# 5 Productivity in Food, beverage and tobacco products

Multifactor productivity (MFP) growth in the Food, beverage and tobacco products (FBT) subsector[[1]](#footnote-1) declined significantly between the last two complete productivity cycles — making the second largest negative contribution of any subsector to the MFP decline in Manufacturing (Petroleum, coal, chemical and rubber products making the largest). The decline in FBT MFP was driven by a slowdown in value added (VA) growth while there was a strong rebound in hours worked and continued growth in capital services. This chapter outlines the scope and size of FBT before examining factors likely to have influenced these changes in its VA, inputs and MFP growth.

## 5.1 FBT subsector scope and structure

FBT is the largest Manufacturing subsector — in 2009‑10 it accounted for 22 per cent of VA and 25 per cent of those employed in Manufacturing. FBT manufacturing includes processing of agricultural products but also more transformed products such as bakery and confectionery products. As well as providing finished goods for final consumption, it also provides intermediate inputs to other parts of the economy, such as retail food services and restaurants.

The FBT subsector includes two industry subdivisions under the ABS *Australian and New Zealand Standard Industrial Classification 2006* (ANZSIC06) — Food product manufacturing (‘Food’), and Beverage and tobacco product manufacturing (‘BT’). Food is the largest subdivision — 71 per cent of FBT’s VA and 87 per cent of FBT’s employment in 2009‑10.

There is a diverse range of products found within each subdivision. Food manufacturing includes nine ANZSIC groups, being the manufacture of meat and meat products, processed seafood, dairy products, processed fruit and vegetables, oils and fat, grain mill and cereal products, bakery products, sugar and confectionery products, and other food products (such as potato crisps, frozen meals, and pet food). BT includes two ANZSIC groups, being the manufacture of beverages (soft drinks, wine, beer, and spirits) and tobacco products. There have been some shifts in classification over time for the data presented, which can affect comparability (box 5.1).

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| Box 5.1 Industry classification for FBT |
| The FBT subsector consists of the following ABS *Australian and New Zealand Standard Industrial Classification* subdivisions and groups.  **ANZSIC subdivisions and groups within FBT subsector**   |  |  | | --- | --- | | Subdivision | Group | | **11 Food product manufacturing** | | |  | 111 Meat and meat product manufacturing | |  | 112 Seafood processing | |  | 113 Dairy product manufacturing | |  | 114 Fruit and vegetable processing | |  | 115 Oil and fat manufacturing | |  | 116 Grain mill and cereal product manufacturing | |  | 117 Bakery product manufacturing | |  | 118 Sugar and confectionery manufacturing | |  | 119 Other food product manufacturing | | **12 Beverage and tobacco product manufacturing** | | |  | 121 Beverage manufacturing | |  | 122 Cigarette and tobacco product manufacturing |   *Source*: ABS (*Australian and New Zealand Standard Industrial Classification, 2006,* Cat. no. 1292.0). |
| The shift from the 1993 edition of ANZSIC (ANZSIC93) to the 2006 edition (ANZSIC06) affects the extent to which data for FBT manufacturing can be compared over time. There were numerous shifts into FBT from outside Manufacturing and between industry groups within FBT — but the most significant change was moving non‑factory baking (for example, hot bread shops) from Retail trade to FBT manufacturing. Non‑factory baking is a large share of total Bakery — 46 per cent of VA and 60 per cent of employment in 2009‑10.  The year in which the ABS introduced ANZSIC06 differed across surveys. Only for some surveys did the ABS backcast data to increase comparability over time (that is, convert earlier ANZSIC data into ANZSIC06).   * Where possible, backcast data are used. However, it should be borne in mind that backcast data may not be as accurate as data collected on an ANZSIC06 basis. * Where backcast data are not available, it has been necessary to refer to unadjusted data. Breaks in series are identified and their implications noted.   Further details are provided in appendix G. |
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In 2009‑10, the largest contributor to Food VA was Meat and meat products, followed by Bakery products (figure 5.1, left panel). Within BT, Soft drink and Wine were of similar size, but more than half of total BT was Other beverages and tobacco (including beer, spirits and tobacco for which data were not separately available).

Differences in the labour intensity of production across types of FBT manufacturing lead to a different picture for employment shares (figure 5.1, right panel). In 2009‑10, Bakery was the largest employer, followed by Meat and meat products. Within BT, Wine was the largest employer, followed by Soft drink. Other beverages and tobacco had a considerably lower share of employment than of VA.

Figure 5.1 Composition of FBT value added and employment, 2009‑10**a**

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| --- | --- |
| *Value added* | *Employment (persons)* |
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a Industries are ANZSIC06 groups, except for Other beverages and tobacco that includes ANZSIC06 classes of Beer, Spirits and Tobacco products, for which data are not separately available (appendix G).

*Data source*: ABS (*Experimental Estimates for the Manufacturing Industry, 2009‑10*, Cat. no. 8159.0).

## 5.2 FBT’s MFP growth and its proximate causes

Between 1985‑86 and 2010‑11, FBT’s average MFP growth was ‑0.5 per cent a year. But there are distinct changes in the MFP trend over this period — MFP was fairly flat to the mid‑1990s, grew more strongly from the mid‑1990s to early 2000s, then declined considerably over the 2000s (figure 5.2). FBT had a fairly similar MFP trend to Manufacturing in total up to 2000‑01, but since then has declined much faster.

Figure 5.2 FBT and Manufacturing MFP

Index 2009‑10 = 100

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*Data sources*: Authors’ estimates; ABS (*Experimental Estimates of Industry Multifactor Productivity, 2010‑11*, Cat. no. 5260.0.55.002).

For the purposes of identifying the contributions of a subsector to MFP for Manufacturing as a whole, the cycles for Manufacturing in aggregate are used.[[2]](#footnote-2) Figure 5.3 shows that FBT’s average MFP growth was low over each cycle, but the strongly negative growth rate in cycle 4 was exceptional.

Over cycles 1 to 3, FBT MFP growth was (on average) just above or just below zero, because combined input growth was fairly evenly matched with VA growth. However, the proximate causes (changes in the volumes of VA, capital and labour) differed. Capital growth was positive and relatively strong in each cycle. Although hours worked growth was quite variable, it was lower than capital services growth in each of these cycles — which implies that FBT manufacturing became more capital intensive. VA growth was positive in all three cycles, but strongest in cycle 2.

Cycle 4 (2003‑04 to 2007‑08) was very different. VA growth was close to zero and there was a very strong increase in hours worked growth along with continued capital growth. Without an increase in VA in proportion to the increase in combined inputs, this produced a large decline in FBT MFP and explains FBT’s major contribution to the decline in MFP for Manufacturing in total. Also, in cycle 4, hours worked growth exceeded capital services growth — which marked a departure from the longer‑term trend of increasing capital intensity of production.

There was some improvement in VA growth in the incomplete cycle, but the absence of any further growth in hours worked was the key factor behind the slowdown in the MFP decline. Capital services growth was again greater than hours worked growth — implying a return to the longer‑term trend of increasing capital intensity of production. (However, as noted in chapter 2, some care is needed in the interpretation of the incomplete cycle since it may have been influenced by temporary factors, including the global financial crisis.)

Figure 5.3 Growth in FBT MFP and its proximate causes**a** by cycle

Average annual growth rate (per cent)

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a Capital services and hours worked weighted by income shares.

*Data source*: Authors’ estimates.

Focusing on the considerable decline in MFP growth *between* cycles 3 and 4 (that is, growth in cycle 4 less growth in cycle 3), it was the reduction in VA and the increase in the hours worked that were most significant (figure 5.4). At face value, the concurrent slowdown in VA growth and increase in the rate of hours worked growth (and continued capital growth) is a puzzle. The departure from the pattern of increasing capital intensity of production is also unusual. But as noted, FBT is made up of a wide range of activities which are subject to different pressures and which respond to these pressures in different ways and at different speeds. Changes in the composition of output may lead to shifts in the mix of inputs and change in the rate at which production capacity is utilised as output of some products grows and others contract. These factors can affect measured MFP.

Figure 5.4 Growth in FBT MFP and its components**a** in cycles 3 and 4

Average annual growth rate (per cent)

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a Capital services and hours worked weighted by income shares.

*Data source*: Authors’ estimates.

The remainder of this chapter looks at changes between cycles 3 and 4 in VA and inputs at a more disaggregated level. Influences on FBT’s VA and input use are examined in section 5.3. Section 5.4 provides a closer look at two specific parts of FBT — Wine and Bakery product manufacturing. Section 5.5 draws together the implications for FBT’s productivity.

## 5.3 Influences on FBT’s MFP growth

### Changing demand for Australian FBT products

Despite the diversity of FBT manufacturing, there are some broad influences on demand for its output. Shifts in consumer preferences have affected the demand for particular FBT products and the appreciation of the Australian dollar has reduced the competitiveness of domestic FBT products.

#### Consumers preferences for health benefits, convenience, quality and value

In high‑income countries, the potential for growth in domestic demand for food tends to be limited by low rates of growth in both population and per person consumption. Per person consumption tends to have relatively low responsiveness to income changes in developed countries (Short, Chester and Berry 2006). And average Australian population growth has been relatively stable over the last two complete productivity cycles (around 1.5 per cent a year).

However, changes in tastes (in some cases linked to higher incomes) can influence demand for particular foods and beverages and are likely to have reduced demand for some FBT products and increased demand for others. Box 5.2 provides a summary of some of the broad influences on food markets over the last decade.

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| Box 5.2 Broad trends affecting food markets |
| The Department of Agriculture, Fisheries and Forestry has identified a number of major trends over the past decade affecting how consumers shop and eat that have created significant but steady change in the food industry environment. These trends affect manufacturers, food service providers and retailers (as summarised in this figure from Spencer and Kneebone 2012, p. 13).    Business Monitor International (2009) noted that recent trends influencing Australia’s food‑processing sector are similar to those elsewhere in the developed world.  Consumers are driven by their demands for convenience, growing health awareness and the continued desire to trade up to premium and added‑value food products. (p. 27) |
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Of the range of factors identified by Spencer and Kneebone (2007, 2012) as affecting demand for food in general, those with the most direct implications for the product mix of FBT manufacturing are:

* increased demand for convenience or ‘lifestyle compatible’ products
* reduced meal preparation time — with a movement towards ready‑prepared components and full meals
* eating ‘on the go’ — with a movement towards snacking products and portion size products
* increased consciousness of wellness/healthy eating
* an increase in healthy eating options per product category
* increased focus on portion size products
* more complex tastes and preferences reflected in greater diversity of products and producers
* quality/premium/indulgence products
* specialised products
* value products (including private label products).

The net effect of these preference changes on overall demand for food and beverage products, and for particular product groups, is complex. For example, there are potential tradeoffs between preferences for healthy eating, convenience and premium/indulgence products.

The complexities of these changes, and differences in their timing across product groups, make them difficult to identify from the available statistics. However, anecdotal evidence suggests, for example, there has been strong growth in sales of private label products (box 5.3) and chilled ready meals (Kitney 2013). And a greater proportion of space in supermarkets has been allocated to fresh foods and convenience foods (Australian Food and Grocery Council 2011a, p. 16).

