to give "primary responsibility for industrial relations and agreement making to employers and employees at the enterprise and workplace levels"[87]. Enterprise bargaining agreements registered with the Australian Industrial Relations Commission are not scrutinised by the Commission by reference to public interest considerations.

Enterprise bargaining is one of the tools open to an enterprise to negotiate the types of terms and conditions and work practices that will best ensure the future profitability of a particular enterprise and therefore the capacity of the enterprise to attract investment and provide future employment.

In keeping with the spirit of recent changes to industrial relations legislation and wage determination practice, the Commission is more likely to not object to prices where wage increases are associated with improvements in productivity.

Information Guidelines for Notifications

. The Government's policy of generally not supporting price increases in excess of movements in unit costs [Direction number 6, 15 October 1985]; and

. The Government's policy that increases in executive remuneration in excess of those conferred under wage fixing principles should generally not be accepted as a basis for price increases [Direction number 8, 22 April 1988].

[87] *Changes in federal workplace relations law - legislation guide,* Commonwealth Department of Industrial Relations, Dec. 1996, p.1.

These information guidelines relate to notifications examined under a cost based approach to surveillance. In assessing notifications under s.22 of the PS Act the Commission will expect the declared company to justify their case for price increases. The Commission will examine the evidence and arguments put forward by the declared company to form an opinion about the efficiency of the declared firm's cost base and the reasonableness of their rate of return. Particular information, which is likely to support this approach, includes as follows:

- A detailed description of the operations of the declared company, including the relationship between declared goods or services and non-declared goods or services, is likely to be useful in cases where notifications are infrequent and/or operations are complex.

- Information should be provided over a sufficient length of time to enable the Commission to form a reasonable assessment of the profitability and efficiency with which the declared goods or services are supplied. This implies that the ACCC will require information for a period of several years, rather than a short time frame of say a year[88].

- The levels and movements in costs, revenues and volumes over an entire period of assessment, not just a comparison between a base period and the current period.

- Information on improvements in service quality to bring Australia to the standard of international best practice.

- The nature of productivity improvements agreed in enterprise agreements as trade offs for wage increases.

- The extent to which cost savings are passed on to users; and

- Information on the allocation of costs between declared and non-declared goods or services.

Confidentiality of Information Voluntarily Supplied to the Commission

The Commission proposes the following guidelines for information supplied to the Commission for price notifications under section 22:

- The information contained in a s.22(2)(a) notice (the date of the notice, the declared company, the description of the declared goods or services covered by the notification, the locality of supply of those goods or services and the proposed terms and conditions and prices of those goods or services) will not be treated as confidential by the Commission;

- If an applicant wants information contained in supporting submissions to be treated as confidential, they must clearly indicate the parts of the submission they regard as confidential and the reasons for the claim;

- The ACCC may reject an applicant's claim for confidentiality on the grounds that disclosure of the information is in the public interest or that it would not, if disclosed, damage the competitive

[88] This may not to be required where the company has recently notified for price increases for the declared goods or services.

position of the company;

- The applicant will be informed that the:
- the ACCC does not accept the claim for confidentiality and/or that
- the ACCC accepts the claim for confidentiality but may give less weight to the information when reaching its decision.

The applicant will be given an opportunity to respond within a certain time limit.

- If the Commission confirms its decision to deny the confidentiality claim, the applicant may, within a specified time limit, withdraw the information. Ordinarily, the Commission will not have regard to this information when reaching its decision.

- A claim for confidentiality will be taken into account in the operation of section 23 of the PS Act, which provides for the inclusion of information in the Gazette and public register. However, information that was treated as confidential during the prescribed period will not automatically be excluded from the register.

- These guidelines do not apply to information, which has been provided to the Commission in accordance with a notice issued under s.32 of the PS Act.

Consultation with users

Information from users is important in understanding the issues in significant notifications. The ACCC will normally consult with users as part of the assessment process of notifications. Before consulting with users the ACCC will advise the declared company that it will be consulting users and the nature of the information that the ACCC intends to disclose. The ACCC will normally wish to disclose the following information to users:

- the fact that a s.22(2) notice had been given to the Commission;

- the date on which the notice was received;

- the name of the person;

- a description of the goods and services;

- the proposed locality; and

- the terms, conditions and price upon which the person proposes to supply the goods or services.

The Commission will discuss issues raised by users and other interested parties with declared companies and invite their response before acting on that information. In doing this the Commission will not necessarily reveal the identity of users consulted or the information provided by them, for example confidential information.

Time frame for consideration of notifications

While the Commission is now dealing with relatively few cost based price notifications, the notifications which are arising are from industries with a high degree of monopoly power and involve increasingly complex issues. The statutory 21 day period for the Commission to consider notifications is a problem for some notifications now being received given the complexity of the issues that are arising. In order to accommodate the notification function in these complex cases without involving a public inquiry process the Commission advises it will need to discuss prospective notifications with declared companies at an early stage and require a high degree of co-operation. The following policy is proposed:

- The Commission encourages declared companies to discuss any prospective notifications with the Commission prior to formal lodgement.

- It is desirable that declared companies submit *draft* notifications and attempt to resolve issues, such as interpretation of data provided and provision of information prior to formal lodgement with the Commission. An appropriate timetable for the notification could be worked out at pre-notification discussions.

- The Commission is able to give detailed reasons for its decisions in the 21 day statutory time frame for notifications in many cases but there are some cases where this time frame is too short. In these cases the provision of detailed reasons by the Commission would involve the ACCC being able to assess a notification over a longer time frame and issue a draft statement of reasons. While the ACCC will work expeditiously to assess a notification and issue a draft statement of reasons for more complex notifications the time frame involved is likely to be greater than 21 days. Depending on the complexity and significance of the notification, the Commission may adopt a similar process to that involved in the Commission's reasons for decision under the authorisation process under the *Trade Practices Act.*

To accommodate the above process the following procedures are proposed:

- The declared company lodges a *draft* notification under s.22(2)(a) and supporting submission;

- The ACCC undertakes a preliminary review of the notification in particular to assess the adequacy of data provided and any likely issues of interpretation with the notification submission;

- There is discussion and agreement on a timetable for handling the notification;

- The ACCC consults with users and possibly other interested parties about the proposed price notification;

- The ACCC discusses issues raised by users with the declared company;

- The ACCC issues a *draft* decision and statement of reasons to the declared company. In order to protect confidential information a non-confidential version of the decision will be issued to users in order to permit them to make submissions.

- The Commission will anticipate that the declared company will respond to the *draft* statement reasons at the time of formal lodgement of a notification. Users would be expected to respond

within 14 days of issuing the draft statement of reasons. Given this timing it is not anticipated that a declared company would lodge a formal notification until 14 days after receipt of the Commission's draft reasons for decision.

- Following lodgement of a formal notification the Commission will hold a pre-decision conference with the declared company and interested parties who receive a copy of the *draft* statement of reasons and then issue its final decision under s.22 (2)(b) of the Act. This will be accomplished within the 21 day period unless an extension is agreed to under s.22 (6).

- Note that a declared company retains the right to lodge a notification without prior consultation with the Commission and that the Commission would give due consideration to the notification lodged although it would prefer a consultative process.

The ACCC welcomes comments on this Draft Regulatory Approach. Comments should be directed to:

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ACCC
GPO Box 520J
Melbourne, Vic. 3001

by 30 April 1998.

Attachment D: Menezes and Pitchford, Tendering and Bidding for Access: A Regulator's Guide to Auctions

Tendering and Bidding for Access: A Regulator's Guide to Auctions

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And

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Abstract

The lessons from auction theory are vital for the design of tenders and traditional auctions. Since these tools are increasingly being used in regulation, an understanding of the basics of auction theory is essential. Unfortunately, there is no simple prescription for an auction or tender form that will fit all situations. The best mechanism will vary according to the particular circumstances involved, and the costs to auction and tender designers from inappropriate design can be very high. For example, while a second-price sealed bid auction is efficient in the absence of collusion, if participants can collude then such auction formats can result in very low revenue. This is precisely what happened in a recent New Zealand spectrum auction. A cable TV auction in Australia was similarly a spectacular failure, because the designers of the auction allowed parties multiple bids without penalty for exit. Auction design is a complex and challenging area, and regulators should be aware of the dangers of inappropriate design.

0. Introduction

Tendering and traditional auctions have become increasingly common in the context of regulated industry. Examples under the ACCC's charter include tenders for airport freight handling, airport services, allocation of gas distribution rights and harbour towage services. These examples are relatively small scale when compared to the potential use of auctions in other areas of interest to the ACCC such as auction of airport landing slots; auctioning of access to local loops for internet, cable and telephony; auction of mobile telephone spectrum; and perhaps auctions of airports themselves! The application of auction theory to regulated firms is very new, and there has been very little written in this area. Therefore, much of the analysis in this paper will draw on existing auction theory, and make preliminary conclusions concerning their application to regulated entities. An understanding of the basics of auction theory is essential for understanding how regulated firms might react in the face of different auction formats. Therefore, we present a summary of some of the main intuitions from auction theory in this paper. The aim of this paper is not create a recipe book for regulators on the application of auctions, but to introduce concepts and improve understanding of how auctions might work in a regulated environment. Auction design itself is very difficult, and is one of the few areas of economics where specialized auction theorists are hired world-wide as consultants. Such specialists have been used to help design Treasury Bill auctions in the United States, auctions in the United Kingdom, and in mainland Europe.

1. Overview

Tendering for the purpose of supply, and the selling of access to competitors are important areas of concern for regulators. It turns out that both these areas are covered by the economic theory and practice of auctions. As mentioned, the study of auctions in economics and outcomes in practice are complex. There are some general conclusions that can be made regarding tendering when the regulated firm is a cost-minimiser. However, the main conclusion of this paper - and indeed of the economics profession - is

that auctions are very sensitive to context: The best form of an auction when regulated firms are involved depends on the market environment. For example, what information participants have, how this information is generated, how many participants there are, whether there are concerns of collusion in the auction, and so on. Different types of auctions perform well in different circumstances, and the consequences of choosing the wrong form can be dramatic. Unfortunately, there is no way around these problems. Supply contracts and access could be allocated in an ad-hoc fashion, but this would simply be equivalent to allocating these scarce resources through particularly badly designed auctions! The source of the problem is the *environment* in which these activities are conducted, not the fact of auctions themselves.

The paper is set out as follows. In section 1.1, we introduce some key questions that arise for regulators in the areas of tendering and access. In section 2, we look more closely at the economics of tendering and access. Section 2.1 examines the key questions as they arise for tendering to illustrate the importance of the regulated firms objectives. We argue that if the regulated firm has cost minimization as an objective, then regulators need not concern themselves with the format of the tender. However, if this is not the regulated firm's objective, then there is a case for regulators or government to be concerned about tender design. In section 2.2 we conduct a similar exercise for sale of access by a regulated firm. Section 3 and related appendices is a comprehensive survey of auction design. Section 4 concludes.