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| Box 5.3 Private label products |
| Private labels are brands owned by and produced on behalf of the retailer. The market share of private labels varies considerably by product, with higher shares for commoditised products where there is less scope for differentiation and branding.   * IBISWorld (2012) points to high market shares of private label products in butter, sugar, bread, milk and canned fruit. * The Australian Food and Grocery Council (2011a, p. 18) reports private label shares (for various years between 2007 and 2009) of around: 45‑55 per cent for sugar, milk and cream; 30‑40 per cent for cheese and bread; 15‑20 per cent for smallgoods, snack foods, canned fish and sugar confectionery; and 5‑10 per cent for yoghurt, ice cream and biscuits. * Richardson (2012) reports a higher impact of private label and retailer influence on the wine industry than the beer industry, which is much more concentrated and has higher levels of brand loyalty. IBISWorld (2011) reports that private label wine accounted for about 8 per cent of sales in 2010.   While present in the Australian market for some time, changes in consumer attitudes and retailer strategies have led to an increase in private label growth in recent years. Statistics on private label market shares in Australia vary (and generally include all supermarket sales, not just those of FBT manufactured products), but there is general agreement that the share has increased and is likely to grow further.   * The Australian Food and Grocery Council (2011a, p. 17) reports a steady increase in the private label share of total supermarket sales from about 15 to 25 per cent between 2003 and 2010, with further growth anticipated based on global trends. This accelerated growth was attributed to: unprecedented focus on affordability by consumers, cost pressures of manufacturing placing pressure on margins of branded manufacturers, high level of retail market concentration, improved private label product quality, enhanced retailer capabilities and increased sophistication of private label programs. * IBISWorld (2012) reports private label spending as a share of total supermarket sales in 2007‑08 at 13.5 per cent and 25.2 per cent in 2012‑13, with anticipated growth to 33 per cent in 2017‑18. There were particularly large increases in private label market share in butter, bread and canned fruit between 2002‑03 and 2012‑13.   While private label growth appears to have increased over cycle 4, it may have been a larger influence still during the incomplete cycle. Some analysts suggest that the global financial crisis prompted more consumers to shift to private label products (see, for example, NZTE 2012). |
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Market shares have also increased for ‘health conscious’ products and premium products. For example:

* Consumer demand for more expensive, imported and domestically produced premium and craft beer brands has increased. Premium beers only accounted for approximately 8 per cent of the total packaged beer market in 2002 (Robins 2002) but were reported to have increased in market share to almost 20 per cent in 2009 (Canaider 2009). Craft beers also grew from close to zero a decade ago to make up about 2 to 2.5 per cent of total current beer manufacturing (Bainbridge 2013).
* Sivasailam (2010) reported that confectionery producers, in recent times, have responded to changes in consumer preferences in developed markets for luxury or premium brands, as well as catering to more health conscious consumers. This has been seen in the growth in dark, organic and naturally produced chocolate, as well as sugar‑free confectionery.

It is likely that these changes in consumer preferences have affected not only the range of products produced but also the nature of the production process in some cases. For example, ‘boutique’ production, such as artisan bakery products and craft beer, occurs on a smaller scale than large factory production.

#### FBT net exports declined as the Australian dollar appreciated

The impact of the high Australian dollar has been identified by FBT manufacturers, together with domestic cost pressures and retailer strategies, as dampening their ability to compete both domestically and internationally (for example, Senate Select Committee on Australia’s Food Processing Sector 2012; Food Processing Industry Strategy Group 2012; Australian Food and Grocery Council 2011a).

As noted in chapter 2, the competitiveness of domestically produced goods will be affected by a range of factors including input costs relative to those of foreign competitors and the exchange rate. Imports and exports may also change as a result of constraints on domestic production. For example, imports may increase to meet domestic demand when domestic production is constrained because of reduced input availability during drought; or when current domestic capacity is insufficient to meet a steep, unanticipated rise in demand. Some goods are not produced in Australia and so will not directly compete with domestic production.

The appreciation of the dollar makes exports relatively expensive on world markets and imports relatively cheap on the domestic market. Consumers benefit from relatively cheap imported final goods. A stronger Australian dollar may also provide benefits to some FBT manufacturers through relatively cheap imported inputs (raw materials, services and capital equipment). The Australian Food and Grocery Council (2011a) acknowledged that a stronger dollar makes globally sourced commodities relatively cheap for Australian manufacturers. However, the Food Processing Industry Strategy Group (2012) suggested that for many food and beverage processors, these cost savings from imports are likely to only partially offset the impact of the high exchange rate on demand.

Import competition can provide incentives for firms to improve their efficiency and in the long run is likely to lead to improvements in industry productivity. More generally, trade helps support higher living standards by ensuring that an economy plays to its comparative strengths (box 2.2). However, in the short run, the effect on *measured* productivity may be negative. For example, when firms reduce output this can lead to underutilised capacity, which depresses *measured* productivity*.*

While Australia remains a net exporter of FBT manufactures, since the mid‑2000s there has been a reasonably rapid decline in the extent to which exports exceed imports as the Australian dollar has appreciated and remained high (figure 5.5).

Figure 5.5 FBT net exports**a** and the exchange rate**b**

2009‑10 $m (LHS); Index 2009‑10 = 100 (RHS)

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a Net exports is real exports less real imports. Due to ANZSIC classification changes, there is a break in series between 2005‑06 and 2006‑07. b The trade weighted index is the multilateral exchange rate $A against trade‑weighted average of trading partner currencies.

*Data sources*: Authors’ estimates based on ABS (*International Trade in Goods and Services, Australia,* various issues, Cat. no. 5368.0); and ABS (*International Trade Price Indexes,* various issues*,* Cat. no. 6457.0).

This deterioration in the net trade position was due both to a strong increase in import volumes and some decrease in export volumes. And in value terms, the share of domestic FBT production exported declined while imports as a share of domestic FBT sales increased (box 5.4). The extent to which different parts of FBT manufacturing are affected by these trends varies, which affects the composition of domestic output.

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| Box 5.4 Export propensity and import penetration in FBT | | |
| FBT manufacturing in aggregate is less trade exposed than some other parts of Manufacturing (such as Petroleum, coal, chemical and rubber products) — although this varies across different parts of FBT.  Most of total domestic demand for FBT products is supplied from domestic production rather than imports, and most of FBT output is destined for the domestic market rather than export. For example, in 2010‑11, export propensity for FBT in total was around 19 per cent and import penetration was around 12 per cent. But import penetration has increased and export propensity has decreased, particularly over cycle 4 (see figure).  It should be noted that these measures are in value, not volume, terms thus also reflect price movements. And the mix of goods produced domestically could vary significantly from the mix of goods that are imported or exported. Not all FBT imports compete directly with domestic production (for example, some may be products not produced in Australia). Some may be inputs into other domestic FBT production, although ABS (2013a) estimates of imports of food and beverages classified as ‘mainly for industry’ or ‘mainly for household consumption’ show that most of the increase in imports has been in final consumption goods rather than intermediate inputs (appendix G).  **Import penetration and export propensity in FBT**a | | |
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| a Import penetration is the value of imports as a share of the domestic market for FBT goods (which in turn is total sales and service income of domestic FBT manufacturing, plus the value of imports, less the value of exports). Export propensity is the value of FBT exports as a share of FBT manufacturing sales and service income. 1999‑00 is from PC (2003) and may not be directly comparable because of changes to the scope of the survey from which sales and service income is derived.  *Data sources*: PC (2003); authors’ estimates based on ABS (*International Trade in Goods and Services, Australia,* various issues*,* Cat. no. 5368.0); and ABS (*Australian Industry*, various issues, Cat. no. 8155.0). | | |
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#### Possible implications for measured productivity

In principle, there are two main ways in which the changes in demand (as a result of consumer preferences and the appreciation of the dollar) might reduce measured MFP.

* Changes in the composition of output can affect the measure of *aggregate* FBT MFP to the extent that different types of FBT manufacturing have different MFP levels. If the shift is into types of production with lower levels of productivity (that is, more input intensive per unit of output), this can reduce aggregate productivity.
* As noted above, during the process of adjusting production levels, producers reducing output may underutilise inputs (and possibly have to write off capital) but these inputs remain ‘on the books’ for productivity statistics. As other producers increase their output they employ additional inputs. Overall, this can result in input growth in excess of output growth, depressing measured aggregate productivity.

The diversity of the output produced, and of the inputs employed, by FBT manufacturers means that the nature and/or timing of change in the composition and volume of output can vary. The following sections use available data to examine the changes in VA, labour, and capital across the range of FBT manufacturing groups.

### Slowdown in value added growth and change in its composition

Real VA[[3]](#footnote-3) growth for FBT in aggregate was almost nil over cycle 4 (0.2 per cent a year), compared with cycle 3 (1.2 per cent a year), based on ABS National Accounts estimates (figure 5.6, left panel). But this conceals differences within FBT.

It appears that change in the Beverages and tobacco products (BT) subdivision was the main driver of FBT’s real VA growth in cycle 3 and its slowdown in cycle 4 (figure 5.6, right panel). BT’s real VA growth was 6.2 per cent a year over cycle 3, but fell to ‑2.0 per cent a year over cycle 4. This pattern was reversed in Food — with little growth (0.2 per cent a year) over cycle 3, but growth of 1.9 per cent a year over cycle 4. However, it should be noted that these subdivision estimates are only indicative, since they are based on a different data source to the National Accounts aggregate for FBT and are subject to data limitations.[[4]](#footnote-4)

Figure 5.6 FBT real VA**a**

2009‑10 $bn and average annual growth rate (per cent)

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| --- | --- |
| *National accounts*b | *Based on Economic Activity Survey*c |
|  |  |

a The charts in left and right panel are from different data sources and there are some differences in trend. Disaggregated data are not available from the ABS National Accounts. See appendix G for details. b Chain volume measure. c Nominal data adjusted for breaks in series in 2000‑01 and 2006‑07 and deflated using the producer price index for output. To the extent the output and intermediate input prices have grown at different rates, this derived VA series will differ from a double deflated series (such as FBT real VA from the National Accounts). This affects the BT series more than that for Food (appendix G).

*Data sources*: Authors’ estimates based on ABS (*Manufacturing Industry, Australia,* various issues, Cat. no. 8221.0); ABS (*Experimental Estimates for the Manufacturing Industry*, various issues, Cat. no. 8159.0); ABS (*Australian Industry*, various issues, Cat. no. 8155.0); ABS (*Producer Price Indexes, June 2012,* Cat. no. 6427.0); and ABS (*Australian System of National Accounts, 2010‑11*, Cat. no. 5204.0).

Reliable estimates of real VA at a disaggregated level below Food and BT are not available, but nominal VA data for ANZSIC groups provide some further indication of the areas of a slowdown in growth within those two subdivisions (figure 5.7).[[5]](#footnote-5) In broad terms:

* Seafood, Oil and fat, and Wine had absolute declines in nominal VA in cycle 4, after growing in cycle 3. (Given the large contribution of Wine to the slowdown in nominal VA growth, it is examined in more detail in 5.4.)
* Fruit and vegetable processing, Sugar and confectionery, and Other food manufacturing had slower growth in cycle 4, compared with cycle 3.
* Soft drink, Dairy, Meat, and Grain and cereal had faster growth in cycle 4 than cycle 3. For Bakery, the addition of non‑factory baking from 2006‑07 distorts the comparison. (Bakery is also examined in more detail in section 5.4.)

Figure 5.7 FBT nominal VA**a** by ANZSIC group

$m

|  |  |
| --- | --- |
| *BT — growth rate higher in cycle 4* | *BT — growth rate lower in cycle 4* |
|  |  |
| *Food — growth rate higher in cycle 4* | *Food — growth rate lower in cycle 4* |
|  |  |

a Blanks indicate break in series: shift to management units in survey in 2000‑01; shift to ANZSIC06 in 2006‑07; and in the case of beverages missing data for wine and other BT in 2000‑01. See appendix G for details.

*Data sources*: ABS (*Manufacturing Industry, Australia,* various issues, Cat. no. 8221.0); ABS (*Experimental Estimates for the Manufacturing Industry*, various issues, Cat. no. 8159.0); ABS (*Australian Industry*, various issues, Cat. no. 8155.0).

#### Changing consumer tastes shifting the composition of domestic FBT value added

As noted above, changes in consumer preferences for particular characteristics — such as health, convenience, quality, value and diversity — can affect the composition of demand for food and beverage products. It is difficult to be precise about the timing and extent to which manufacturers in different parts of FBT are likely to be affected by, and respond to, these preference changes. There is the potential for positive and negative effects from changing consumer preferences on different parts of FBT manufacturing.

* Preferences for quality, convenience and ‘lifestyle‑compatible’ products may result in an increase in value adding. The Australian Food and Grocery Council (2011b, p. 47) noted that prepared meals that are sold at supermarkets or specialist food retailers generally have higher levels of processing. This can include meal kits, which have the components of a meal assembled and prepared for cooking, and ready to eat meals that are pre‑cooked.
* If changing consumer preferences led to some shift in demand from processed food products to fresh produce (such as unprocessed fruit and vegetables), then, in statistical classification terms, this would appear as a decrease in demand for Manufacturing output and an increase in demand for the output of the Agriculture sector.
* The effect of consumer preference shifts on Australian FBT manufacturers will also depend on the relative competitiveness of Australian producers and international producers. (Changes in detailed exports and imports are discussed in the next subsection.)

Figure 5.8 shows that there has been some shift in the composition of nominal VA[[6]](#footnote-6) between FBT groups over cycles 3 and 4. Between 2003‑04 and 2007‑08, in particular:

* Soft drink, Bakery, Dairy and Meat have increased in share
* Seafood, Oil and fat, Grain and cereal,[[7]](#footnote-7) Fruit and vegetable processing, Sugar and confectionery, Other food, Other BT (including Beer) and Wine have declined in share.

However, it is difficult to link these changes in composition with shifts in consumer preferences. The extent to which consumer preferences have changed between cycles 3 and 4 is unclear, and many of the changes between products will occur within the ANZSIC groups/classes for which data are available, rather than between them.

Figure 5.8 Composition of nominal VA in FBT by ANZSIC group**a**

Percentage shares of total FBT

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a Shaded blocks indicate break in series: shift to management units in survey in 2000‑01; missing data for 2000‑01 for Wine and Other BT, and shift to ANZSIC06 in 2006‑07 (which particularly affects Bakery).

*Data sources*: ABS (*Manufacturing Industry, Australia,* various issues, Cat. no. 8221.0); ABS (*Experimental Estimates for the Manufacturing Industry*, various issues, Cat. no. 8159.0); ABS (*Australian Industry*, various issues, Cat. no. 8155.0).

A further complicating factor is that it is difficult for measures of real output to fully reflect changes in the quality of FBT products. Real VA growth for FBT in aggregate may be understated if improvements in quality (including convenience) have increased over time and are not fully reflected in VA measurement (box 5.5).

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| Box 5.5 Issues in measuring change in the quality of output |
| For the purpose of measuring productivity, improvements to the quality of outputs or inputs should ideally be converted into quantity changes, before MFP is estimated. Unmeasured improvements to the quality of outputs would cause an understatement of the volume of output and therefore measured MFP would understate genuine improvements in productive efficiency.  Output volumes are ‘backed out’ from production valued at market prices. The ABS formulates price indexes for groups of products to do this — and it aims to take account of changes in the quality of products so that the price indexes reflect price inflation rather than payment for improved quality. This requires that products are distinguished from other similar products of lower quality. However, there are some practical limitations to this process. For example, for new products there may be a lag before they can be included in the price index; and with frequent changes in the quality of products it is almost impossible to adequately adjust for all quality changes (see ABS 2006a for further details).  If the rate of quality change is fairly constant over time this measurement issue may not be a major influence on MFP trends, but if the pattern of quality change is variable it may be more important. |
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##### Tradeoff between productivity and profitability is difficult to establish with available data

As discussed in chapter 2, an increase in profitability concurrent with a decline in MFP for an industry sector or subsector may indicate that there was some shift in the composition of output towards products with lower measured productivity levels but higher levels of profitability.

For FBT in aggregate, however, there is no consistent relationship between change in productivity and profitability (ratio of profit to capital stock) over the longer term (figure 5.9). And there is also no clear relationship[[8]](#footnote-8) over cycle 4 between productivity and profitability (which is more volatile). These aggregate measures may conceal offsetting effects across different parts of FBT. However, insufficient data are available with which to examine profitability over time for groups within FBT.

Figure 5.9 FBT MFP and profitability**a**

Index 2009‑10 = 100

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a Profits based on company profits only (does not include unincorporated businesses with fewer than 20 employees), while the capital stock is for all FBT manufacturers. However, the trend is not likely to be materially altered by this exclusion. ABS business count data (*Counts of Australian Businesses, including Entries and Exits, June 2003 to June 2007*, Cat. no. 8165.0) suggest that unincorporated businesses are only around 10‑15 per cent of businesses in FBT over cycle 4. And an alternative measure of profit from ABS (Cat. no. 5676.0) which includes imputed profits for unincorporated businesses — gross operating surplus — shows a similar trend to company profits.

*Data sources*: Authors’ estimates; ABS (*Business Indicators, Australia, June 2011,* Cat. no. 5676.0).

#### Declining net exports in FBT products and lower VA growth

The decline in net exports of FBT products (as noted in figure 5.5) was the result of both a decline in exports and an increase in imports (figure 5.10). Over cycle 4, export volumes fell by an average of 1.4 per cent a year, while import volumes grew at 9.4 per cent a year. (This compares with positive export growth of 4.6 per cent a year and slower import growth of 7.9 per cent a year over cycle 3). These changes contributed to the slowdown in VA growth over cycle 4. In the incomplete cycle, which included the global financial crisis, exports continued to contract and imports continued to grow (albeit at a slower rate), but average VA growth increased.

These trends are consistent with the OECD reporting a decline in Australia’s revealed comparative advantage[[9]](#footnote-9) in FBT manufacturing over the 2000s, particularly from 2005 to 2008 (OECD.Stat 2013).

Figure 5.10 FBT imports and exports**a**

2009‑10 $m

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|  |

a Due to ANZSIC classification changes, there is a break in series between 2005‑06 and 2006‑07.

*Data sources*: Authors’ estimates based on ABS (*International Trade in Goods and Services, Australia,* various issues, Cat. no. 5368.0); and ABS (*International Trade Price Indexes,* various issues*,* Cat. no. 6457.0).

Within FBT manufacturing, trade performance varied considerably. The largest declines in net exports (in nominal terms[[10]](#footnote-10)) were in beverages, processed seafood, processed fruit and vegetables and other food (which includes sugar and confectionery, and other food not elsewhere classified) (figure 5.11). These are FBT groups identified as having lower VA growth over cycle 4 compared with cycle 3. In most of these cases it was higher imports rather than lower exports that contributed more to the decline in net exports — only in Seafood was there a large decline in exports. By contrast, net exports increased in Meat (which had increases in exports in excess of the increase in imports). This FBT group had higher VA growth over cycle 4 compared with cycle 3.

Figure 5.11 Net exports by FBT product group**a**

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| *Declining net exports over cycle 4* |
|  |
| *Relatively stable or increasing net exports over cycle 4* |
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a Nominal exports less nominal imports. Trade classification used here differs from ANZSIC classification used elsewhere in chapter. Exports are classified according to the Australian Harmonised Export Classification and imports are classified according the Harmonised Tariff Item Statistical Code (see DAFF 2005a, p. 35 for details).

*Data sources*: Authors’ estimates based on DAFF (2002, 2008, 2013).

To the extent that changes in trade differ across particular FBT product groups, the overall decrease in net exports will affect the composition of domestic FBT production. It may also affect capacity utilisation (this is discussed later in the chapter in the section on capital).

#### Value added in FBT manufacturing in aggregate did not fall in severe droughts

Given the role of agricultural produce as an input into FBT manufacturing,[[11]](#footnote-11) there is the potential for drought to affect the output of FBT manufacturers. There was a severe drought year in both cycle 3 (2002‑03) and cycle 4 (2006‑07). Agriculture VA dipped in these years but VA for FBT *in aggregate* did not (figure 5.12). However, the period of slow VA growth in FBT did coincide with an extended period of below average rainfall from 2001‑02 to 2008‑09, suggesting some link with agricultural performance.

The parts of FBT closely associated with the processing of current agricultural output are the most likely to be affected by drought. For example, the 2006 drought affected wine production including in 2007‑08 (this is discussed further in section 5.4).

Figure 5.12 Value added in FBT and Agriculture,**a** and rainfall

Index 2009‑10 = 100 (LHS); Millimetres (RHS)

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|  |

a Chain volume measures.

*Data sources*: ABS (*Australian System of National Accounts, 2010‑11*, Cat. no. 5204.0); Bureau of Meteorology (2013).

#### Limited information on change in intermediate inputs

VA can also be reduced if there is an increase in the volume of intermediate inputs used to produce a unit of output.[[12]](#footnote-12) Anecdotal evidence suggests that over the longer term there have been some changes in the nature of products and requirements from retailers and regulators that may have increased the ratio of intermediate inputs to output for some FBT manufacturers, such as:

* increased packaging due to smaller product or portion sizes and retailer requests for ‘straight to shelf’ packaging to reduce labour costs in stocking shelves (Food Processing Industry Strategy Group 2012, p. 83)
* increased commercial quality audits and regulatory food safety audits, with some duplication of coverage (Senate Select Committee on Australia’s Food Processing Sector 2012; Food Processing Industry Strategy Group 2012, p. 106).

However, the influence of these factors in cycle 4 compared with cycle 3 is not known. Insufficient data are available with which to examine change in the ratio of intermediate input to output in *volume* terms. ABS data suggest that over cycle 4 the ratio of intermediate inputs to sales in *value* terms has not changed significantly for FBT manufacturing in aggregate, or for the Food and BT subdivisions within it (figure 5.13). (In value terms, the ratio will also be influenced by changes in the relative price of inputs and outputs.)

Figure 5.13 Ratio of intermediate inputs**a** to sales and service income**b**

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a Intermediate inputs includes purchases of goods, materials and services. b Data not readily available for 1998‑99. 2003‑04 estimates based on ANZSIC93 and 2007‑08 based on ANZSIC06.

*Data sources*: Authors’ estimates based on ABS (*Manufacturing Industry, Australia, 2005‑06*, Cat. no. 8221.0); and ABS (*Australian Industry, 2007‑08,* Cat. no. 8155.0).

### Hours worked

The main proximate cause of the decline in FBT MFP growth between the last two complete productivity cycles was the turnaround in hours worked — from a fall in hours over cycle 3 to significant growth over cycle 4.[[13]](#footnote-13)

Hours worked (and numbers employed) in FBT were relatively stable over cycle 3, compared with the increasing trend up to the mid‑1990s (figure 5.14). However, there was a decline in 2003‑04 (which is the final year of cycle 3 and the first year of cycle 4). There was some volatility in hours worked and employment during cycle 4, but both were considerably higher in 2007‑08 than 2003‑04.[[14]](#footnote-14) Labour input remained relatively stable at this higher level in the incomplete cycle.