1.1 Key Questions on Tendering and Access

Providers of goods and services in both the private and public sectors. A buyer advertises for potential sellers to submit bids to supply a good or service, and selects from among the pool of applicants. For example, in the case of architectural tenders, sellers submit a basic plan for the building, and the buyer selects the bid that has the best mix of price, functionality and aesthetic characteristics for their tastes. Tendering is most effective when it takes place between a substantial number of buyers and sellers, with

repeated interactions over time: e.g., if there are many buyers wanting buildings constructed, and many architectural firms to bid for this work. In this way, tendering works is a matching process between buyers and sellers under reasonably competitive circumstances. However, tendering also occurs in the context of imperfectly competitive, regulated industries, and under circumstances where markets are thin and information is imperfect. Consider regulated airports tendering for supply of freight handling and other services, or regulated port authorities which ask for bids from potential ship towing companies. Concern about market failure is reflected in the fact that regulation or government ownership itself may have been imposed because of fears of adverse effects from imperfect competition.

Tendering raises important questions for regulators:

1. *Does the regulated or government firm have the incentive to run the tender in the most efficient manner, or does regulation (or government ownership) give perverse incentives?*
2. *Is favourable treatment of bidders in tendering inefficient?*
3. *How important is the competitiveness of the tender system?'*

A related set of questions arises in the case where a regulated or government firm provides access to an asset that is an essential input for numerous firms. For example, an airport can ration access by airlines to a new airport terminal, an airport can ration access to landing slots, or a gas pipeline owner can ration capacity to transmission or distribution companies. Questions that arise such cases include:

1. *Will the firm provide access at efficient prices, i.e. what is the best way to ration access?*

2. What will the be the effect of rationing access on the structure of the market? 3. What is the interaction between access to the asset and merger policy?

[1] Note that we have been careful to avoid the terminology "competitive tendering" because tendering takes place in an environment that may or may not be particularly competitive, such as the environments faced by the regulated firms described above.

It turns out that the theory of auctions is the primary area of economics that covers both the case of tendering and rationing of access. This will be explained in section 3 of this paper. Below, we argue that tendering introduces only limited concerns for regulators when the objectives of the firm are correct. However, if firm objectives diverge from what is appropriate - which depends on the nature of the regulation that is imposed on the firm - then there is an argument for some part of government to be involved in designing rules for tendering.

2. The Economics of Tendering and Access Pricing

We identified two emerging areas of concern for regulators in the introduction. In this section, we discuss them in more detail, and present insights that economic theory and practice bring to bear.

With tendering, there is a single *buyer* who wants to find the best *of many potential sellers* for some good or service. With access, there is a *single seller,* who would like to sell access to *a subset of many potential buyers.* Although they can both be considered as auctions (and we will explain why below in Section 3), these situations can be quite different in their implications for regulators. We examine them in turn below.

2.1 Tendering

Consider the first question flagged in the introduction:

> *Does the regulated or government firm have the incentive to run the tender in the most efficient manner, or does regulation (or government ownership) give perverse incentives?*

For purposes of comparison, suppose first that firms are unregulated profit-maximizers. With tendering, a profit maximizing unregulated firm that wants to buy a good or service of known quality would ideally wish to have full information on each of the seller's costs

of production. It would then contract with the seller who has the lowest cost of production. This follows directly since by selecting the firm with the lowest production cost, the buyer's costs of production are minimized. Suppose instead that the buyer does not have full information on sellers' costs of production. The buyer's objective is still the same: to somehow select a lowest cost seller. However, there is an additional informational constraint on the buyer's problem. It turns out that the buyer can devise a method for minimizing the *expected cost,* by offering a menu of cost and quantity combinations that leads sellers to reveal their costs by their selection of a particular contract. [2] This is more complicated than the full information case, but the lesson is the same: As long as the buyer's objective is to maximize profits - and therefore to minimize cost - it will end up with the lowest cost seller (at least in expected terms subject to informational constraints). For a practical illustration of this idea, consider the following example. Suppose that an airport is an unregulated profit maximizer, and wishes to find a company to supply freight handling services. It will clearly choose the company that provides the services at the lowest cost. Now suppose instead that the airport doesn't know the costs of its potential service providers. The airport still has the objective of minimizing cost - expected cost - and does so subject the informational constraints it faces.

If a regulated firm faced the same objectives as our hypothetical unregulated firm, there would be no cause for concern to regulators *provided some key assumptions are met.* This is because by selecting the lowest (expected) cost supplier of services subject to informational constraints, the firm is able to charge a lower price to customers. In other words, the firm's actions in choosing a supplier are completely compatible with the objective of keeping customer prices low. [3]

The crucial aspect of the argument above was that the firm's objectives were correctly aligned with the goal of keeping customer prices low. In other words, it is crucial that the

[2] See for example, Chapter 7 of Laffont and Tirole "A Theory of Incentives in Procurement and Regulation", MIT press 1993.

firm wants to minimize the cost of the service or good for which it tenders. Now suppose that the firm is regulated. In this case, of course, the firm's objectives are determined by the form of regulation. Suppose the firm is subject to rate of return regulation, i.e.

allowed revenue = (operating costs) + depreciation + (allowed rate of return) x (rate base).

The cost of inputs provided by an outside supplier enter this equation as part of operating costs. A firm that faces this objective clearly does not have an incentive to exert effort to keep its operating costs low, since costs are returned to the firm regardless of their magnitude.

What can the regulator do about this situation? The traditional response has been to audit the firm on operating costs to check that they are sufficiently low before being allowed as part of revenue. Another method would be to prescribe the method by which suppliers are selected. This approach will work quite well if there is a simple objective measure of the service that is being provided, and there are no significant informational constraints. For example, if the contract is to supply a widget - and the quality of a widget can be easily and objectively measured - then all the regulator need specify is that the supplier of the lowest priced widget be selected. Of course, if widget quality can be objectively measured, and a record of the bids of potential widget suppliers is kept, then an audit will work well too. (In fact, the advantage of an audit is that it can be random and occur after the fact. It may therefore save regulatory enforcement costs).

If the quality of the good or service being supplied is difficult to measure, or if there are informational constraints, then the basic story is the same. Either some kind of audit, or prescription of a method for selecting a supplier will address the problem. The only difference with the case above (where quality could be easily measured), is that the selection method will be more complicated. Below, in our discussion of the theory of

3 There is a caveat to this argument, if the regulated firm has monopsony power in the market for services. If such power is extreme, then intervention in the tender design may be warranted to protect *sellers* rather than customers.

auctions, we explain the issues of tender design when firm objectives are not correct (as in the situation just described), and there is a cause for intervention by government.

We argued above that rate of return regulation does not give the regulated firm the correct incentives to choose an appropriate supplier. In general, as the type of regulation changes, so do the incentives of the regulated firm to select an appropriate supplier. Consider price-cap regulation. In principle, price caps are a form of what are called "fixed price" contracts. Simply speaking, the firm receives a price p for each unit of output it provides that is fixed and hence independent of current firm decisions. The firm must therefore pay costs associated with production. [4] Firms that are subject to such regulation clearly have the same objective as the private firm we examined above. Therefore, firms that are subject to true price-caps will have an objective that is compatible with consumer welfare.

There has been some recent debate as to whether price cap regulation behaves as a fixed price contract in practice. Regulators have an incentive to tighten regulation if the firm appears to be making too much profit, and the regulated firm has an incentive to make excessive claims for cost pass-through. To the extent that price cap regulation does not give the correct incentives in practice, it may be necessary for the regulator to have a role in prescribing the form of selection of suppliers.

We repeat the general principle that can be drawn from this discussion: If the regulated firm faces the full cost savings associated with choosing a supplier, then there is no need for regulators to be concerned. However, if the regulated firms incentives are different -and the degree of difference will depend on the type of regulation - there is an argument for the regulator to be involved in the supplier selection process, or in auditing the firm for the prudency of the costs it incurs. Exactly how the regulator should intervene will depend on the type of regulation and more generally on informational and other constraints.

[4] In some cases, cost pass-through is allowed, however.

The second question of interest flagged in the introduction was:

Is apparently favourable treatment of bidders in tendering inefficient?

It turns out that Even if a firm faces the correct objectives, it may be optimal for it to give some preference margin to incumbents (or others). Thus, observation of apparently favourable treatment is *not* necessarily a cause for concern by the regulator *provided the firms' objectives are to minimize cost.* For purposes of illustration only, consider the example of architectural firms that bid to design buildings in the private sector. Suppose that at stage 1 of the project, the firm Architecture Inc. was been chosen as the best supplier. Stage 2 of the project - for example another building that complements the first - could well require a firm that has a working knowledge of the stage I building, good relations with the building company and union, a knowledge of the constraints of the landscape etc. That is, Architecture Inc. has made certain investments at stage I that are specific to the stage 2 project. If Architecture Inc. is not awarded stages 1 and 2 of the project at the outset, it has an incentive to choose levels of these project-specific investments that are too low. Alternatively, it might be desirable to award a firm stage I and introduce an up-front preference margin for stage 2 at the beginning of the entire scheme.

With regulated firms the argument is similar. For example, a supplier of towage services to a port authority may tailor its capital to the particular port. Similarly, a supplier of freight handling services to an airport may make investments that are specific to that particular airport. An example would be investments in streamlining business dealings with airlines and airport employees, machines that are specific to the airport (e.g., that are located at the airports), or home locations decisions near the airport by trained employees and managers. The particular type of such investments is not important (and we are not suggesting that our simple illustration represents reality). What is important is the extent of specific investments that must be made. In general, the greater the degree of specific investments, the longer the term of the contract that should be awarded. In cases of more

[5] Alternatively, the airport may own the machinery.

extreme investments, it might be optimal for the airport itself to own the service supply company. [6]

In the context of a buyer bidding for supply, this argument supports the notion of giving an incumbent a bidding margin when tendering for supply, instead of long term contracts or ownership. For example, the incumbent could be given a 10% margin over its competitiors in the bid. In this way, if the incumbent becomes slack, it is still open to competition. However, it also has an incentive to make specific investments that would not be made in the absence of such a margin. It is important to note, however, that this system will only work if the supplier believes that the buyer will commit to awarding a bidding advantage. The buyer clearly has an incentive to undermine this contract after the seller has made the appropriate investments. Such undermining would be inefficient, since a firm would anticipate the problem, resulting in the same incentive to under-invest as when there was no preference margin.

The practical content of this argument depends on the value of specific investments that suppliers must make, and the sensitivity of of their incentive to supply such investments. This will vary across different cases. If there are very valuable and sensitive specific investments in a particular instance, this argues for longer term contracts or margins of preference in shorter term contracts. Finally, it is worth pointing out that a preference margin for an incumbent might appear to be unfair or favourable treatment. As mentioned, the reason for preference is to compensate the incumbent for prior specific investments, and indeed encourage that firm to make the investments in the first place. However, if preference margins are given, authorities need to be very careful to avoid the appearance of corruption. Examples of preference margins when there are domestic and foreign firms, are discussed in appendix B.

The third question raised in the introduction is

How important is the competitiveness of the tender system?

[6] See Joskow, P., "Contract Duration and Relationship-Specific Investments: The Case of Coal", American Economic Review, 77, 1987, 168 - 185.

This question has been addressed to some extent above where we argued that the competitiveness of the bidding process, or competitiveness ex-post (in the form of long term contracts or ownership) will optimally be restricted to the extent that specific investments are present. We also argued earlier that it is not the competitiveness of the tender per-se, but rather the objective of the buyer that matters. Even if there are very few parties bidding for the supply of a good or service, or if these parties are corrupting the system by colluding, a buyer with a cost minimizing objective will be doing its best to keep costs low, and this will therefore lead to the best outcomes for consumers (subject to the constraints of few sellers). There is no need for additional regulation of the buyer, although there may be some need for government to impose penalties if collusion can be detected. On the other hand, if there are few substitutes for the inputs to be supplied (e.g., there is some kind of bottleneck service), and there are very few or only one bidding companies, then a separate argument for regulation of the industry that supplies can be made.

2.2 Bidding for Access

With access issues, there is a single supplier and many potential buyers (as opposed to a single buyer and many potential suppliers in the case of tendering). If the supplier's costs are know, then it is a simple matter to regulate access: just set the access price equal to the marginal cost plus a premium to cover a reasonable return on capital. However, when the sellers costs are not known, and buyers valuations of access are not known - as might typically be the case - then such simple regulation is not possible. In this case, the economic theory and practice of auctions provides useful insights.

A typical auction that may be familiar, is the auction of art by Christies. The owner of the painting wishes to get the highest price. Potential buyers want to pay the lowest price possible. In this case, there can only be one winner, since there is only one painting. Consider the case of a franchise for the distribution of gas. The pipeline owner is the

[7] A more sophisticated version of this would be to require the supplier to implement a peak load pricing formula where if demand is less than capacity, then price equals operating an maintenance costs, but if demand exceeds capacity at this price, then the price is adjusted upwards to just ration demand to capacity. See Rees for a discussion of the optimality of this pricing scheme.

supplier. The good itself is an amount of capacity of the pipeline. The buyers are gas distribution companies that wish to have capacity so they can deliver gas to their franchise area. An auction could be used whereby distribution companies bid for gas capacity, much like art lovers bid for the painting.

Consider the first question on access from the introduction:

Will the firm provide access at efficient prices, i.e. what is the best way to ration access?

There is an analagous argument to the one we used for tendering in this case, though unfortunately much more fanciful! Consider a firm that is perfectly regulated. It charges price equal to marginal cost, and its capacity is chosen optimally. Suppose such a regulated firm auctions access to its capacity to competing firms, and its reserve price is set equal to its valuaton of the capacity. Firms that are unwilling to pay the price for bundles of access will not be able to enter the market. However, firms that do pay the auction-determnined price will enter the market, and will have to charge the same price as our unrealistically-well-regulated monopoly. As long as the auction allocates capacity efficiently, there is no cause for concern by the regulator of the practice of auctioning capacity. The regulated firm's objective will be to obtain the highest price for its capacity, and no less than its reserve price (which will reflect the normal return that the ideally regulated entity can earn).

The reader is (we hope) skeptical of the relevance of this example. Regulation does not operate perfectly. Regulated monopolies have objectives that diverge from social objectives. The tendency is for an owner of capacity to charge too high a price, and restrict entry of competitors. To achieve this with an auction, the regulated firm could set a high reserve price. In this way, such a firm can increase its own prices, because competing firms have either been deterred from entry, or have higher costs. Alternatively, the regulated firm might find it desirable to restrict the capacity it sells in the auction in order to achieve the same goal. An argument can be made, however, that if the regulatory

environment is optimal including the ex-post market structure - subject to informational constraints of the regulator, and both the reserve price and capacity have not been excessively manipulated, then the regulated firm's use of an auction to ration capacity will be desirable. This is because (like the fanciful example of the perfectly regulated firm) the optimally regulated firm that aims to get the highest price for its capacity subject to its regulatition-determined opportunity cost (equal to the reserve price), will be rationing (known and optimal) capacity to highest valued users, who then compete expost with the regulated firm.

To the extent that regulation works well, then, auctions will work well to ration capacity, provided reserve prices and the capacity on sale are chosen appropriately. If regulation does not work as well as we have described, then as with tendering (often referred to as 'procurement' in the economics literature), there is an additional role for government to intervene in its design (on top of monitoring reserve prices and capacity for sale). An understanding of the basic functioning of an auction is crucial in these circumstances.

The analysis of auctions is far from simple. Indeed, under the general area of mechanism design, it has become a separate branch of economics. [8] Auctions have been used to sell spectrum and treasury bonds in various countries, with a wide variance in the success rate. Some degree of technical detail is unfortunately unavoidable in this field: the consequences of a poor understanding of auctions have been disasterous in some cases. Unfortunately two particularly bad examples come from the Antipodes. The auction of cable TV rights in Australia allowed parties to make multiple bids, and included no penalty for withdrawal of these bids. The strategy adopted by bidders was to make a series of bids ranging from low to high, withdraw at will from winning high bids, leaving their lower bids in with a chance of winning. The acutal winner purchased a cable licence at a very low price, and subsequently sold it soon after for a very large profit. The second example was the use of a Vickery or second price auction for radio licences in New

g Mechanism design is the analysis, as the name suggests, of the design of mechanisms for dealing with incentive problems when there are informational and contractual constraints. See Myerson "Game Theory: Analysis of Conflict", Harvard 1991, and Laffont and Tirole, "A Theory of Incentives in Procurement and Regulation", MIT press 1993, for more detail.

Zealand. This auction awards the licence to the highest bidder who then pays the second highest price. Unfortunately, such an auction is quite susceptable to collusion. In fact, the winning bidder made a low bid, and the other participants bid zero!

These examples are situations where the government is directly selling assets to private firms. However, the lessons for the design of auctions cross over to the auctioning of access to capacity put into place by regulated firms. Regulators must be aware of the fact that auctions often need to be be designed very carefully, and with attention to the details of the specific market involved. Indeed, the experience with auctions has led one prominent expert in the field to declare strongly that the devil is in the details. [9] For this reason, and to address the questions asked in the introduction, our discussion presents an overview of the theory of auctions. Such a basic understanding is essential for an awareness of potential pitfalls.

3. An Introduction to the Economics of Auctions

Here we explain the main insights gained from the theory of auctions. We make the assumption that the goal of the buyer (e.g. a government or the regulated firm involved in procurement) is to pay the lowest possible purchase price (subject, clearly, to certain specifications, which can include technical requirements or quality standards). Recall that this objective is desirable for consumers of the product sold by the regulated firm, since this ensures lower prices. If the regulated firm does not have cost minimization as its objective, then our assumption is that the regulator wishes to design the tender to receive the lowest price.

Equivalently, we assume that when the regulated firm is a seller, its goal is to maximize revenue from the sale of assets, or of access to assets. (Recall that this is a reasonable objective if regulation, reserve prices and capacity are optimal.) In the case where regulation distorts the firms incentives, the regulator or some other government body will

[9] See Klemperer: "What Every Economist Should Know About Auction Theory" http://www.paulklemperer.org/index.htm

need to be involved in the design of the auction. In this case, we assume that the goal is to maximize revenue, subject to setting an appropriate reserve price for the regulated firm's capacity, and that there is an appropriate amount of capacity being auctioned. Setting reserve price and capacity appropriately ensure that the price of access will not be too high. With this constraint, maximizing revenue ensures that the regulated firm gets a reasonable return on its capital.

In this part of the paper we restrict ourselves to auctions in which the regulated firm is the seller and there are several potential buyers. It is important to point out that all the results also apply, with appropriate adaptations, to the case where the regulated firm is the purchaser and there are various potential sellers. In other words, the theory of auctions is general enough to encompass the case of tendering and procurement that we discussed above. l° This is explained in detail below in section 3.1.

Below, we will discuss the results on the expected revenue that auctions generate. In the case of tendering, these results translate into the expected cost that the regulated firm pays, and thus directly into the prices that consumers of the regulated product will pay. The goal of the regulator in keeping expected cost down, translates one for one to the equivalent goal with access of maximizing expected revenue (subject to reserve price constraints etc).

Note that auctions are universally used in privatization processes at the local, state and federal levels; in the assignment of subscription television licenses and cellular telephone concessions; and in the sale of dollars or government bonds by the Central Banks. We will sometimes explain auctions as if the central character is a privatizing government, rather than a regulated firm. The principles are the same.

The growing public interest in auctions are part of the international economic scenario. The recent sale in the United States of the frequency spectrum to be used for the next

'° In procurement or tendering, there is one buyer and many potential sellers. The buyer could, for example, calls out prices starting from zero, and sellers make bids as the price rises. The first seller to accept a price wins the auction.

generation of cellular phones - the PCS (Private Communication Services) - raised more than $20 billion for the government coffers. A similar sale in the United Kingdom brought in the equivalent of over $ 25 billion. Auctions have also been employed in privatizations in Eastern Europe, in the sale of public debt in over a hundred countries, and in the electric power market created by deregulation in many nations.

This growing popularity of auctions has sometimes been accompanied by a lack of understanding of their functioning and desirability. For instance, it is common to refer to the difference between the final bid and the minimum price as a premium. The problem with this terminology is that it appears to suggest the buyer paid more than the real value of the company or other asset. In reality, the price obtained at auction is the market price based on a balance between supply and demand. As will be explained shortly, the auction format and the nature of the restrictions on participation affect the price obtained, but this reflects the value attributed by the market to the asset given these restrictions. The rationality of establishing a minimum price will also be discussed.

Another example of lack of understanding of auctions is shown by the discussion in the press of "successful" bidders in privatization or asset access processes. To win an auction it is only necessary for the party to bid well above the price the market is willing to pay, a phenomenon known as the "winner's curse" - when the winner bids more than the true value of the asset in question. The true talent is in winning the auction at a price that is profitable for the buyer.

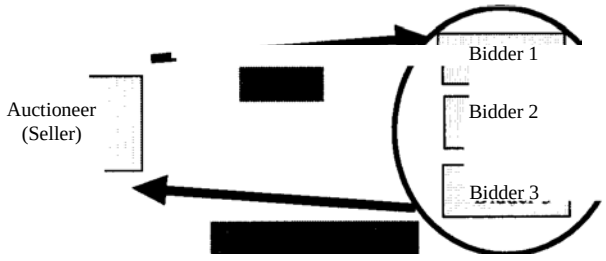
In this first part we answer a series of relevant questions in the context of auctions: What is an auction?; What is the reason for interest in auctions?; When should we use them?; What types exist?; What strategies should be used by bidders?; What is the best auction from the standpoint of the seller, or in the case of a public tender, the buyer?; Which type of auction maximizes the seller's revenue; How should auctions be formulated for access to assets when the government is concerned about consumer welfare (and the ex-post competitiveness of the industry after an access auction)?

In this section we consider the nature of auctions in more detail. An auction is simply a method to allocate scarce resources. Other methods include sale at a fixed price - just like at a supermarket or store, with no bargaining between the buyer and seller - and direct negotiation - such as the sale of a house or car. Unlike a fixed-price sale, in an auction the price is established by the interaction among the potential buyers.

To sum up, an auction is a mechanism to establish a price at which supply is equal to demand in a situation in which the seller does not know the price the various buyers attribute to the object to be sold. In an auction, the seller and each potential buyer know their own values or estimates for the object, but do not necessarily know those of the other participants. The seller wishes to obtain the highest price possible and the buyers want to win the auction paying the lowest price.