Figure 5.14 FBT employment and hours worked**a**

Index 2009‑10 = 100

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a Hours worked annualised and adjusted for public holidays and changes in survey methodology (appendix A). Unadjusted employment numbers.

*Data source*: Authors’ estimates based on ABS (unpublished Labour Force Survey data).

Figure 5.15 Contributions of FBT subdivisions to average annual growth in total hours worked in the FBT subsector

Percentage points

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| --- |
|  |

*Data source*: Authors’ estimates based on ABS (unpublished Labour Force Survey data).

FBT hours worked were dominated by Food manufacturing rather than Beverage and tobacco manufacturing. And in both cycles 3 and 4, the change was almost solely due to the Food manufacturing subdivision (figure 5.15).

Explanations put forward for the decline in labour usage in FBT during cycle 3 include:

* rationalisation of production in some parts of FBT (including Meat and Bakery) and the rising Australian dollar between late 2001 and early 2003 (Smith and Jahan 2003)
* decrease in underemployed labour due to changes in workplace arrangements allowing food processors to better match labour with fluctuating demand (Delforce, Dickson and Hogan 2005)
* the severe and widespread drought in 2003 reducing the primary products available for food processing in 2003‑04 (DAFF 2005b; Smith and Jahan 2003).

Explanations for the significant increase in FBT hours worked over cycle 4 are less clear. The positive turnaround in hours worked growth in Food manufacturing appears to have been much stronger than the turnaround in real VA growth. And in BT, hours worked continued to grow (albeit at a slower rate), while VA declined. During the process of adjustment of production, there may have been some underutilised labour (or ‘labour hoarding’) in the parts of FBT with declining VA, particularly if declines were expected to be temporary. Firms may hoard labour in anticipation of an upturn, generally to avoid hiring costs and to retain employees that may be difficult to replace.[[15]](#footnote-15) But change in the composition of output, including in response to consumer preferences, may also have increased the average labour intensity of production.

#### Largest increases in hours worked in Bakery, Meat, and Sugar and confectionery

Most Food manufacturing groups had a decline in hours worked in cycle 3, followed by a rise in hours worked in cycle 4 (figure 5.16). But the largest turnarounds in hours worked were in Bakery, Meat, and Sugar and confectionery.

Figure 5.16 Hours worked by Food manufacturing group**a**

‘000 hours

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a Food nfd (not further defined) includes survey respondents who provided insufficient details to be allocated to an ANZSIC group.

*Data source*: Authors’ estimates based on ABS (unpublished Labour Force Survey data).

Figure 5.17 shows the *contributions* of each of the groups to the increase in growth in aggregate FBT hours worked in cycles 3 and 4 and the change *between* cycles.

* Bakery contributed almost half of the total FBT increase in hours worked growth between cycles,[[16]](#footnote-16) followed by Meat (almost a quarter), and Sugar and confectionery (22 per cent). It was large increases in cycle 4 that led to the particularly large contributions from Bakery and Meat.
* Within Bakery, it appears to be non‑factory baking (for example, hot bread shops) rather than factory baking that led to this growth.[[17]](#footnote-17)
* Seafood, Oil and fat, Grain and cereal, Dairy and Other food made positive contributions of between 2 and 15 per cent of the total FBT increase.
* Fruit and vegetable processing had an offsetting decline in hours worked, as did BT.[[18]](#footnote-18)

Figure 5.17 Contributions of FBT groups to average annual growth in total hours worked in the FBT subsector**a**

Percentage points

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|  |

a Food nfd (not further defined) includes survey responses the ABS has been unable to allocate to a specific ANZSIC food group.

*Data source*: Authors’ estimates based on ABS (unpublished Labour Force Survey data).

#### A move to more labour‑intensive products and production processes?

There are some trends in consumer preferences that are consistent with an increase in the labour intensity of FBT production:

* ‘home made’ products or ‘ready to eat’ products that are relatively labour intensive — such as artisan bread, handmade chocolates, and some pre‑prepared meals
* ‘boutique’ or niche products made in smaller scale businesses rather than large factories — for example, craft beer and non‑factory bakery products. Growth in the number of beer brewers was especially significant in cycle 4, increasing 25 per cent a year from 51 to 126 (Australian Food and Grocery Council 2010).

As noted in the ‘value added’ section, it is difficult to identify the timing and extent of these changes, and data for such finely differentiated products are not available. However, the labour intensity of FBT ANZSIC *groups* can be compared. Figure 5.18 shows that Food is more labour intensive than BT (that is, has a higher number of employees per million dollars of real VA).[[19]](#footnote-19) Therefore the increase in Food manufacturing as a share of FBT VA is consistent with a higher average level of labour intensity for FBT manufacturing as a whole. Furthermore, within Food, there has been an increase in the VA share of some of the more labour‑intensive groups (for example, to Meat, Dairy and Bakery away from Oil and fat, and Grain and cereal).

Figure 5.18 Employed persons per $m of real value added in FBT by ANZSIC group**a**

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a Real VA in 2009‑10 dollars — approximate estimates based on nominal VA deflated by producer price indexes for output (appendix G). Data for employment for 2007‑08 are not available from the ABS *Economic Activity Survey*. Data for 2006‑07 have not been adjusted for change in industry classification in 2006‑07. Bakery includes non‑factory baking for 2006‑07 but not for 2003‑04.

*Data sources*: Authors’ estimates based on ABS (*Manufacturing Industry, Australia,* various issues, Cat. no. 8221.0); and ABS (*Producer Price Indexes, Australia*, *June 2012,* Cat. no. 6427.0).

Compounding these share changes, there has also been some change between 2003‑04 and 2006‑07 in the labour intensity of some of the ANZSIC groups and this accounts for more than half of the change in overall FBT labour intensity.[[20]](#footnote-20) However, in some cases, this change over time is accentuated by industry classification change. The large increase for Bakery, for example, is due to the addition to this ANZSIC group of non‑factory baking which is more labour intensive than factory baking.[[21]](#footnote-21) (The change in the nature of Bakery products and production processes is discussed further in section 5.4.)

Most FBT businesses employ fewer than 200 persons — and small firms are less able to capture economies of scale. The Prime Minister’s Taskforce on Manufacturing (2012) noted that FBT manufacturers were of significantly smaller average scale (by employment) in Australia than in Germany and the United States. However, the number of Australian FBT businesses classified as small (employing fewer than 20 person), medium (20–199 persons) and large (200 or more) remained relatively stable between 2003‑04 and 2006‑07 (figure 5.19).[[22]](#footnote-22) What has changed is the makeup of the small business category — the number of non‑employing businesses has declined and there has been a marked increase in the number of businesses employing 1–19 persons. This change has been more pronounced in Food than in BT.

Figure 5.19 Shifts in the scale of FBT businesses**a**

Number of businesses by employment sizeb

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| --- | --- |
| *Food manufacturing* | *BT manufacturing* |
|  |  |
|  | |

a On an ANZSIC93 basis (does not include non‑factory baking). b A non‑employing business is one without an active income tax withholding role or which has not remitted income tax withholding for five consecutive quarters. Business counts include only those registered for an Australian Business Number (during the period covered by this figure businesses with a turnover of at least $50 000 per year, or $100 000 in the case of non‑profit organisations, were required to register for an Australian Business Number and remit goods and services tax).

*Data source*: ABS (*Counts of Australian Businesses, including Entries and Exits, June 2003 to June 2007*, Cat. no. 8165.0).

The Food manufacturing groups that had the largest turnarounds in hours worked growth between cycles 3 and 4 — Meat, Bakery and Sugar and confectionery — also had large shifts from non‑employing businesses to businesses employing 1–19 persons (figure 5.20).[[23]](#footnote-23)

Figure 5.20 Small‑scale FBT businesses by ANZSIC group**a**

Number of businesses by employment size

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a On an ANZSIC93 basis: Sugar and confectionery is included in Other food manufacturing; and Bakery does not include non‑factory baking. Tobacco product manufacturers are not included.

*Data source*: ABS (*Counts of Australian Businesses, including Entries and Exits, June 2003 to June 2007*, Cat. no. 8165.0).

#### Measurement error?

The hours worked estimates used in the MFP and labour productivity estimates in this paper are based on the ABS *Labour Force Survey* data that have been backcast by the ABS to account for changes in industry classification over time. It is possible that these estimates are subject to some measurement error.

* Industry misclassification is possible in household surveys, such as the *Labour Force Survey*, as employees’ descriptions of their industry of employment may be less precise than those provided by employers.
* Backcasting for change in industry classification is unavoidably based on assumptions and may be subject to imprecision where assumptions do not reflect actual movements.

These issues are discussed further in appendix G. However, it should be borne in mind that any measurement error in hours worked growth would need to be very large to reverse the decline in measured MFP in cycle 4 (appendix E).

### Capital

Capital services grew at similar rates over cycle 4 (5.1 per cent a year) and cycle 3 (6.0 per cent a year) — so an increase in capital growth was not the proximate cause of the fall in FBT MFP growth *between* these cycles. However, capital growth over cycle 4 in particular warrants closer examination since, *in aggregate*, it produced little growth in the real VA measure. And it does not appear to reflect a substitution of capital for labour inputs (since hours worked growth was even stronger).

Changes in product mix and levels of processing, as discussed above, may have required new types of capital and led to a decline in the utilisation of some of the existing capital stock. There may also have been an adjustment period before some investment (in response to increased competition and input costs) provided benefits in terms of productivity and/or profitability.

#### Most investment was in machinery and equipment for Food manufacturing

The majority of FBT investment was in machinery and equipment (M&E) — around two‑thirds on average in both cycles 3 and 4 (figure 5.21). M&E also accounted for the majority of investment growth, although there was growth in all asset types. Non‑dwelling construction (NDC) was relatively volatile, but there was steady growth in software and R&D. R&D intensity also grew — at a faster rate over the last two complete productivity cycles than in the previous decade (figure 5.22).

Food manufacturing accounted for the majority of the investment and the growth in investment in both M&E and NDC (figure 5.23). On average over cycle 3 and 4 this subdivision accounted for around 70 per cent of M&E and 80 per cent of NDC investment.[[24]](#footnote-24)

Figure 5.21 FBT gross fixed capital formation by asset type**a**

2009‑10 $m

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a The estimation of capital services for each subsector of Manufacturing (as discussed in chapter 3), involved apportioning Manufacturing investment (gross fixed capital formation from the ABS National Accounts) across the different subsectors. This allowed for the construction of a time series for FBT investment in different capital asset types (see appendix A for details).

*Data sources*: Authors’ estimates based on ABS (*Australian System of National Accounts, 2010‑11*, Cat. no. 5204.0); and ABS (unpublished Survey of New Capital Expenditure data).

Figure 5.22 R&D intensity**a** for FBT

Per cent

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|  |

a Total R&D expenditure (current and capital expenditure) as a percentage of industry value added.

*Data sources*: Authors’ estimates based on ABS (*Research and Experimental Development, Businesses, Australia*, Cat. no. 8104.0); ABS (*Manufacturing Industry Australia*, various issues, Cat. no. 8221.0); and ABS (*Australian Industry*, various issues, Cat. no. 8155.0).

Figure 5.23 FBT gross fixed capital formation by subdivision and asset type**a**

2009‑10 $m

|  |
| --- |
| *Machinery & equipment* |
|  |
| *Non‑dwelling construction* |
|  |

*Data sources*: Authors’ estimates based on ABS (*Australian System of National Accounts, 2010‑11*, Cat. no. 5204.0); and ABS (unpublished Survey of New Capital Expenditure data).

#### New products and processes require different capital

There has been steady growth in capital in FBT for some time but, more recently, this has been accompanied by low growth in VA in aggregate. Given the diversity of FBT manufacturing activities and limited data on capital at a disaggregated level, a detailed look at FBT investment and its drivers is beyond the scope of this paper. Recent studies of FBT manufacturing (box 5.6) note that competitive pressures have led to some consolidation/rationalisation of existing capital and to investment in improved technology. Shifts in the nature of investment identified include:

* more energy efficient M&E to reduce operating costs
* more automation, including for packaging
* additional equipment needed for higher levels of processing for growing product groups such as ‘ready to eat’ meals
* more diverse equipment to produce a wider variety of products — including more specialised, smaller and sometimes purpose‑built M&E to produce specific niche products. (Scale of production is discussed for Bakery in section 5.4.)

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| Box 5.6 Some influences on investment in FBT |
| Competitive pressures on FBT have led to investment in improved technology, and also to a rationalisation and offshoring of production.   * The Australian Food and Grocery Council (2011a) noted that, between 2005 and 2010, food and grocery manufacturers had responded to pressures on the industry by rationalising operations through a combination of consolidation and productivity initiatives to cut costs. * Ambler (2005) found that:   In 2004‑05 there was further rationalisation and increased capital investment in the food manufacturing sector. Many parts of the industry are seeking to lift their competitiveness against increasing competition. Technological capabilities are improving in low‑cost competitor countries, and local food retailers, in response to commercial pressures, are benchmarking supplier competitiveness on an increasingly wide geographical basis and changing their sourcing arrangements accordingly. … The commercial success of the Australian food industry lies in its capacity to innovate its practices, processes and products and exploit niche markets through the supply of specialised, high quality, differentiated products. It is likely the move toward private labels will reinforce this trend. (p. 31)  Changing product types have required additional/new equipment.   * The Food Processing Industry Strategy Group (2012) noted that:   During the 1970s and 1980s there was significant growth in the variety of processed food products; however, the changing nature of this market caused a movement away from standard food machinery products to a diverse market of specialised food machinery (typically smaller machines for specific niche products). … There is great diversity in the food processing sector and the type of machinery used is often highly specialised and sometimes purpose‑built. (p. 91)   * The Australian Food and Grocery Council (2011b) noted that:   Prepared meals that are sold at supermarkets or specialist food retailers generally have higher levels of processing, therefore the demand for food has a positive effect on demand for food machinery. (p. 47)   * New biscuit products have been enabled by improved oven technology and new manufacturing lines (Funnell 2012, p. 58). |
| (continued on next page) |

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| Box 5.6 (continued) |
| There has been investment in energy efficiency, waste reduction and automation.   * The Food Processing Industry Strategy Group (2012) noted increased investment in energy efficiency and automation.   Today there is an increasing trend to invest in more energy‑efficient machinery and equipment in the food and beverage processing sector to save on operating costs and to ensure the longer‑term sustainability of the industry. … IBISWorld estimates major markets for Australian machinery uptake are the meat and seafood processing sectors. These sectors are converting to energy‑efficient machinery to reduce operating costs. Upgrades to increase automation have also influenced growth. (p. 91)  The high cost of labour makes decisions to replace labour with automation easy, despite redundancy costs. … However higher automation means that there is a greater need for trade and engineering skills (restructuring to a higher‑paid workforce). The trend toward greater mechanisation of food and beverage processing also potentially diminishes the significance of labour costs in Australia’s comparative competitiveness, but perhaps not materially so in the short term. (p. 138)   * Significant capital investment by major confectionery producers has occurred over the last decade to improve the efficiency of their production, including greater automation and higher speed production lines (Sivasailam 2010). * Some firms are using robotic packaging equipment. One firm in the frozen food industry has installed robotic packing equipment for its pie‑packing line; however its introduction involved high conversion costs and supply disruptions (World Packaging News 2011; The Australian2013). A major biscuit manufacturer is also extending the use of robotics in its biscuit packing (Funnell 2012, p. 58).   The higher exchange rate, which makes imported capital cheaper, may have been a factor in the continued investment by FBT manufacturers.   * Imports are a major source of food processing machinery (Australian Food and Grocery Council 2011b, p. 47). * Funnell (2012, p. 58) noted that the strong dollar had enabled Campbell Arnott’s to get much better returns on predominantly overseas sourced manufacturing equipment and technology. |
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#### Possible decline in the utilisation of capital

As well as affecting investment in new capital, changes in consumer preferences and the composition of output may have affected the use of existing capital. In the longer term, producers may respond to reduced levels of demand by rationalising production facilities or exiting the industry altogether. But in the short term, capital may be underutilised when output is reduced. Measures of capital services do not account for declines in utilisation and also may not capture early retirement of capital, so in these circumstances measured productivity will decline.

##### Rates of capacity utilisation in FBT manufacturing may be low and declining

There are indications that average capacity utilisation in FBT manufacturing is perennially low, although information is very limited (box 5.7). But, in order to contribute to a decline in measured MFP, utilisation rates need to *decrease*. This can occur as a result of change in the composition of production when:

* the parts of FBT that are maintaining or increasing production have relatively low rates of utilisation
* the parts of FBT with absolute declines in production have not made matching reductions in their capital stock, so that their utilisation rate has fallen.

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| Box 5.7 Underutilised capacity in FBT |
| Available information suggests that there is perennially underutilised capacity in FBT.   * A survey in 1999 reported low capacity utilisation (60 per cent or lower) (AFFA 2000). * The Food Processing Industry Strategy Group (2012) reported a 2011 PricewaterhouseCoopers survey that found underutilisation of plant and equipment was an issue for FBT manufacturers — with around half of respondents citing market demand preventing greater sales. * Spencer and Kneebone (2012) identified underutilisation of food processing facilities as a mature risk to the food supply chain. * Treasury Wine Estates and Accolade Wines entered into reciprocal bottling and packaging contracts in July 2012. Accolade Wines will bottle for Treasury Wine Estates in the United Kingdom and Treasury Wine Estates for Accolade Wines in Australia. Treasury Wine Estates reported that this arrangement will allow them to use spare capacity in their Australian facilities. (Treasury Wine Estates 2012)   Reasons given for low utilisation rates include: seasonality of supply of raw materials, misjudgements about the likely rapidity of growth of domestic and export markets, and the unavailability of ‘off‑the‑shelf’ smaller sets of plant and equipment (AFFA 2000); and lack of market demand (Food Processing Industry Strategy Group 2012). |
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No specific measures of FBT utilisation rates over time are available. Anecdotal evidence suggests that:

* A fall in utilisation rates is plausible for those FBT manufacturers experiencing a loss of competitiveness and increased import competition. However, this may have been a larger influence in the incomplete cycle than in cycle 4.
* Capacity utilisation in Wine may have decreased as a result of recent lower production and VA levels (this is discussed in section 5.4).
* In Dairy manufacturing there have been some reductions in the excess processing capacity that existed after the reductions in milk supply following the rationalisation of dairy farming in 2000.

As in the farm sector, the milk processing sector is undergoing continuing rationalisation. This has resulted in improved factory capacity, as larger operations have improved their efficiency and economies of scale. The lack of growth in milk production over the past decade has relieved the pressure on Australian dairy companies to continue to invest in increasing processing capacity — at least in the short to medium term. Instead, the challenge has been to remove surplus capacity and to utilise the existing capacity as profitably as possible. (Dairy Australia 2013)

The net effect of change in utilisation rates in different parts of FBT is not known.

##### Unmeasured retirements of capital?

A complicating factor in the measurement of capital is that some capital that has been retired from production may still remain ‘on the books’ in the statistics.[[25]](#footnote-25) This may occur, for example, in some cases when machinery and equipment is scrapped early to reduce production capacity. Reductions in the capital stock as a result of factory closures also may not be fully reflected in the measures of capital, while the capital associated with new factories will be measured. Part of the decline in measured productivity may be attributable to this capital that remains on the books but is no longer producing output.

The capital services estimates for FBT manufacturing in this paper assume that capital is not retired before it is fully depreciated and the asset life and age‑efficiency assumptions are the same as those used by the ABS for Manufacturing as a whole (appendix A). The above discussion has identified possible changes in the FBT product mix and the associated capital requirements. And there are a number of examples of FBT plants closures and consolidations (box 5.8). However, data are not available to test for an increase in unmeasured retirements of capital in FBT manufacturing during cycle 4.

Lags between when investment is recorded and when it produces output can also depress measured MFP in the short term. However, this is less likely to be a significant issue for FBT than other parts of the economy with very large multi‑year investment projects, such as Mining and some parts of Metal products manufacturing (which is discussed in chapter 6).

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| Box 5.8 Some closures and consolidations in FBT |
| A number of closures and consolidation of FBT plants have occurred over the period examined in this study. For example:   * in April 2003, Foster’s Group Limited (2003) announced the closure of its Kent Brewery in NSW by February 2005 * in July 2003, Simplot announced the closure of its pie factory in Kensington after selling its bakery business brands to Patties Bakery (Das 2003) * in 2004, George Weston Foods closed its Camperdown and Abbotsford manufacturing sites (George Weston Foods 2013) * in September 2004, Parmalat Australia announced the closure of its soft cheese and butter factory in Warwick, Queensland (Sydney Morning Herald 2004) * in August 2005, Foster’s Group Limited (2005a) announced its intention to sell its Lower Hunter Valley winery and the smaller of its Coonawarra wineries as soon as practical * in January 2006, Kraft announced the closure of a biscuit plant in Broadmeadows shifting production to China (Sydney Morning Herald 2006) * in June 2006, Foster’s Group Limited (2006) announced its intention to sell two Australian wineries, as well as surplus production and packaging facilities in the Upper Hunter Valley, Barossa Valley, and selected facilities at Penfolds Nuriootpa * in June 2007, Foster’s Group Limited (2007) announced that it would cease beer production at its North Fremantle brewery by the end of September, with production shifting to other Foster’s sites * in November 2007, Hardy Wine Company announced that from 2008, winemaking and packaging at its Buronga winery would be consolidated to its Berri Estates winery (Constellation Brands Incorporated 2007) * in April 2008, Campbell Arnott’s announced plans to close its Players biscuit and chocolate factory in Sydney, shifting production of Arnott's branded products to other facilities in Australia (West 2008) * in August 2008, Constellation Wines Australia (formerly Hardy Wine Company) announced its intention to sell three of 10 production facilities, in addition to the sale of more than 20 vineyard properties; consolidation of bottling operations; portfolio streamlining and rationalization of more than 30 per cent of the company's Australian product lines (Constellation Brands Incorporated 2008) * in November 2010, McCain Foods closed its vegetable plant in Smithton, Tasmania (McCain Foods Australia/New Zealand 2012) * in May 2011, Heinz announced that it would close its tomato sauce factory in Girgarre, Victoria and relocate Golden Circle’s beetroot‑processing operations in Northgate, Brisbane to New Zealand (Hattersley, Isaacs and Burch 2013) * in August 2011, Coca‑Cola Amatil announced that it would close its Mooroopna fruit and vegetable processing facilities (Hattersley, Isaacs and Burch 2013). |
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## 5.4 A closer look at Wine and Bakery manufacturing

A closer examination of two key groups within FBT provides further insight into the interactions between key influences on FBT manufacturers and measured productivity. Wine manufacturing was the largest contributor to the decline in FBT VA between cycles 3 and 4, and Bakery product manufacturing was the largest contributor to the growth in hours worked.