As an illustration, consider the following diagram:

Diagram 1: A Three Bidder Auction



There are three bidders, and one seller whom we call the auctioneer. The seller is in possession of an object for which the potential buyers bid. An auction mechanism is a process of allocating the object. Note that the object to be sold could be any kind of object. In the case of a traditional auction, the object might be a house or a painting. In the regulatory context, the object could be airport landing slots, the seller an airport owner and the buyers some airlines. In the case where the object is the right to provide a service of some kind, standard terminology is to describe the 'auction' as a tendering process. Thus, the 'seller' could be an airport that wants to choose a company to supply freight handling services. The 'object' is then the right to provide airport landing services. The price of the object is negative, in the sense that bidders are paid for their provision if they win the auction. All of the technical analysis that applies below to traditional auctions, are therefore also directly applicable to tendering.

3.2 - When should a seller resort to an auction?

An auction should be used to sell an asset for which there is no established market, that is, when the market is thin. For example, auctions can be used to sell unique objects, such as a painting or shareholding control of a company owned exclusively by the government, or in the sale of various objects, such as public bonds, subscription TV licenses, access to port facilities, airport terminals, or access to gas pipelines by distribution and transmission companies. In emerging economies, they are necessary due to the absence of prices that can serve as an appraisal basis for a company to be privatized. We discuss privatization in some of the examples below: note that sale of a whole asset is similar to sale of access to an asset such as airport terminals, telecommunications capacity etc. The difference is that there is one unit in the case of privatization, and many units for sale in the case of access.

An auction is more flexible than a fixed-price sale - where there is no short-term margin for variation in the price and where each customer is charged the same price - and quicker than direct negotiation - where the process of offer and counteroffer can be quite

drawn out. In terms of tenders, for example, as the government is generally a large buyer, it would pay more if buying at a fixed price with no quantity discount. The alternative of bargaining directly with the supplier, however, leaves room for corruption. Since an auctioneer must follow determined rules, the ability for a corrupt government employee to favor a determined company is reduced.

Auctions protect uninformed sellers. Instead of having to predict the market price, a government employee who has insufficient information about the potential value of the asset to be sold can simply let the competitors determine the final price.

Besides this, the seller - or a regulator in the case of asset access - chooses or can influence the auction rules. It can create an auction to sell something unique that has never been sold before. For instance, we have already mentioned the use of auctions for cellular telephone and PCS frequencies in the United States, United Kingdom and other countries.

Finally, auctions are generally efficient from an economic standpoint: the asset auctioned tends to go to the bidder that attributes the greatest value to it. In this fashion, a well-designed bidding process can ensure that the most competitive player emerges victorious.

3.3 - What types of auction are there?

There are various classifications of auctions. For example, we can distinguish between open outcry auctions - where the participants make their bids in public - and sealed-bid auctions - where bids are submitted in sealed envelopes. We can also distinguish between ascending and descending price auctions. Finally, we can differentiate auctions by the number of objects involved - a single item or many. Regardless of this diversity, there are four basic types of auctions for a single object: open ascending price, or English; open descending price, or Dutch; sealed highest-bid; and sealed second-highest bid, or Vickrey auction.

The English auction is open, with **rising** bids. The auctioneer announces the minimum bid (or reserve price) and the participants, through gestures or vocally, express their bids. The winner is the one whose bid is not topped by any other. This is certainly the most widely known type of auction, used in the sale of art objects, antiques, race horses, rare wines, as well as residential and commercial real estate. Despite its apparent simplicity, it is really quite complex, for there is a continuous flow of information during the course of bidding.

The Dutch auction is open but with **descending** bids. The auctioneer announces a high starting price, which is reduced successively by an automatic indicator. The winner is the one who yells "stop" or who makes the indicator stop (in the automatic version), and the price paid is that marked on the indicator. This format is used in the sale of flowers in Holland, fish in England and Israel, and foreign currency in some African countries.

In a **first-price sealed-bid** auction, the participants submit sealed bids and the winner is the one presenting the best offer (either the highest for purchasing or the lowest for supplying the good or service). This type of auction is generally used for the purchase of goods or services by the government - a public tender is nothing more than a descending bid auction where the winner is the one offering the good or service at the lowest cost.

A **second-price sealed-bid** auction is also known as a Vickrey auction since it was proposed by the economist William Vickrey, winner of the 1996 Nobel Prize. The winner is the participant with the highest bid, but he pays the equivalent of the second highest (or highest unsuccessful) bid. The contribution of Vickrey was to propose an auction in which the bid of each participant only affects the probability of winning but not the profit in the event of winning. This type of auction is in truth not very common, being used, for example, in the sale of rare stamps.

Other auction formats include all-pay, where all participants pay their bids and the winner is the highest bidder, and **hybrid auctions,** which involve combinations of different

formats, such as a rising-bid auction where the top two bidders are invited to take part in a highest-price sealed-bid "runoff." A good example of a hybrid auction was that employed in the sale of the companies resulting from the break-up and privatization of Telebras - the Brasillian telecommunications monopoly.

Besides this, when various objects are sold simultaneously or sequentially, auctions are used modeled on the basic formats described above. Government bonds are commonly sold through discriminatory price auctions, an extension of the first-price sealed-bid auction for the case of multiple identical objects. In this format, participants submit sealed bids consisting of price and quantity pairs. The auctioneer ranks the bids from highest to lowest price and allocates the bonds desired at the various prices to each bidder until all objects are sold.

3.4 - Basic auction models

The main element in modeling auctions is the presence of asymmetrical information. If there were complete information, i.e., the seller knew exactly the values attributed by each potential buyer of the object being sold, it would be trivial to design an auction to extract the highest price. The seller would only have to approach the buyer attaching the greatest value to the object in question and make a "take it or leave it" offer at any price between the first and second highest values. Consider the following diagram:

Diagram 2: Private Information in Auctions

Again, there are three bidders and one seller. Each participant (including the seller) has a personal valuation of the object to be sold that is private information represented by s;. Thus, the bidders do not know each others valuations, and do not know the seller's valuation. Neither does the seller know the bidders valuations. Private information means that the bidders have an incentive to bid strategically. For example, suppose buyers make open bids. Once a party bids, the other parties receive information about the value of the object. It might be that bidders valuations are independent. In this case, one party's bid may reveal to the other parties some information on their valuation. Such information will be useful for them in constructing their own bids. However, each bidder is aware of this process and may have an incentive to distort their bid in order to gain strategic advantage. It is the strategic processes that underlie bidding with asymmetric information that can make auctions difficult to design.

To analyse auctions in the face of such strategic behaviour, it is necessary to carefully specify an appropriate equilibrium concept. Due to incomplete information, the concept of adequate equilibrium in the context of auctions is the Bayes-Nash equilibrium proposed by Harsanyi.ll In this context, the strategy of each participant is a function of his private information and maximizes his expected profit given the strategies of the other participants and their estimates based on the information of these other players. [12]

In general, we analyze auctions taking their format as a given, and hence the behavior of the auctioneer is normally fixed. (The theory of auctions, however, permits us to study the effects, in terms of expected revenue and allocative efficiency, of changes in the auction format, including price rules, minimum bid setting, reserve prices, participation fees, etc.) The buyers, however, act strategically, calculating their bids so as to maximize their gain from participation, taking the format as a given.

There are three basic auction models. In the *private-value* model, each participant knows

[11] J. Nash, J. Harsanyi and R. Selten shared the 1994 Nobel Prize for economics for their work in the theory of non-cooperative games. J. Nash introduced the concept of equilibrium, which became known as the Nash equilibrium, where the strategy of a player is an optimal response to the optimal responses of the other players in a static context. J. Harsanyi extended this concept to static games with incomplete information, and R. Selten to dynamic games.

its valuation of the object (or objects) up for bid, but this value is only known to that bidder. As an illustration, consider an auction of a race horse, and assume that the potential buyers are stable owners who want the horse strictly for their own pleasure and thus are not interested in a future sale (or stud fees). The value of the horse for each bidder is simply a function of each one's individual taste, i.e., the valuation bidder A gives to the horse is independent of the other participants' valuations. This does not mean that the bids are independent: each individual must predict how the others will behave and respond accordingly. Note that the winner's curse does not apply here since there is no uncertainty as to the true value of the object - which in this case is different for each participant.

In the *pure common-value* model, the true worth of the object is the same for all players, but they each have distinct information regarding this value. For example, consider an auction for the right to explore a mineral deposit. The bidders will only know the size and quality of the mineral deposit after exploration. Each one has access to different geological information (signals) about the quantity and quality of the deposit, and based on these signals formulates an estimate. In this case a certain buyer would change its estimate if it discovered the signal of one of its competitors. In the private-value case, if one bidder discovered the preferences or information of another it would not change its estimate (its behavior in the auction, however, would change). Regarding the terminology employed, we refer to any model where there is a common component among the individual values as being a common-value model. In regulatory contexts, the object(s) being sold are access to infrastructure. Since such access generates returns to the company through sales to final customers, auctions of access to infrastructure are part of the common value model.

Finally, in a general model that takes in both previous models, each participant receives a private signal (information), although the worth this bidder attributes to the object is a general function of all signals. In the case of the sale of infrastructure access, these

iz For an excellent introduction to game theory, see R. Gibbons. 1992. Game Theory for Applied Economists. Princeton, New Jersey: Princeton University Press.

signals could include the state of demand for the product, the cost of labour or materials of the participants in the industry, or expected changes in the regulatory regime. Algebraically, in a model with *n* potential buyers, participant i who receives a signal sj would have a value v, (s, , ...,sl ,... ,s„) if he knew the private signals of all the other *n-1* buyers. In the private-value model, vi (s, _.,si ,. . . ,s,) is a function only of s;. In the pure common-value model, v; (s, _.,st ,..., sj , ...,s„) = v,{sl , ...,s; ,..., sj , ...,s,,) for all s; *,..., sn.* Sale of access to infrastructure is clearly a case of common values, since the information of all participants - on market conditions, regulatory uncertainty etc, would affect an individual buyer's future profitability, and hence that buyers valuation of the access.

3.5 - Bidding strategies

We now analyze the bidding strategy in each auction format. We start with the descending bid or Dutch auction. Although the description of this auction suggests treating it as a dynamic "game", the problem each bidder must resolve in choosing his optimal bid is essentially static in nature. Each bidder must choose a price at which he will stop the indicator, as long as no other bidder already has done so. The bidder choosing the highest price wins and pays that price. In this fashion, the descending auction is the strategic equivalent' [3] of a highest-price sealed-bid auction and hence participants will formulate their bids in similar form in these two auctions.

With private values, staying in a rising bid open outcry (or open English) auction until the price reaches the individuals private value is clearly a dominant strategy, i.e., a bidder will remain until the price reaches a point where he no longer cares if he wins the object or not. The second-highest bidder will drop out when his value is reached and the bidder attaching the greatest worth to the object will win and pay the equivalent of the second-

[13] This is to say that the set of strategies available to a bidder is the same in both auctions. Any strategy chosen generates the same expected profit in both types of auction as a function of the bids of the other players. For a formal definition of strategic equivalence, see R. Myerson. 1991. Game Theory: Analysis of Conflict. Cambridge, Mass.: Harvard University Press.

highest value. to

We now consider the strategies for formulating bids in a sealed second-highest bid, or Vickrey-auction. Vickrey's argument is that in this type of auction, a dominant strategy is for a bidder to offer an amount equal to the value he attaches to the object. The essential reason for this outcome, is that the payment of the second price by the winner removes any strategic advantage of bidding any other amount than one's true value: such a strategy can only make the bidder worse-off. is

Since making a bid equal to the value is a dominant strategy for the participants in a Vickrey auction, the winner will be that individual with the highest valuation, who will pay the equivalent of the second-highest valuation - in the same fashion as in an ascending price auction. For this reason, we sometimes refer to a rising price auction as a second-price auction.' [6]

An important element in choosing a strategy for taking part in an auction where the valuations have a component in common, is the presence of the winner's curse: each

[14] In reality, the winner will pay a bit more than the second-highest value since the auctioneer normally increases the bids by discreet increments. Nevertheless, for simplicity we assume that the price announced by the auctioneer increases continuously.
is To understand why, consider the problem of one of the bidders, say bidder number 1, who attributes a value vl to the object. Assume that the other bidders are making bids at random, and also that bidder 1 offers b, > vl, regardless of the bids of the others. If the maximum bid among the other players is lower than vi, then bidder 1 wins the object with a bid equal to *bl;* and thus also equal to vi. If the highest bid of the others is greater than *bl,* then bidder 1 loses when he would also lose with a bid equal to vl. Nevertheless, if the highest bid of the other players is higher than vl but lower than *bl,* bidder 1 wins the object but pays more than his value for it, wasting money. In this fashion, a player does not gain anything by bidding higher than his own valuation, but can lose. An analogous argument is valid to discard the possibility of a player's bidding lower than his valuation. This was Vickrey's insight in proposing an auction where the winner does not pay his bid, but instead the second highest.

[16] However, this strategic equivalence between the two auction formats is only valid with private valuations or if there are only two bidders. When the individual valuations have a common component or there are more than two bidders, the participants have the chance to update their estimates of the object's worth after observing other participants dropping out, and condition their behavior on this information. In this case, bidding strategies are truly dynamic, as oppose to the Vickery auction where there can be no updating of estimates.

bidder must recognize that he will be awarded the object only when receiving the highest signal - the most optimistic information on the value of the object - when the bidders behave symmetrically, i.e., individuals with similar information will submit similar bids. The consequence of ignoring the fact that winning means really having the most optimistic information on the value of the object can make the winner wind up paying more for the object than its true worth. This means that in equilibrium, the participants should adjust their bids downward. This phenomenon has been widely documented in many auctions.

Since the equivalence between descending and first-price sealed-bid auctions for a single object is general, and since ascending and second-price sealed-bid auctions are also equivalent under some conditions (and have similar properties under very general conditions), from this point on we will only distinguish between first- and second-price auctions. This information is useful, since it enables us to simplify our analysis of auctions that at the surface seem quite different.

3.6 - Which is the best type of auction for the seller?

The question of the best type of auction for the seller is particularly relevant in the case of privatization - i.e. sale of government owned assets to the private sector. [17] Note also that these auctions will also be best when a firm that is optimally regulated sells capacity to competitors, as long as the reserve price and capacity are appropriate.

Note that privatized firms are almost always subject to regulation ex-post, since one reason why these assets were in public hands in the first place, was to address concerns of monopoly pricing. As long as the regulation governing the soon-to-be-private firm are efficient - i.e. deliver the highest social welfare, and the reserve price is set appropriately, it is clearly optimal for the asset to be sold at the highest possible price that the

[17] Achievement of the highest possible revenue means that the government can levy lower taxes on other activities, and hopefully in so doing improve the efficiency of the economy.

government can get. However, if regulation of the future private firm was flawed, for example if the firm was able to charge prices that are too high, then the government would certainly be able to raise more revenue, but this would be at the expense of efficiency later on. The auctioned object in this case must be defined as an optimally regulated set of assets in order for revenue maximization from sale to be desirable. We will now consider the particulars of revenue raising by auction.

In the early 1960s, Vickrey introduced the analysis of expected revenue from auctions, an important factor in his winning the 1996 Nobel Prize. [18] Vickrey was the first to consider the strategic elements in determining individual behavior and the expected revenue from an auction. However, only at the end of the 1970s, with the contributions of R. Wilson, P. Milgrom, R. Weber, J. Riley, E. Maskin, W. Samuelson and R. Myerson, among others, was the theory of auctions developed more systematically. [19]

Vickrey demonstrated a special case of one of the most celebrated results of the theory of auctions, the Revenue Equivalence Theorem, later generalized by Myerson2°, Harris and Raviv21, and Riley and Samuelson 22:

> *Suppose that the potential buyers of an object are risk-neutralz3 and that their private information on the value of the object is generated independently, based on a common distribution function. Then any auction format generates the*

[18] W. Vickrey. 1961. "Counterspeculation, Auctions, and Competitive Sealed Tenders." Journal of Finance 16, pp. 8-37; and W. Vickrey. 1962. "Auctions and Bidding Games." In **Recent Advances in Game Theory,** pp. 15-27. Princeton, New Jersey: The Princeton University Conference.

[19] For an excellent summary of the state of auction thinking in the 80s, see P. McAfee and J. McMillan. 1987. "Auctions and Bidding." *Journal of Economic Literature 25, pp.* 699-738. In turn, a good overview of the current state of the theory of auctions can be found in P. Klemperer. 1999. "Auction Theory: A Guide to the Literature," *Journal ofEconomic Surveys 13(3), pp.* 227-286.

[2°] R. Myerson. 1981. "Optimal Auction Design," *Mathematics of Operations Research 6,* pp. 58-73.

[21] M. Harris and A. Raviv. 1981. "Allocation Mechanisms and the Design of Auctions," *Econometrica 49,* p. 33-64.

[2] J. Riley and W. Samuelson. 1981. "Optimal Auctions," *American Economic Review 71,* pp.381-392.

[23] Various factors affect the revenue generated by an auction. Among the most important we can mention the behavior of bidders in relation to risk: bidders can be risk-averse, risk-neutral or risk-loving. Suppose that an individual has to choose between the certainty of receiving R$ 1,000 and a coin toss where he either receives R$ 0 or R$ 2,000. A *risk-neutral* individual is indifferent, a *risk-averse* person will prefer to receive the R$ 1,000 and a *risk-lover* will take a chance on the outcome of the toss.

same revenue for the seller where: (i) the object is assigned to the individual with the highest signal; and (ii) the participant with the lowest signal receives an expected gain of zero.

Note that the above result is applicable both to the private and common valuation models, as long as the signals are independent. In the example of the sale of an artwork (in the private valuation model) this restriction implies that how much a potential buyer likes the object is independent of how much the other bidders like it. In the case of an auction for the right to explore a mineral deposit, this hypothesis requires that the geo-technical data received by the bidders be independent.

In this form, with independent signals and risk-neutral players, all traditional auctions (ascending, descending, first-price sealed-bid, second-price sealed-bid) generate the same expected revenue for the seller. Besides this, other less traditional auctions such as the all-pay described previously, generate the same expected revenue. Generalizations of the revenue equivalence result are presented in appendix A.

While it may seem that "all auctions are the same" in terms of expected revenue, it must be noted that these results hold under very special circumstances. In appendix A we explain the following (loosely expressed) results, among others:

(1) When bidders are risk averse, a first-price auction generates more revenue than a second price-auction. (Appendix A.2)
(2) When bidders signals are correlated (specifically affiliated), an ascending auction generates higher expected revenue than a second price auction, which in turn generates higher expected revenue than a first-price auction. The optimal reserve price is also lower. (Appendix A.3)
(3) With (non-drastic) asymmetric bidders, a first-price auction generates more expected revenue than an ascending auction, although it is not allocatively efficient. (Appendix A.4)

(4) When the seller is able to obtain royalties from the winning bidder, it can gain more expected revenue. (Appendix A.5)

Clearly, the design of auctions is no simple matter. Therefore, if government has a hand in the design of auctions are used to allocate assets or access to assets, a great deal of care needs to be exerted.

3.7- Collusion among bidders

A central concern of auction modelers, whether for selling assets or purchasing goods and services, is the possibility of collusion among bidders. 24 Ignoring for the moment the division of spoils amongst colluders, note that in a second-price auction the optimal plan involves a very high bid by a predetermined winner, while the other bid zero. No bidder has an incentive to deviate from this strategy. In a first-price auction, on the other hand, the winner designated by the group will make a very low bid, with all the others bidding zero. In this case there is a strong incentive for a bidder to break the deal to obtain the object at a low price and keep the surplus all to himself.25

It is important to determine if there is indeed an efficient mechanism, compatible in terms of incentives, that colluders can use to designate the winner and divide the resulting profits of the collusion when the bidders possess private valuation information. In truth, such a mechanism consists simply of the use of an informal auction among the members of the cartel prior to the holding of the real auction. The optimal policy of the auctioneer to prevent such collusion is strategic use of the reserve price. 26

Thus, we have,

24 For an excellent rundown of the circumstances under which there can be collusion in auctions and on the methods to detect this, see K. Hendricks and R. Porter. 1989. "Collusion in Auctions," *Annales D'Economie a de Statistique 15/16, pp.217-230.*

zs See M. Robinson. 1985. "Collusion and the Choice of Auction." *RAND Journal of Economics 16,* pp.141-145.

A first price auction is less prone to collusion among bidders than a second price auction. If there is suspected collusion, the auctioneer should use the reserve price strategically.

3.7.1 Collusion over time

Repeated auctions are more likely to lead to collusive equilibria. Moreover, this phenomenon is more likely to be present in repeated ascending and uniform price auctions than in repeated sealed-bid and discriminatory auctions. In ascending multiobject auctions, the agents can use the initial stages, when bids are still low, to signal the final allocation of the objects.27 Once reaching a consensus, the prices stop rising and remain at lower levels than would be the case with no collusion. In simultaneous firstprice sealed-bid auctions, unless there is "cooperation" from another competitor there is no chance for signaling or retaliation.

Uniform price sealed-bid auctions for homogenous objects are, in turn, vulnerable to implicit collusion. Since the unit price is determined by the lowest winning bid, the agents can reach tacit agreements to divide the market at favorable prices. In contrast, in discriminatory auctions, since each participant pays the value of its own bid for the quantity it obtains, a firm cannot use its bid as a veiled threat (seeking a collusive equilibrium) without risking having to pay.

Although some collusive tactics are illegal or could be made so, it is inherently easier to deal with this type of problem through the auction design rather than trying to apply complex rules that often wind up restricting the flexibility of agents without necessarily producing efficient results.

26 See P. McAfee and J. McMillan. 1992. "Bidding Rings," *American Economic Review* 82, pp. 579-599.

27 Klemperer (2000) (as per n.r. 40) reports an episode occurring during a spectrum auction in the United States in 1997. U.S. West was competing aggressively against McLeod for Rochester, MN (License 378). Although the majority of bids were in exact thousands of dollars, U.S. West entered bids of $ 313,378 for Waterloo, IA, and $ 62,378 for Marshaltown, IA, where McLeod was high bidder, apparently trying to punish it. Thereafter, McLeod stopped bidding on Rochester. For a detailed report of this episode, see Cramton and Schwarz, 1999. "Collusive Bidding in the FCC Spectrum Auctions". Working Paper, University of Maryland.

Another important focus of competition policy is to ensure that entry is not overly difficult. An auction with few bidders will tend to reduce the expected revenue of the seller, as well as being potentially inefficient.