For Wine, declines in output volumes and the amount of value adding per unit of output (in particular more ‘bulk wine’ exporting), and associated underutilised capacity, may have contributed to the decline in FBT MFP. For Bakery product manufacturing, changes in the nature of the output and how it is produced (with growth in non‑factory bakeries) may also have contributed to the decline in FBT MFP, particularly through its contribution to growth in hours worked. Bakery product manufacturing has also been affected by measurement issues.

#### Wine

Wine manufacturing is likely to have contributed to the decline in aggregate FBT MFP between the last two complete productivity cycles. Assuming no comparable adjustment in the inputs used in Wine manufacturing, the driver of this decline is likely to have been the significant fall in VA in cycle 4 after strong VA growth during cycle 3. This section provides a summary of the influences on productivity in Wine manufacturing — further details are provided in appendix G.

##### Declining output and reduced value added

Strong international demand for Australian wine, beginning in the late 1980s, led to a significant expansion in Australian grape growing and wine production capacity. This underpinned the strong production, VA and export growth in the Australian wine industry in cycle 3 (figure 5.24).[[26]](#footnote-26) By the middle of cycle 4, Wine manufacturers faced an excess supply of wine relative to demand (Sheales et al. 2006). These market circumstances contributed to the significant decline in (nominal) VA by the end of the cycle.

Figure 5.24 Wine manufacturing output and exports

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| --- | --- |
| *Output*a | *Exports* |
|  |  |

a Nominal industry VA ($m), survey break in 2000‑01. Production (megalitres), only includes wineries crushing more than 400 tonnes annually.

*Data sources*: ABS (*Australian Wine and Grape Industry*, various issues, Cat. no. 1329.0); ABS (*Manufacturing Industry, Australia*, various issues, Cat. no. 8221.0); ABS (*Experimental Estimates for the Manufacturing Industry*, various issues, Cat. no. 8159.0); ABS (*Australian Industry*, various issues, Cat. no. 8155.0); Wine Australia (unpublished data).

Wine production grew by 11.6 per cent a year in cycle 3, contributing to a build‑up of inventories. Strong production levels continued throughout cycle 4, despite some consolidation among large winemakers (Kiri‑Ganai Research 2006). Record production volumes, averaging around 1441 megalitres, were achieved in the years 2003‑04 to 2005‑06 as a result of strong vineyard investments between 1998 and 2000 (Sheales et al. 2006). This led to a peak in wine inventories of over 2100 megalitres by 2005‑06. The 2006 drought drove production lower by the end of cycle 4, marked by significantly lower production in 2006‑07 and 2007‑08 compared with the record levels at the start of the productivity cycle. Nevertheless, inventories of Australian wine remained high, at around 154 per cent of total production for the year 2007‑08 (ABS 2012e).

Producers responded to changes in market conditions by shifting the composition of wine sales. Excess Australian (and global) wine capacity, greater competition from other ‘New World’ wine producers and a high Australian dollar, resulted in the concentration of sales around lower price points in many export markets (Bailey 2011). The average export price of Australian wine dropped from $4.40 per litre in 2003‑04 to $3.80 in 2007‑08 (figure 5.24). This was the result of both discounted sales and the trading of increased volumes of bulk stock (Rabobank 2012).

Bulk wine export volumes as a share of total exports increased from an average of 14.8 per cent in cycle 3 to 22.4 per cent in cycle 4 (figure 5.24) as producers looked to maintain market share and shift surplus stocks in an increasingly competitive global market. The effect of increased bulk wine production was to reduce the amount of value adding per litre of wine in Australia — with bottling and other packaging activity undertaken in the destination‑market country. (As figure 5.24 shows, bulk wine exports have become even more significant during the current incomplete cycle.)

This change in the composition of wine sales, along with the effect of the 2006‑07 drought, led to industry nominal VA declining from $1808 million to $1347 million (averaging negative 7.1 per cent a year) over cycle 4.

##### Have inputs contracted in line with value added?

While VA declined, there is no strong evidence that inputs declined at the same pace. For example, employment continued to grow over cycle 4 by 2.1 per cent a year, although this was much slower than the 11.7 per cent a year growth over cycle 3 (ABS 2008c, 2012d). This growth in both cycles is likely to have been driven by strong growth in the number of smaller winemakers, despite some consolidation of larger producers.[[27]](#footnote-27)

There is limited data available about the capital side of production. It is likely that capital investment increased in cycle 3 as industry in the mid‑1990s advocated for investment priorities to shift from vineyards to processing and storage capacity to utilise increased grape supplies from the growth in vineyard plantings in the 1990s (Australian Wine Foundation and Winemakers’ Federation of Australia 1996). For example, winemaking facilities were processing around 72 per cent more wine grapes by the end of cycle 3 (2003‑04) compared with the beginning of the cycle (1998‑99) — from 1.1 million to 1.9 million tonnes (ABS 2012e). And record production volumes were achieved in the first three years of cycle 4. By the end of cycle 4, it is likely that some capital was underutilised (assuming most producers retained their production capacity) because output declined late in the cycle and more of the value adding moved overseas. The consolidation among large producers could have had some offsetting effect (depending on the extent to which this involved a reduction in the total capital stock). However, data on change in the capital stock are not available.

###### Pace of industry adjustment

The adjustment on the input side to the weaker market conditions might have been slowed by several factors.

* Significant change in market conditions. The excess world supply of wine relative to demand (referred to as ‘the wine glut’ by some commentators), with which domestic winemakers were faced in the middle of cycle 4, was preceded by a period of rapid expansion with record production levels and strong growth in export volumes. Adjustment to such large changes in market conditions takes time — especially the adjustment of capital.
* Taxation arrangements. According to Henry et al. (2009, p. 438)

The wine producer rebate [Wine Equalisation Tax rebate] fosters small‑scale production and supports some small, otherwise uneconomic wineries. The industry currently reports a widespread grape oversupply and that around half of all wine producers are currently unprofitable. This suggests that resources such as land, water and capital are not being used efficiently. Moreover, the rebate may be acting to prevent an appropriate market response to these circumstances by discouraging mergers within the industry.

* Lifestyle ventures. High income or high net worth urban owners can operate their wine businesses at a loss as they have other sources of income and capital. For example, some hobby or ‘sea change’ growers can rely on other sources of income (for example, cafe, bed and breakfast accommodation or tourist attractions) (Kiri‑Ganai Research 2006).
* Expectations of export growth in new markets. For example, the value of Australian exports to China grew (albeit from a very small base) by 28.2 per cent a year in cycle 3 and 79.9 per cent a year in cycle 4. In 2008‑09 China became Australia’s fourth biggest wine export market (in value terms) (ABS 2012e).

##### Implications for MFP

While there is insufficient information to estimate MFP in Wine manufacturing, MFP may have declined over cycle 4. There is no clear evidence of a reduction in inputs of sufficient size to offset the decline in real VA and thus maintain productivity levels.

Since then, there are signs that the wine industry has made further adjustments in response to (global) market conditions. A major statement by key Australian winemaking and grape growing bodies noted the need for the industry to address structural oversupply of wine (Winemakers’ Federation of Australia et al. 2009). Output and VA have declined further, and there has been a further shift to bulk exports (figure 5.24).

On the input side, there has been some decline in employment at an average rate of 0.7 per cent a year between 2007‑08 and 2010‑11 (the current incomplete cycle).[[28]](#footnote-28) Further consolidation among larger producers is also occurring, including a deal by the two largest wine producers to consolidate their bottling activities in Australia and overseas (Treasury Wine Estates 2012; Accolade Wines 2012). However, given the lack of capital data for the industry as a whole, it is not known whether the industry has reduced its total inputs in line with VA or if MFP has declined further since cycle 4.

#### Bakery product manufacturing

Bakery product manufacturing (‘Bakery’) is made up of factory and non‑factory based production. Non‑factory bakery accounted for 46 per cent of Bakery nominal VA in 2008‑09 (figure 5.25, left panel). Non‑factory bakery is relatively labour intensive, with 61 per cent of Bakery employment in 2008‑09 compared with 39 per cent for factory bakery (figure 5.25, right panel).

Figure 5.25 Composition of Bakery product manufacturing**a**, 2008‑09

Percentage shares

|  |  |
| --- | --- |
| *Value added* | *Employment (persons)* |
|  |  |

a In‑house supermarket bakeries do not appear to be included in ABS statistics for Bakery product manufacturing (appendix G). They are mentioned in this chapter in the context of changes in overall supply of bakery products. b The ABS does not disaggregate Bakery product (non‑factory) by product type.

*Data source*: ABS (*Experimental Estimates for the Manufacturing Industry, 2008‑09*, Cat. no. 8159.0).

Bakery may have contributed to the decline in aggregate FBT MFP between the last two complete productivity cycles, as strong growth in hours worked does not appear to have been accompanied by a comparable increase in measured VA.

Figure 5.26 Value added, investment**a** and labour input in Bakery product manufacturing**b**

|  |  |
| --- | --- |
| *Nominal value added and investment* | *Labour input* |
|  |  |

a Investment is total acquisitions (expenditure on the acquisition of capital including plant, machinery and equipment, buildings, and other assets) and is not net of disposals of assets. b Break in series due to change in ANZSIC, with the addition of non‑factory bakery from 2006‑07. Data in left panel have not been adjusted for this break in series (or other survey methodology breaks from 2000‑01 and 2007‑08). Data in right panel have been backcast by ABS for the ANZSIC change. See appendix G for limitations on the comparability of these estimates.

*Data sources*: Authors’ estimates based on ABS (unpublished Labour Force Survey data); ABS (*Manufacturing Industry, Australia*, various issues, Cat. no. 8221.0); ABS (*Experimental Estimates for the Manufacturing Industry*, various issues, Cat. no. 8159.0); and ABS (*Australian Industry,* various issues, Cat. no. 8155.0).

Figure 5.26 shows Bakery product manufacturing output and inputs — nominal VA and investment (left panel) and labour inputs (right panel).

* Nominal VA grew slightly over cycle 3. It is not possible to estimate the extent of VA growth over cycle 4 because of change in industry classification, although it is likely to have been stronger in cycle 4 than cycle 3.[[29]](#footnote-29)
* Employment and hours worked fell over cycle 3, but grew strongly over cycle 4.
* Investment data are limited but show fairly stable investment, again affected by the change in industry classification.

Labour input growth may have been stronger than VA growth over cycle 4, if there was relatively strong output growth in the more labour‑intensive non‑factory bakery. And available investment data do not show a fall in investment sufficient to offset the strong rise in hours worked. This suggests that Bakery may have had a decline in MFP and contributed to the decline in FBT’s measured MFP between cycles 3 and 4. The following provides a summary of the influences on Bakery and their likely implications for productivity — further details are provided in appendix G.

##### Changing consumer tastes shifting the composition of Bakery output

Over the longer term, there has been considerable change in the pattern of demand for Bakery products (box 5.9). This shift is the result of change in consumer preferences related to a range of factors — including demand for a wider diversity of products, including artisan products, premium products and international‑style specialty products, but also private label products and for products with particular health‑related characteristics (such as high fibre).