In ascending auctions, the presumption that the bidder with the highest valuation will win can discourage the participation of relatively weaker competitors. This phenomenon can be aggravated by the costs of formulating bids. In both the independent private value and common value models, potential bidders (who could even win) often wind up being no shows. In the common-value model this problem is exacerbated due to fear of winner's curse. When an object has similar value to all bidders, each participant must be careful in bidding, realizing that its chance of winning increases along with its rising estimate of the object's true worth. Going up against a competitor that is assumed to have some advantage tends to heighten this realization, leading to a more cautious stance (since beating a strong opponent would suggest the possibility of having overbid). Aware of this, the bidder with the advantage can reduce its bid, meaning that its signal discouraged others. In summary, the "weak" agents become overly cautious, when participating at all, resulting in the strong agent winning most of the time, paying less than otherwise would be the case and thus reducing the seller's revenue.

Therefore, in ascending auctions, small advantages in valuation or even reputation by a strong participant can dramatically alter the outcome. This creates incentives to invest in creating a reputation that can discourage the entrance and participation of rivals.

In sealed-bid auctions, since each participant makes only one "best and final offer", the result is more uncertain. The firm with an advantage has no way to change its strategy (start with lowball bids that are increased only if necessary). Since it intends to profit, its bid will not be as aggressive as it would be in an ascending auction. This opens the door for the participation of comparatively "weaker" competitors, who encounter a relatively reduced winner's curse.

In synthesis, a sealed-bid auction can serve not only to attract more firms, but also can lead to more satisfactory results for a given number of firms. But there is a tradeoff in efficiency - a sealed-bid auction is less likely than a second-price auction to assign the good to the agent with the greatest valuation.

While ascending auctions, as discussed, can have problems with collusion and predatory activity, they tend to allocate the objects to the agents with the highest valuations, the definition of efficiency for an auction. They also permit the bidders to learn about the valuations of their opponents during the auction, which makes the agents more comfortable in their own valuations. This can imply increased revenue for the seller, of course absent collusion and predation.

This quandary of tradeoffs has led to the proposal of new auction formats. Klemperer (2000)28 argues in favor of a hybrid he calls the Anglo-Dutch format. With this mechanism, the auctioneer starts with an ascending auction until there are only two bidders willing to pay the current price. These two agents are then called to make a final best and last sealed bid, of not less than the current price, and the winner pays the value of its bid. The author's argument is that an Anglo-Dutch auction performs better in terms of expected revenue and can resolve some problems of incentives. The probability of selling to the agent with the highest valuation is greater relative to a pure sealed-bid auction since the Anglo-Dutch model reduces the number of participants entitled to bid in the first-price auction. Furthermore, each of the two finalists has had a chance to learn about the valuations of its opponent and also about the value of the object by observing the bidding in the first phase.

The Anglo-Dutch model eliminates the final stage of an ascending auction, in which there is only one excess bidder. This is the stage at which an ascending auction is particularly vulnerable to collusion and predatory activities. Sealed-bid auctions, in turn, induce

28 P. Klemperer. 2000. "What Really Matters in Auction Design". Mimeo, Nuffield College, Oxford University. Available at the site www.nuff.ac.uk/economics/people/klemperer.htm.

some uncertainty about which of the two finalists will win, which attracts entrants who know they will have a chance to attain the final stage.

Another hybrid mechanism with interesting properties was used in Brazil to privatize the companies created from breaking up the national telephone monopoly Telebras.29 This auction, which we will simply designate the Hybrid, also combines a sealed-bid and ascending auction, only in the opposite order. Each participant submits a sealed bid. If the highest bid is greater than the second-place one by a previously determined margin or percentage, that bid wins outright. If not, all participants whose bids are within that range of the highest bid take part in a final ascending auction with the best previous sealed bid being the reserve price.

Dutra and Menezes (2000-a)3° developed a model that captures some of the characteristics of this Hybrid auction. They modeled a situation in which three riskneutral agents compete in a two-stage auction: a first-price auction followed by a Vickrey auction when there are bids sufficiently near the highest first-price auction bid. In a situation where the potential buyers have just as much private as common valuation information on the object in question, the authors showed that this hybrid model can generate more revenue than any standard auction. The reason is that this auction can be seen as a Vickrey auction with an endogenously determined reserve price. Additionally, unlike the optimal auction, this hybrid auction is ex-post efficient.

The first-price auction which serves as the first stage of this hybrid mechanism attracts bidders. Based on the chance of winning outright in the first stage (since the Vickrey portion is only contingent), weaker participants may bid more aggressively. Faced with this knowledge, a strong competitor is also led to raise its bid. However, the desire to profit (which will cause a strong competitor not to bid as high as would be the case in a pure second-price auction), allied with the belief it has a good chance of winning the

29 Although several regional "baby Telebrases" were auctioned off, this Hybrid can be considered as involving a single object due to prohibitions on cross-holdings.

30 J. C. Dutra and F. M. Menezes. 2000-a. "A Hybrid Auction: Combining Sealed Bid and Ascending Auctions." Mimeo, Fundagao Getulio Vargas.

second-price auction, soften this tendency (a very aggressive stance would wind up reducing the incentive to enter).

Summarizing, because it employs a second-price auction, this hybrid retains the desirable property of allocative efficiency (laboratory experiments attest to this property, as shown by Dutra and Menezes (2000-b)31). In turn, the first-price auction in the first stage has the desirable properties of discouraging collusion and predatory behavior. In this fashion, the final price of the first stage can easily be higher than would result from a pure firstprice auction, even in the event the Vickrey auction does not occur.

Extending this format to multiple-object auctions, one can well argue that the sealed phase would hinder tacit collusion. In summary, we argue that hybrid auction mechanisms such as the Anglo-Dutch and the Hybrid used in the Telebras case, often combine the best of ascending and sealed-bid auctions.

3.8 Corruption between bidders and auctioneer

Besides collusion among bidders, another concern is collusion between a group of bidders and the auctioneer, more properly called corruption. The auctioneer is an agent of the seller and thus the possibility of corruption between the auctioneer and bidders exists. What can we say about the expected revenue from traditional auctions in the presence of corruption?

Consider a first-price auction in which the auctioneer approaches the winner and offers him the chance to reduce his winning bid (let us say 1 cent above the second-highest bid) in exchange for a bribe. With independent private values and risk-neutral bidders, this corruption will reduce the expected revenue, although in this case there be no allocative loss because the object will still go to the highest bidder. Now suppose the auctioneer approaches the loser and offers him a chance to raise his bid (say 1 cent above that of the

official winner). In this case there is loss of revenue and also the possibility of allocative inefficiency, because the object can be awarded to an individual who does not give it the greatest valuation.

Ascending auctions are less susceptible to corruption. Since the optimal strategy for each bidder in this type of auction is to tender a bid equal to his valuation, the individuals do not gain in revising this bid. [32]

Hence, we have

> *With a corrupt auctioneer, ascending auctions generate greater expected revenue than first price auctions, with independent private valuations and risk neutral bidders.*

3.10 - Auctions of various objects

The previous discussion focused on auctions of a single object. In the case of selling more than one good, simultaneously or sequentially, the auction literature is still in flux. An exception is the case in which each bidder wants only one of several identical objects. In this context, the Revenue Equivalence Theorem continues to hold with independent private valuations. [33]

Another special case already resolved in the literature is the extension of optimal auction

" J. C. Dutra and F. M. Menezes. 2000-b. "An Experimental Investigation of a Hybrid Auction Mechanism." Mimeo, Fundacao Getulio Vargas.

[32] See F. M. Menezes a P. K. Monteiro. 2000. "Corruption and the Choice of Auction Format," Ensaios Econ6micos EPGE no. 368.

[33] See F. M. Menezes. 1998. "Auctions of Identical Objects with Single-Unit Demands: A Survey," *Revista de Econometria 18(2), pp.* 309-340.

certain number of identical objects. In this case the insights of optimal auction theory as applied to a single object also apply to several objects, with appropriate adaptations. [34]

The literature on single-object auctions has established that under general conditions, an ascending auction is efficient in the case of unidimensional bidder signals, even in the presence of asymmetries and common components in the individual valuations. [35] However, as mentioned this is an emerging area. Without going into technical detail, a summary of findings is as follows:

> *The Revenue Equivalence Theorem and the results regarding the optimal auction can be extended to the analysis of auctions of various identical objects with independent private values, and symmetrical and risk-neutral bidders, as long as the demands are unitary. More generally, there is a consensus in the literature that the conventional formats of multiple-object auctions cause allocative inefficiency. The ascending auction described is efficient, although it can result in lower expected revenue for the seller.*

3.11: **Conclusion**

An auction can be seen as one of the purest forms of the market in operation, in which supply matches demand through a price determined by interaction between buyers and the seller. The theory of auctions - one of the most successful applications of mathematical economics and game theory - can assist in the choice or creation of an auction appropriate for the sale of goods for which there are no fixed markets and for government purchases of products and services, seeking to minimize its costs. Auctions protect uninformed sellers and inexperienced negotiators, as long as they understand the rules of the game. Besides this, auctions limit the opportunity for favoritism in government procurement.

[34] For more details on the conditions for validity of this result, see E. Maskin and J. Riley. 1989. "Optimal Multi-Unit Auctions," in F. Hahn (ed.), **The Economics of Missing Markets, Information, and Games,** pp. 312-335. Oxford: Oxford University Press, Clarendon Press.

[35] See E. Maskin. 1992. "Auctions and Privatization," in H. Siebert (ed.), Privatization, pp.115-136.

The principal lesson from auction theory for government purchases of goods and services is that the format can affect the expected revenue and allocative efficiency. Furthermore, we have shown that there is no general rule that can be always used to obtain the highest revenue (or lowest cost). Each case must be analyzed to determine which format is best, based on the desired objectives (maximizing revenue, minimizing cost, allocative efficiency, minimizing collusion among bidders or the possibility of corruption between bidders and the auctioneer, etc.) Nevertheless, some general lessons can be discerned.

When the bidders have independent information regarding the value of the object, as would be natural, for example, in the purchase of specialized consulting services, and the bidders are risk-neutral with symmetry among them, the auction format does not matter -any auction mechanism guarantees the same expected revenue. However, in the presence of asymmetries among the interested firms, a first-price auction minimizes the expected cost to the government. With symmetric but risk-averse firms, a first-price auction also is the most appropriate to minimize cost, but can result in allocative inefficiency. The chance for collusion among bidders suggests the choice of a first-price auction as well, which should be used in this case with the establishment of a reserve price.

In cases of independent information, we can again indicate the first-price auction as the most adequate. The only exception regards the possibility of corruption between bidders and the auctioneer. To minimize this chance, an ascending or second-price auction is most indicated.

We have argued in the appendix that with affiliated values, risk-neutral and symmetric bidders, as is natural in the purchase of common goods and services, we have seen that the ascending auction, among all conventional formats, generates the highest expected revenue for the seller (or minimizes the expected cost to the government). With risk-aversion, the ranking of auction formats in terms of expected revenue is ambiguous. Nevertheless, the revelation of information that inherently occurs during an ascending auction can be advantageous for governments that value transparency.

When there is a possibility for the government to observe, even if imperfectly, some information on the value of the object for the winner, such as in the auction of oil exploration rights, the expected revenue can be augmented through a system of royalties.