While it is difficult to establish the extent of such changes over cycle 4 compared with cycle 3, anecdotal evidence suggests some increase in the pace of change in demand for some bakery products. For example, Food Magazine (2008) noted that increasing sophistication of consumers drove greater product development and diversity in bread manufacturing over the 5 years to 2008 than in previous decades.

|  |
| --- |
| Box 5.9 Trends in bakery product purchasing patterns |
| There has been considerable change in purchasing patterns for bakery products, affecting total demand and demand for particular products.  *Health*  Increased focus on foods that offer health benefits (such as high fibre or healthy additives) or meet other dietary requirements (such as gluten free, low salt, low fat or yeast free) has increased the demand for specific bakery products.   * Premium wholemeal and grains bread grew 10‑15 per cent over the 5 years to 2010 and there has been a decline in market share of white bread (Wahlquist 2010). * Health trends have increased demand for low‑fat cakes and muffins (DAFF 2003).   But the popularity of low carbohydrate diets may have decreased overall demand for bread. There was a slight decrease in the proportion of the population consuming bread between 2001 and 2008 (AIHW 2011).  *Lifestyle/convenience*  Changing lifestyles have led to some replacement of sandwich lunches with hot meals eaten out, although with some reversal of this trend since the global financial crisis (National Baking Industry Association 2011).  Increased snacking, and packaging innovation to provide convenience and portability, have allowed the development of VA products with higher margins (Dobie 2012).  There has been growth in lunchbox fillers, such as muffins and bakery treats, and some crossover between biscuits and the confectionery/snack sector (DAFF 2003).  *Quality, value, specialties and diversity*  A shift to premium products in bread and cakes/pastries led to stronger growth in value (than volume) between 1997‑98 and 2000‑01. Specialty and gourmet pies, and premium or indulgence biscuits also grew. (DAFF 2003)  Consumers have been prepared to purchase more expensive specialty breads and high quality freshly baked bread, including premium artisan bakery products.   * Demand for a more varied range of bread has been reinforced by the changing ethnic structure of the Australian population, which has had its greatest impact on non‑factory bread production (Food Magazine 2008). * Product diversity is exemplified by the 319 different product lines of one non‑factory baking franchise in 2010 (Wahlquist 2010).   But there has also been an increase in the market share in private label products.   * There has been an increase in share of generic or house brand biscuits (DAFF 2003). * The National Baking Industry Association (2011) reported that private label products were 8 per cent of the total value of baked goods in 2009, and higher shares within the packaged/industrial baked goods sub‑category (bread products 22 per cent; pastries 52 per cent; and cakes 35 per cent). |
|  |
|  |

##### Different products produced in a different way?

Changes in consumer preferences may affect various types of Bakery manufacturers differently. For example, for bread manufacturing, change in consumer preferences may have led to stronger growth in non‑factory production and affected factory production.

* The Department of Agriculture, Fisheries and Forestry (2003, p. 52) suggested that smaller bakers and hot bread shops are better positioned to produce a greater variety of bread products; while large bread manufacturers are restricted to producing in larger quantities but can drive development of innovative products through their R&D capabilities.
* Food Magazine (2008) noted that demand for a more varied range of products had its greatest impact on non‑factory production, and that small bread makers competed with larger producers by offering more specialised products.
* But large factory bakeries have also introduced a wider range of bread lines including health ranges and international breads (Food Magazine 2008). More recently, Goodman Fielder developed an artisan bread strategy and invested in a new artisan‑style bread plant, reducing other product lines and closing three other bakeries (Mitchell 2013).

Change in the composition of output can have implications for productivity. For example, ‘hand‑crafted’ bread from a small‑scale artisan bakery will have a different production process to the standard white loaf made in a large‑scale automated factory, and productivity levels are likely to be commensurately different. Non‑factory production that does not have economies of scale and is more labour intensive is likely to have lower levels of measured productivity, particularly given the challenges of measuring output quality differences. But smaller production runs of a wider variety of products in a factory may also reduce economies of scale. There may also be changes in the type of capital required, which could lead to retirement of capital or changes in utilisation rates. Limited ABS data make it difficult to quantify these changes. Available information about growth in non‑factory bakeries and differences in the input intensity between factory and non‑factory production are presented below.

###### Growth in the number of non‑factory bakeries

There has been stronger growth in non‑factory bakery than factory bakery over the longer term, particularly in bread (box 5.10). And Food Magazine (2008) noted that small bakeries became more competitive with major players in the bread industry in the few years up to 2008.

|  |
| --- |
| Box 5.10 Growth of non‑factory bakeries |
| There are limited statistics on the growth of non‑factory bakeries specifically over cycle 4 (2003‑04 to 2007‑08). But over the longer term (since the 1990s) there is clear growth in non‑factory bakery operations and some evidence of faster growth in some non‑factory bread output than in factory bread output.  There has been strong growth in the number of non‑factory franchise bakeries since the early 1990s, but most of the growth in store numbers was before cycle 4.   * The number of Bakers Delight bakeries grew from 200 to 600 between 1993 and 2003 (in Australia and New Zealand), reaching 700 in 2013 (with most of the additional 100 stores opened in Canada) (Bakers Delight 2013b). Since the early 1990s, the number of Brumby’s Bakeries (in Australia and New Zealand) has grown from 51 to over 300 (Brumby’s Bakeries 2013). There were 254 Brumby’s stores in Australia in 2003, suggesting that, like Bakers Delight, most of the growth in store numbers took place before 2003 (DAFF 2003, p. 19).   Output of non‑factory bread manufacturers grew faster than factory production between 1995 and 2000, and may have grown further in cycle 4.   * Total growth in the volume of bread production over the 5 years to 2000 was 45 per cent in traditional hot bread shops and 10 per cent in franchise hot bread shops, compared with ‑0.7 per cent in factory bread and ‑3 per cent in supermarket in‑house bakeries. But factory bread still had the largest share of output in 2000 (61 per cent), compared with supermarket bakeries (20 per cent), franchise hot bread shops (14 per cent) and traditional hot bread shops (5 per cent). (DAFF 2003, p. 12) * Since then, the market share of franchise bakeries appears to have grown further, with the bread market share of Bakers Delight alone at 13.7 per cent in 2010 (Wahlquist 2010) and 12.5 per cent in 2013 (Bakers Delight 2013a).   But there may also have been some shift in market share between different types of non‑factory bakeries and, more recently, a return to growth for factory bakeries.   * Perry and Alam (2005, p. 5) noted a marked decrease in the number of small baking operations with the rise of national franchise and in‑house supermarket bakeries — with small independent local bakeries all but disappearing. However, they also reported growth in boutique bread baking with new markets in specialty, exotic and health associated breads. * The National Baking Industry Association (2011) also noted the rise of a small but growing artisan baking sector and suggested a recent turnaround in the output of factory bakeries.   Previously, competition between the on‑site operations is strong which has forced the prices of their products down, often to the point where the products are cheaper than the packaged equivalent produced by corporate plant bread bakeries. Consequently the onsite operations are gaining market share while the plant bread market share is in steady decline, which has caused the corporate plant bakeries to diversify. However, now with the supermarket’s reduction in the price of bread, it is our perception that this trend has been reversed and forced a significant downturn in trade for retail bakeries. (p. 3) |
|  |
|  |

###### Smaller scale operations?

As expected, non‑factory bakery had a lower proportion of businesses in the largest size category (by employment and turnover) than factory bakery in 2006‑07 (figure 5.27). But non‑factory bakery also had a lower proportion of businesses in the smallest size category.[[30]](#footnote-30)

Business numbers grew by 9 per cent in Bread (factory) manufacturing between 2002‑03 and 2005‑06, driven by a 10 per cent growth in the number of small and medium size businesses (employing fewer than 200 people). (There was a decline in the number of large businesses from nine to six.)[[31]](#footnote-31)

Figure 5.27 Bakery product manufacturing**a** businesses by size, 2006‑07

Percentage shares

|  |  |
| --- | --- |
| *Turnover* | *Employment* |
|  |  |

a Bakery product manufacturing, Bakery (Total), includes Factory (F) and Non‑factory (Non‑F).

*Data source*: ABS (*Counts of Australian Businesses, including Entries and Exits, June 2007 to June 2009*, Cat. no. 8165.0).

Non‑factory bakery uses smaller scale equipment than factory bakery. There are two types of bakery equipment — retail bakery equipment (servicing the independent and franchise sector) and industrial bakery, larger, automated equipment (servicing larger independents and corporate plant bakeries) (DAFF 2003, p. 34).

Non‑factory bakery is more labour intensive than all three groups within factory bakery. Table 5.1 shows employment per million dollars of nominal VA in 2006‑07.

Table 5.1 Labour intensity of Bakery product manufacturing, 2006‑07

|  |  |  |  |
| --- | --- | --- | --- |
| ANZSIC06 group/class | Employed per  $m of VAa | Share of  VA | Share of employed |
|  | persons | share | share |
| **117 Bakery product manufacturing** | **24.3** | **1.00** | **1.00** |
| 1171 Bread manufacturing (factory) | 16.2 | 0.27 | 0.18 |
| 1172 Cake and pastry manufacturing (factory) | 23.5 | 0.14 | 0.14 |
| 1173 Biscuit manufacturing (factory) | 11.1 | 0.16 | 0.07 |
| 1174 Bakery product manufacturing (non‑factory) | 35.1 | 0.42 | 0.60 |

a Nominal value added.

*Source*: Authors’ estimates based on ABS (*Manufacturing Industry, Australia, 2006‑07*, Cat. no. 8221.0).

The higher labour intensity of non‑factory bakery is related to scale but also to other differences in production processes. For example, ‘hand‑crafted’ artisan bread has a relatively labour‑intensive production process. Other types of non‑factory bakery using instant doughs and pre‑mixes from flour millers are likely to be less labour intensive than artisan bread, but still more so than factory bakery. Unlike factory bakeries, all non‑factory bakeries will also require labour for the retailing component of their operations.[[32]](#footnote-32)

Lower labour intensity of factory bakery is due to both larger scale and automation.

In the typical large‑scale bakery or factory, there is now little manual labour directly involved in production. … The introduction of new technology and the adoption of greater automation are inevitably reducing the role of labour in the production process. This is especially true in factory baking where, in the last decade, high speed production lines have dramatically increased throughput, allowing manufacturers to significantly raise production without requiring corresponding increases in employment. (Food Magazine 2008, pp. 18–9)

Employment appears to have been growing faster in non‑factory bakery than factory bakery. From 1997‑98 to 2001‑02 factory bakery employment remained fairly flat before declining in 2001‑02 (with rationalisation of bread manufacturing), while employment in retail bakeries increased at around 1 per cent a year (DAFF 2003, p. 8). Comparable statistics are not available for cycle 4. However, the strong growth in hours worked for Bakery in total (as measured in ABS *Labour Force Survey*, shown in figure 5.26) is more likely to be due to non‑factory bakery than factory bakery (given the relatively low labour intensity of the latter).[[33]](#footnote-33)

Lower productivity but higher profitability in non‑factory bakery?

The change in the composition of Bakery may represent a shift into products with lower measured productivity levels but higher levels of profitability. There is some evidence that non‑factory bakery is relatively profitable. In 2006‑07 the profit margin was higher in non‑factory bakery (9.7 per cent) than in each of the factory bakery groups — Biscuit (9.6 per cent); Bread (7.5 per cent); and Cake and pastry (‑1.2 per cent).[[34]](#footnote-34)

However, a complicating factor (as discussed for FBT in general in box 5.5) is that it is difficult to accurately capture changes in product quality. This may mean that any shift in the composition of Bakery output towards higher quality products may not be adequately captured in the measure of real VA growth that is available for FBT as a whole. This may have led to an overstatement of the decline in FBT MFP.