Finally, when various objects are being sold, such as government bonds, the theory of auctions as yet offers no definitive answer as to the best format. It has been shown, however, that conventional formats, such as the discriminatory auction and uniform price auction, can result in allocative inefficiency. A specific recommendation suggests the use by the government of ascending formats.

4. Final Comments and Policy Summary

This paper has presented an informal discussion of the literature on auction theory, and applied this to the case of regulated firms tendering for inputs or selling capacity, and similarly to governments that seek to privatize assets. From the discussion, it should be clear that there is a role for the government in the design of auctions when regulated firms are involved. In the case of tendering, it must be determined that the regulated firm has cost minimization as its incentive. In some cases, favourable treatment of incumbents is desirable.

When capacity is being auctioned, the situation becomes more complicated. If it can be determined that the reserve price is not too high, and capacity has not been unduly restricted, then a well regulated firm can be left to choose an auction format that maximizes expected revenue. However, if the regulated firm does not have the correct objectives, there is a need for intervention not only with regard to capacity and reserve price, but also for the appropriate design of the auction. Auction design is no simple matter. Unfortunately, there is no way around this: any what that is chosen for allocating objects can be considered as some form of auction. It is better to understand the complexity of the environment than resorting to an arbitrary allocation.

Appendix A: General Revenue Equivalence and Caveats

Here we consider generalizations of the revenue equivalence theorem, and conditions that undo the theorem. The discussion in this appendix is quite technical, and is included for completeness. If nothing else, we hope to convince the reader that the design of an auction in specific circumstances is not a trivial matter!

A.1 Generalization of Revenue Equivalence

Myerson extended the techniques utilized in the derivation of the Revenue Equivalence Theorem to determine, in the context of independent signals, the auction mechanism that guarantees the maximum expected revenue to the seller - the optimal auction. These techniques also can be employed in various traditional areas of economic theory, such as industrial organization, economic law, public finance, and mergers and acquisitions. [36]

Subsequently, Bulow and Roberts [37] clarified the relation between the theory of auctions and traditional economic theory by demonstrating that analysis of the optimal auction is equivalent to analysis of the problem of a monopolist that can practice third-degree price discrimination. It thus became possible to apply the standard logic of marginal cost versus marginal revenue to the problem of auctions.

Consider the case of a firm whose demand curve is constructed based on a set of buyers whose valuations are obtained from independent samples of a certain valuation distribution. When these buyer valuations are private and independent, the marginal revenue of a buyer is defined as the marginal revenue of the firm at the price that equals

[36] .this theme, the relationship between auction theory and traditional economic theory, is explored in detail by P. Klemperer, 2000. "Why Every Economist Should Learn Some Auction Theory." *Invited Lecture to 8th World Congress of the Econometric Society.* Available at www.nuff.ox.ac.uk/economics/ people/klemperer.htm.

[3'] J. Bulow and D. Roberts. 1989. "The Simple Economics of Optimal Auctions," *Journal of Political Economy 97,* 1060-1090.

the valuation of that individual. Bulow and Roberts, based on Myerson's analysis, demonstrated that under the hypotheses of the Revenue Equivalence Theorem, the expected revenue of an auction equals the marginal revenue of the winning bidder.

Hence, in an optimal auction the objects are assigned to the individuals with the greatest marginal revenues, analogously to a monopolist who can practice price discrimination and sells to buyers with the highest marginal revenues. Besides this, just as a monopolist will not sell at a price lower than that at which the marginal revenue equals the marginal cost, the seller should not sell at price lower than the valuation of the buyer whose marginal revenue is equal to the value the seller gives to the object.

We can conclude, then, that:

> *The optimal auction with independent private valuations when the participants are ex-ante symmetric (Le., when their signals are determined based on a common distribution) can be implemented through any traditional auction process (which attributes the object to the individual with the highest marginal revenue) as long as the reserve price is equal to the valuation of the bidder whose marginal revenue equals the valuation of the seller. The optimal reserve price is thus independent of the number ofpotential bidders..*

Observe that the optimal auction is characterized by a reserve price above the value the seller gives to the object .[38] This implies that the optimal auction cannot be efficient in the ex-post sense, i.e., there is a chance that the object will not be sold even when the bidder with the highest marginal revenue has a valuation above that of the seller. This is the case when the marginal revenue of this bidder is lower than the valuation of the seller. This is known as the trade-off between expected revenue and economic efficiency that arises from the theory of auctions.

[38] Recall that for a monopolist, the marginal revenue schedule lies below the marginal valuation schedule, hence, the valuation of a bidder whose marginal revenue equals the sellers marginal valuation, yields a higher reserve price than the seller.

As we have seen, the Revenue Equivalence Theorem depends on three important hypotheses: the risk neutrality of the bidders; the independence of the agents' signals; and symmetry, in the sense that the individual valuations or signals are determined based on random samples of a common distribution. Below we investigate the effects of relaxing these hypotheses one by one on the expected revenue from traditional auctions. We intend here to answer the question, What is the best auction for the seller outside the limits of the Revenue Equivalence Theorem?

A.2 The effect of risk aversion

The behavior of the agents regarding risk does not affect their strategies in formulating bids in second-price (or ascending) auctions. While in the case of independent signals and private values it is still a dominant strategy to bid one's valuation, in the case of a common valuation and independent signals the dominant strategy is to bid one's estimate of the value of the object conditional on that signal being tied with that of the opponent with the highest signal.

In a first-price auction, moreover, a small increase in the bid of a risk-neutral individual increases the probability of winning, even though it reduces the profit in case that individual wins the object. Therefore, since a risk-averse individual is willing to trade risk for expected value, he bids higher than he would if he were risk-neutral. Therefore, with independent signals and risk-averse bidders (if the seller is risk-neutral) a first-price auction is preferable to the seller, i.e. it raises more revenue in expectation.

What would be the preferred mechanism for a seller who is risk-averse when the bidders are risk-neutral? The equivalence of revenues implies that in a first-price sealed-bid auction, a bidder should offer the same as the expected value of the second-highest bid. (Remember that in both a second-price and ascending auction the winner pays the price established by the highest unsuccessful bidder). In other words, depending on the seller's signal, in a first-price auction the price is fixed, while in a second-price auction it is random, but with the same average as a second-price sealed-bid auction. Thus, regardless of the winner's signal, even though the average is the same, there is more price risk

inherent in a second-price auction. In this form, a risk-averse seller prefers a first-price to a second-price auction, and for similar reasons, prefers a second-price auction to an ascending one.

In summary, we have the following result:

> *With independent signals, a risk-neutral seller and risk-adverse bidders, a first price auction generates greater expected revenue than a second price or ascending auction. With independent signals, a risk-averse seller and risk neutral bidders, a first price auction generates greater expected revenue than a second price auction, which in turn generates more expected revenue than an ascending auction.* [39]

A.3 The effect of correlated signals

Which type of auction generates higher expected revenue when the private information of the agents is correlated? Myerson (1981) presents an example where the auctioneer manages to extract all the social excess as if he knew the valuations of the bidders. The mechanism functions as follows. The auctioneer offers each player a list of "bets", among which the player must choose in order to participate in the auction. This list is drawn up so that - regardless of the private information - the best choice results in zero participation profit for each bidder, and on choosing that "bet", the bidder reveals his type and all his surplus is extracted efficiently. [40] However, perhaps because they are difficult to implement, these optimal mechanisms are not used in practice. Thus, the need remains to compare the expected revenue from traditional auctions when information is correlated.

[39] For a generalization of this result and for a description of the optimal auction when the seller is riskneutral and the bidders risk-averse, see E. Maskin and J. Riley. 1984. "Optimal Auctions with Risk Averse Buyers." *Econometrica* 52, pp. 1473-1518.

[40] For a generalization of this result, see J. Cremer and R. McLean. 1988. "Full Extraction of the Surplus in Bayesian and Dominant Strategy Auctions," *Econometrica* 56, pp. 1247-1257. These authors in reality demonstrate that the possibility of designing an auction that will extract all excess depends fundamentally on the assumption that the bidders and seller are risk-neutral, the value distribution is common knowledge, the bidders are unable to act in collusion, and finally that the seller can believably and without cost implement the auction results, including collecting payments even from losing bidders.

Milgrom and Weber4l consider this question in a general model of auctions with affiliated information. The signals of the bidders are said to be *affiliated* when an elevated signal for one bidder makes elevated signals for the other bidders more probable. In general, affiliation implies positive overall correlation among the signals of the bidders.

The main result of this article is that an ascending auction generates more expected revenue than a second-price auction, which in turn results in more expected revenue than a first-price auction. Intuition says that the winner's surplus is related to his private information. The greater the degree to which price paid depends on the information of other bidders, the greater the correlation between the price paid and the winner's signal, given that the signals are affiliated. It so happens that the price depends on the information of all other bidders in an ascending auction with common valuation, on the information of only one other bidder in a second-price auction, and is not dependent on the information of other bidders in a first-price auction. Therefore, the lower the rent associated with the winner's private information (and thus the lower his surplus), the greater the expected price that will be paid by the winner and consequently, the higher the expected revenue received by the seller.

For this reason, if the *seller* has access to any private information, his best strategy is to pledge to reveal it. The principal that the sellers expected revenue is increased if the winners information (and hence payment) is affiliated with others' information, is known as the "linkage principal"

One of the most important results of analyzing optimal auctions with independent private values is that *the optimal reserve price is independent of the number of bidders* and is *higher than the value to the object to the seller.* The reason is that the optimal reserve price is determined by the equality between the marginal revenue and marginal cost (i.e., value to the seller), and in addition that the marginal revenue of a bidder is independent

4' P. Milgrom and R. Weber. 1982. "A Theory of Auctions and Competitive Bidding," *Econometrica 50,* pp. 1089-1122.

from that of other bidders when the values are independent.