##### Implications for MFP

While there is insufficient information to estimate MFP in Bakery, it may have declined over cycle 4. Shifts in the composition of bakery output and the growth of non‑factory bakery production are consistent with lower levels of measured MFP arising from fewer economies of scale and increased labour intensity in production. This is notwithstanding other changes in Bakery that may have had some offsetting positive effects on MFP (such as increased automation in large factory bakeries and efficiencies in some non‑factory baking from the use of pre‑mixes). It is also possible that Bakery manufacturing contributed to the *measured* decline in MFP in FBT between cycles 3 and 4 because of measurement challenges related to output quality improvements and changes in industry classification. However, again, insufficient data are available to test these hypotheses.

Since cycle 4, VA and hours worked in Bakery have been relatively stable (with no continuation of the strong hours worked growth recorded in cycle 4). However, given the lack of data on capital, the change in Bakery MFP is not known.

## 5.5 Drawing together the implications for productivity

MFP in FBT declined significantly between the last two complete productivity cycles and was the second largest contributor to Manufacturing MFP decline (Petroleum, coal, chemical and rubber products being the largest).

The key proximate causes of the large decline in the rate of MFP growth in FBT over cycle 4 compared with cycle 3 were a slowdown in VA growth at the same time as strong growth in hours worked. There was consistent capital services growth in each cycle (although the average rate of capacity utilisation may have declined in cycle 4).

The slowdown in real VA growth was most noticeable in BT manufacturing — which grew over cycle 3 but declined in absolute terms over cycle 4. The increased rate of hours worked growth occurred mainly in Food manufacturing — which had a fall in hours worked in cycle 3 and a very large increase in cycle 4.

Both BT and Food contributed to the decline in FBT MFP in aggregate by having input growth in excess of real VA growth, but for different reasons.

* In BT it was due to *decline* in real VA that does not appear to have been accompanied by a similar decline in inputs. Wine was a major contributor to this.
* In Food it was due to an *increase* in real VA that was accompanied by an even greater increase in inputs. Bakery was a major contributor to this.

A range of influences on FBT have been identified that may explain the changes in the proximate causes of MFP.

* The composition of the output produced by Australian FBT manufacturers appears to have changed as a result of change in consumer product preferences related to health considerations, quality, value, diversity and convenience.
* There was decreased export demand and increased import competition resulting from the appreciation of the Australian dollar and other influences on the competitiveness of Australian products.
* There was reduced availability of some agricultural inputs due to drought (for example, grapes in the case of Wine).

These influences are consistent with:

* an increase in the production of more input‑intensive products and/or a decrease in the average scale of production (for example, towards pre‑prepared meals and ‘boutique’ or niche products).
* an increase in underutilised capacity.

Such changes are consistent with a reduction in the average level of MFP. However, it is not clear whether the influences identified and the extent of change, particularly in consumer preferences, were of sufficient magnitude to explain all of the observed fall in measured MFP. There are limited data available to test this. For example, many of the changes in consumer preferences are likely to have taken place at a level of disaggregation for which data are not available. And in some cases there are no data available for the relevant measures, such as capacity utilisation.

It is also possible that the decline in *measured* MFP in FBT was overstated because of other measurement challenges.

* Output quality improvements are difficult to measure, so real VA growth may have been understated.
* Changes in industry classification and survey limitations may mean that labour input growth was overstated.

Notwithstanding these measurement issues, it appears that the steep decline in MFP in FBT manufacturing over cycle 4 was exceptional. In the period since, hours worked has not grown further and the rate of VA growth has increased. Capital services growth has slowed. While MFP growth was still negative on average between 2007‑08 and 2010‑11, it was at a rate more typical of the long term.

1. Tobacco products manufacturing is not discussed in this chapter — separate data for this group are limited, but it is included in totals. [↑](#footnote-ref-1)
2. The pattern of MFP growth over FBT-specific cycles, in terms of increase or decrease from cycle to cycle from the mid-1990s, is similar in direction to that over the cycles for Manufacturing in total (appendix C). As a result, FBT-specific cycles are not shown here. [↑](#footnote-ref-2)
3. VA is gross output less intermediate inputs used in producing that output. Intermediate inputs are the inputs used by the business other than capital and labour — for example, energy, raw materials and services. Real VA (the volume of VA) refers to VA with the effect of price changes removed. [↑](#footnote-ref-3)
4. These estimates of real VA in Food and BT are based on nominal VA from the ABS *Economic Activity Survey,* which is affected by issues of comparability over time. The limited availability of appropriate deflators also affects the quality of the derived *real* VA estimates. See appendix G for details. [↑](#footnote-ref-4)
5. Nominal VA is affected by both price and volume changes, so may not be a reliable indicator of volume changes. Breaks in series will also affect comparability of nominal VA over time (appendix G). [↑](#footnote-ref-5)
6. The composition of nominal VA is affected by change in relative prices and volume. Also, non-factory bakery is included only from 2006-07 causing a jump in the shares for Bakery. Although comparable data for non-factory bakery are not available prior to this, other sources suggest relatively strong growth in non-factory bakery compared with factory bakery (box 5.10). Therefore the share for Bakery in total is likely to have increased over cycle 4. [↑](#footnote-ref-6)
7. While Grain and cereal had an increase in its growth rate between cycles (figure 5.7), its share declined because of its relatively low growth rate over cycle 4. [↑](#footnote-ref-7)
8. This is in contrast to Manufacturing in total (figure 2.16), where there is a decline in profitability and productivity over cycle 4. [↑](#footnote-ref-8)
9. A measure based on domestic VA embodied in gross exports. [↑](#footnote-ref-9)
10. Real export/import data are not available for all ANZSIC groups. Nominal exports and imports are only indicative of changes in volume as they are also affected by changes in prices. [↑](#footnote-ref-10)
11. Appendix G shows the input-output linkage between Agriculture and FBT as a whole. [↑](#footnote-ref-11)
12. The volume of value added is the volume of gross output less the volume of intermediate inputs such as energy, raw materials and services. [↑](#footnote-ref-12)
13. The hours worked measure used in the MFP estimates in this paper are based on ABS *Labour Force Survey* data on an ANZSIC06 basis. Comparability between employment estimates from the *Labour Force Survey* and the ABS *Economic Activity Survey* is discussed in appendix G. The trend is broadly similar in both surveys, with faster growth in cycle 4 than cycle 3. However, the *Economic Activity Survey* data suggest a smaller increase between cycles. [↑](#footnote-ref-13)
14. While there may be some volatility in employment in FBT manufacturing around drought years (DAFF 2005b, 2007), ABS *Labour Force Survey* data at lower levels of disaggregation can also be subject to ‘noise’ from year to year. [↑](#footnote-ref-14)
15. Hours worked does not provide a reliable indicator of labour hoarding — since firms may reduce the number of hours worked by each employee during a downturn. Productivity estimates based on hours worked measures of labour input will be less affected by labour hoarding than estimates based on numbers employed. There are no readily available data to test whether labour hoarding was a significant factor over this period. A decline in average hours worked may provide an indicator of the hoarding of employees at reduced hours per employee. There was a small decrease in average hours worked in FBT over cycle 4, but year-to-year volatility in the data make it difficult to draw firm conclusions. Since cycle 4, average hours worked has stabilised. [↑](#footnote-ref-15)
16. The large contribution of Bakery is not due to a break in series for ANZSIC06 as the ABS has backcast the *Labour Force Survey* data to make it more consistent over time (appendix G). [↑](#footnote-ref-16)
17. Based on more detailed data on employment from the ABS *Economic Activity Survey* (appendix G). [↑](#footnote-ref-17)
18. Food not further defined (nfd) also had an offsetting decline. Food nfd is a category for which the ABS have been unable to allocate hours worked to a specific ANZSIC food group (appendix G). While there was considerable growth in this category in both cycle 3 and 4, it was not the source of the increase between cycles 3 and 4. [↑](#footnote-ref-18)
19. These labour intensity measures should be considered as broad indicators of differences across ANZSIC groups. The real VA estimates used have been derived using producer price indexes for output (see appendix G for a discussion of limitations of this approach). It should also be noted that these estimates are based on VA and employment from the ABS *Economic Activity Survey*, which is subject to limited comparability over time. The *Economic Activity Survey* employment estimates also differ from the *Labour Force Survey* data reported earlier in the chapter and used to estimate MFP for FBT. [↑](#footnote-ref-19)
20. Shift-share analysis (appendix G) suggests that the bulk of the change in average labour intensity was due to changes in the labour intensity of the FBT groups rather than in the relative size of the FBT groups (changes in the VA shares of each group). For those ANZSIC groups with absolute declines in real value added, it is possible that labour ‘hoarding’ may have contributed to the increase in labour intensity. However, this cannot be determined from available data. Those groups with declines in real value added (such as Seafood processing and Fruit and vegetable processing) made relatively small contributions to the overall increase in labour intensity (table G. 1). [↑](#footnote-ref-20)
21. In the ABS *Economic Activity Survey* data, non-factory baking was just added in 2006-07 and not backcast. However, as there has been relatively strong growth in the number of non-factory bakery firms, it is expected that VA per employee for baking in total would still decline over time if the *Economic Activity Survey* series was backcast (appendix G). (The data used to estimate MFP for FBT have been backcast for the inclusion of non-factory baking and other changes in ANZSIC.) [↑](#footnote-ref-21)
22. The number and shares of businessesby turnover size show little change over this period,based on data fromABS (2007). [↑](#footnote-ref-22)
23. In figure 5.20, Sugar and confectionery is included in Other food manufacturing and Bakery does not include non-factory baking. [↑](#footnote-ref-23)
24. Disaggregated data not available for other assets. Very limited data are available for ANZSIC groups within Food and BT (appendix G). [↑](#footnote-ref-24)
25. Estimates of capital stocks are based on measures of investment and a range of assumptions including asset life (appendix A). For practical reasons the capital stock is not tracked at the level of individual assets or individual factories. [↑](#footnote-ref-25)
26. The volume of Australian exports reached 584 million litres in 2003-04 (growing from 201 million litres in 1998-99). By 2001-02, exports overtook domestic sales as the largest contributor to total Australian wine disposals. [↑](#footnote-ref-26)
27. According to Winetitles (2013), between 2004-05 and 2007-08 the number of wine producers crushing less than 500 tonnes grew by 21 per cent, while those crushing over 10 000 tonnes declined by 15 per cent. ABS (2012e) show a general consolidation in producer numbers (based on wineries crushing 50 tonnes or more of grapes). [↑](#footnote-ref-27)
28. Derived from ABS (*Australian Industry*, Cat. no. 8155.0). Employment for 2007‑08 was imputed as the average of the adjoining years, given that no estimate was published by the ABS. [↑](#footnote-ref-28)
29. VA growth between 2006-07 and 2007-08 alone is greater than the growth over cycle 3. This growth is due mainly to the classes of baking that are comparable with those included in the cycle 3 estimates. Earlier data for non-factory bakery are not available (appendix G). [↑](#footnote-ref-29)
30. Given the wide ranges for the size categories, there could be considerable differences in actual average size. [↑](#footnote-ref-30)
31. Authors’ estimates based on ABS (2007). [↑](#footnote-ref-31)
32. Non-factory bakery may also have a higher proportion of part-time employment. This may have contributed to the higher growth of employment than hours worked for Bakery over cycle 4 (figure 5.26). [↑](#footnote-ref-32)
33. Growth in total hours worked in Bakery over cycle 4 (compared with cycle 3) may also have been affected by the change in industry classification — it was necessary for the ABS to backcast the *Labour Force Survey* data into ANZSIC06 using assumptions (appendix G). [↑](#footnote-ref-33)
34. Ratio of operating profit before tax to income from sale of goods, services, and rent, leasing and hiring from ABS (2008c). [↑](#footnote-ref-34)