In the case of *affiliated* values, however, an increase in the number of players implies a reduction in uncertainty about the valuation of a certain bidder conditional on the information of the other bidders. As a result, the marginal revenue curves are flatter and there is a greater proportion of bidders with marginal revenues above the seller's marginal cost (i.e., his valuation of the object). The reserve price is thus lower with affiliated values than with independent ones. In fact, when the number of bidders increases, the optimal reserve price converges to the valuation of the seller.42

In summary, we have:

> *With affiliated values, an ascending auction generates higher expected revenue than a second price auction, which in turn generates more expected revenue than a first price auction. The optimal reserve price of the seller is lower than the case of independent values and converges to the valuation of the seller as the number of bidders increases.*

A.4 The effect of asymmetries

With independent signals, we have already seen that the optimal auction is that which awards the object to the bidder with the highest marginal revenue and not necessarily to the one with the highest valuation. The traditional theory of demand establishes that a buyer with a given demand curve has a marginal revenue higher than that of another buyer with the same valuation from a demand curve that is higher due to a horizontal shift. Hence, a seller wishing to maximize his expected revenue will favor bidders whose valuations are determined based on lesser distributions. Simply put, the seller prefers to

42 See D. Levin and J. Smith. 1996. "Optimal Reservation Prices in Auctions." *Economic Journal 106, pp.* 1271-1283.

sell to "weaker" bidders. [43]

A first-price auction discriminates in favor of selling to the weakest bidder, since in this auction a participant whose valuation is determined starting from a sample of a "weaker" distribution will bid nearer his valuation than will a bidder whose valuation is determined from a sample of a "stronger" distribution. In contrast, a second-price (or ascending) auction always assigns the object to the individual with the highest valuation (in a model with private valuations). Thus, when all the hypotheses of the Revenue Equivalence Theorem are met with the exception of symmetry, a first-price auction can generate more revenue than a second-price auction, despite being less efficient in allocative terms. Nevertheless, general results do not exist, for they depend on the nature of the asymmetry.[44]

The effect of introducing asymmetry in the case where the individual valuations have a common component is even more dramatic. Consider a situation in which the valuation is nearly common, but has a small private component. Suppose that bidder 1 has a private valuation slightly higher than those of the other bidders. This player will bid more aggressively, which will strengthen the winner's curses of the opposing bidders (given that winning over an individual who bids more aggressively is bad news in terms of realization of the common valuation component of the object). In this fashion, his opponents will bid less aggressively in an ascending auction, which will result in a reduced winner's curse from the standpoint of bidder 1, who will bid even more aggressively, and so on. As a result, a small advantage in terms of the private valuation component for one of the bidders can result in a very large competitive advantage in an ascending auction, thus generating very low expected revenue in this context. [5]

In contrast, in a first-price auction, a small change in the symmetrical model results in a

[43] For an application of this argument in a context of government procurement, see P. McAfee and J. McMillan. 1989. "Government Procurement and International Trade." *Journal of International Economics* 26, 291-308.
[44] See E. Maskin and J. Riley. 1999. "Asymmetric Auctions," to be published in *Review of Economics Studies.*

small change in the equilibrium (symmetry), so that the individual with the greatest signal continues to win the auction, generating a higher expected revenue than in an ascending auction.

In summary,

> *With independent private valuations, as long as the asymmetry in the process of determining the valuations is not drastic, a first price auction generates more expected revenue than an ascending auction, although it is not efficient in allocative terms. With "nearly common" valuations, a first price auction dominates an ascending one in terms of expected revenue.*

A.5 Payment of royalties

In our discussion of auctions, we assumed that buyers' payments depend only on the bids given. However, if the value to the buyer could be seen afterward, even if imperfectly, the seller could increase his payoff by linking the payment of the winning bidder to this information. The reason is again the linkage principle: by associating the payment to the observation of the winner's information, the seller reduces the rent generated by the private information of that participant.46 In particular, the seller can use a royalty system to extract additional payments above the winning bid price.

Consider a public supply tender where the winner pledges to invest subsequently to reduce its costs. *47* Suppose that the government can observe the true cost of the winning bidder and that there are two dimensions - price and quality. The auctioneer uses a rule that assigns weights to price and quality to produce a "score". With independent costs, the Revenue Equivalence Theorem applies and the expected cost paid by the government in auctions of the two types: "greatest number of 'score' points wins and receives its

4s See P. Klemperer. 1998. "Auctions with Almost Common Values." *European Economic Review 42,* pP.757-769.
4 See J. Riley. 1988. "Ex Post Information in Auctions," *Review of Economic Studies SS, pp.* 409-430.
47 For example, a company winning a concession contract with some type of price cap must undertake to reduce costs and in this form increase its profitability.

cost" and "greatest number of ‘score’ points wins but receives the second lowest cost" is identical. More precisely, the optimal tendering process in this case is a point-assignment rule that understates quality in relation to the true preferences of the government, because this will cause firms to bid more aggressively. [48]

To summarize:

> *When some information on the valuation of the winning bidder can be observed ex post by the auctioneer, even if imperfectly, then it is possible to increase the expected revenue by introducing an additional payment conditional on this information. Analogously, through a point-assignment rule that values quality less than really desirable, the government can reduce the expected costs of its purchases because the participants are induced to behave more aggressively, submitting bids nearer their true costs.*

Appendix B: The economic theory of preference margins

Here we discuss the issue of preference margins for domestic firms. While not directly relevant to current issues in regulation, these issues will likely be relevant for future regulatory policy.

Discrimination in favor of domestic firms in government purchases **as practiced by many** countries. For example, a study by the European Commission covering Belgium, France, Germany, Italy and the United Kingdom showed that the percentage of government purchases from foreign suppliers ranged from 0.3% in Italy to 3.8% in Germany. The United States applies a 6% preference margin for domestic firms, while Australia, Canada and New Zealand establish, respectively, margins of 20%, 10% and 10%.

The very existence of the General Agreement on Government Procurement (AGP), (discussed in detail in Section 3) suggests that preferences for domestic products are, like

[48] See Y. K. Che. 1993. "Design Competition Through Multidimensional Auctions." *BAND Journal of Economics 24, pp. 668-680.*

import duties, seen as instruments to protect domestic industry. This analogy between preference margins for government purchases and import tariffs is inappropriate, for it omits the strategic element in a world with incomplete information. Thus, when a local firm has lower costs than a foreign one, in the absence of preferences it will generally have little competition. Preferences in this case induce more competitive bidding by the foreign firm. Indeed, one can argue that if the domestic firm has a cost advantage, any preference should be given to the foreign firm.

Below we discuss in greater detail the relationship between preference margins and government purchasing.

a) Preferences and trade

The following discussion is based on an article by Aaditya Mattoo.49 We begin with an analysis of the effect of preference margins on trade. There is an assumption that preference margins reduce imports and increase domestic output in comparison with free trade. However, Baldwin5° shows that preferential treatment for domestic firms is not effective because the shift in government demand to local companies is offset by a shift of private demand to imports. This reasoning does not hold when government demand, in the absence of preferences, is greater than domestic supply. In this situation, the increased demand for domestic production has the real effect of increasing domestic output and reducing imports.

Miyagiwa (1991)51 studied the effects of preferences in an imperfectly competitive economy. If the goods in question have perfect substitutes, the above conclusion remains valid. However, if the government pays domestic firms a premium proportional to the cost of importing, the preference increases imports. The reason is the strategic interest of

49 A. Mattoom, 1997, "Economic Theory and the Procurement Agreement", Chapter 3, in **Law and Policy in Public Purchasing, The WTO Agreement on Government Procurement,** B. Hoekman and P. Mavroidis, eds.
so R. E. Baldwin, 1984, "Trade policies in developed countries," in R. W. Jones and P. B. Kenen (eds.), *Handbook oflnternational Economics,* Vol. 1, Amsterdam: North Holland.

national suppliers in seeing the price of importation rise, as this will allow a higher price for the domestic product and thus increase their revenues from government purchases. The increase in import cost can occur by the restriction in sales to the private sector, which causes a rise - albeit lesser in degree - in sales of foreign products. In the new equilibrium, the loss of domestic firms in the private sector is compensated by increased revenue from sales to the government. If the goods are not perfectly substitutable, the same effect occurs but the effect on imports is not clear.

The above results assume that the government buys goods at the market price. If government demand is isolated from private sector demand, i.e., government purchases have a different price than the market price, the results are somewhat different. Three cases occur, in accordance with the shape of the marginal cost curve.

i) Rising marginal cost:

In this case, the transfer of government purchases to domestic firms weakens the competitive capacity of those that supply private demand. Hence, private purchases of foreign products increase and the final result on imports is ambiguous.

ii) Decreasing marginal cost:

In this instance, the transfer of government purchases improves the competitive position of private sector suppliers and reduces imports.

iii) Constant marginal cost:

In this case the shift of government purchases does not affect the equilibrium of the private sector and there is no effect on imports.

" K. Miyagiwa, 1991,"Oligopoly and Discriminatory Government Procurement Policy, " American Economic Review.81, 1321-1329.

At the international level, preferences that reduce imports can lead to retaliatory measures. A little-studied aspect of preferences is their effect on production of goods of lower quality or less in line with consumer tastes than imported goods.

b) Preferences and social welfare

Suppose that the government's goal is to maximize social welfare. Favoring national firms enters the picture here because their profits are part of the welfare function while those of foreign firms are not. McAfee and McMillan(1989)52 showed that the profits of domestic companies enter the welfare function with the same weight as the consumer excess - in the optimal case there should always be some preference for domestic firms. Fernando Branco(1994)53 concluded that this is also true if we consider the weights, between the consumer excess and the profit of firms, endogenously determined by the distortionary taxation. A more robust result of McAfee and McMillan(1989) showed that even if the government is indifferent to the distribution of domestic and foreign firms' profits, social welfare can improve with preference margins. This happens in a model with asymmetric information and imperfect competition. Assume that each firm knows its own cost but not the costs of other firms and that the government is ignorant of the costs of all firms. If a foreign firm has an average cost advantage, then to minimize the acquisition cost, the government should use preference margins. The symmetric result is also valid. If a domestic firm has a cost advantage, the preference margin should favor the foreign firm. This effect occurs because the preference margin requires greater competitiveness from the firm with a cost advantage. The work of Menezes and Monteiro(2000)54 presents another reason for preference margins: the lower loyalty of the foreign firm, reflected in a greater chance it will not fulfill its contractual obligations.

c) Considerations on calculating the economic benefit of using preference margins.

52 P. McAfee and J. McMillan, 1989, "Government Procurement and International Trade, " Journal *of International Economics 26*, 291-308.
53 F. Branco, 1994, "Favoring domestic firms in procurement contracts," *Journal of International Economics* 37, 65-80.
54 F. M. Menezes and P. K. Monteiro, 2000, "Porque favorecer firmas nacionais?", to be published in *Revista Brasileira de Economia.*

Calculation of the possible economic benefits of using preference margins is not straightforward. A fundamental reason for this is the change in strategies for equilibrium. The first step in this calculation is to identify the sectors in which foreign firms have been winning tenders. Then one checks to see in which of these the foreign firms have average cost advantages. The third step is to estimate theoretically or empirically the cost distributions of foreign and domestic firms. Finally, through theoretic calculations or simulations, the expected revenue is determined with and without preference margins. McAfee and McMillan (op.cit.) simulated uniform distributions with overlapping intervals for domestic and foreign firms. They obtained, for example, an optimal preference margin of 3.8% for a cost differential of 10%. They also found a savings of 1.5% when the cost advantage of the foreign firm is high (50%).

Naturally, the simulations of McAfee and McMillan are not necessarily appropriate in practice. Other distributions, such as the log-normal, might be more suitable.

d) Why does the AGP insist on the absence of preference margins?

Initially is must be pointed out that an agreement like the General Agreement on Government Procurement cannot be based solely on economic theory. Not only is theory constantly evolving, but more importantly, politics obviously plays an important role. The weakness of the economic theory concerning the use of preference margins arises partly because this theory is so short-term. The allocative effects of preferences can be perverse, as can be excessive capital spending by firms in countries with no comparative advantages. If the preferences have an effect, the domestic firms will win the competition more often than without preferences. A reason based on economic policy is that the gains from preferences can be seized by special interest groups and not in practice be of benefit to consumers in general. The preferences, then, can turn into a program of redistribution of wealth that is socially inefficient and unequal. Additionally, since preferences are used only in one sense (i.e., preferences for foreign firms are not used), from an international perspective preference margins can impede international

trade or bring retaliatory policies. Such retaliation will lead to reduced domestic and foreign social welfare, relative to the case where neither country uses these instruments.