Farm-to-retail price spread and farm share in food supply chains
Background paper
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Summary

Similar to some other countries, farmers and consumers in Australia are concerned about diverging trends between farmgate and retail prices for food, and the potential for market concentration in the processing and retailing sectors to lead to higher retail prices and lower farmgate prices. These concerns were recently reflected in the terms of reference for the Senate Committee on Rural and Regional Affairs and Transport’s inquiry into the effect of market consolidation in the red meat processing sector on market competition and farm returns. Similar concerns have been raised in other countries.

The main objectives of this paper are to:

- review local and international experience in monitoring and analysing movements in farm and retail prices for food products
- outline a relatively simple methodology used by the United States Department of Agriculture Economic Research Service (USDA ERS) to monitor changes in farm shares and farm-to-retail price spreads for food products
- review the availability of price data within Australia’s food supply chains
- identify options for ongoing monitoring and analysis.

The review of international research found significant variation across countries in the importance they place on food price monitoring and analysis. Research has consistently found that the more processed food products are at the point of retail sale, the lower the farm share, and that farm shares have generally been declining over time.

The review also found that the USDA ERS is a world leader in analysing prices in food supply chains. In 1946 the US Government introduced legislation mandating that the United States Department of Agriculture (USDA) measure the cost of marketing US agricultural commodities following concerns over movements in food prices. The methodology developed by the USDA ERS to calculate farm share and farm-to-retail price spread is considered to be the benchmark for this type of analysis.

Farm-to-retail price spread and farm share of the retail price are high-level indicators of the cost structure of a food supply chain. Farm share is the proportion of farm value in the retail price of a food item purchased at a retail store. The farm-to-retail price spread is the difference between the retail price and farm value at a given point in time. The farm-to-retail price spread includes payments for value-added services beyond the farm gate that are needed to transform a raw product into a retail product. They include transport, processing and retailing costs. Movements in farm share and price spread are analysed because a decline in farm share or an increase in price spread could signify a change in the level of competition in one or more sectors of a food supply chain.

Few studies systematically analyse movements in farm share or price spread in Australia over the long term. Despite this, some price data are available in Australia that could be used to estimate long-term trends in farm share and price spread. Although these data have some limitations, ABARES is currently investigating the potential to estimate farm share and price spread over longer periods by applying the USDA ERS methodology to Australian data, using the sugar and beef industries as examples.

One limitation of the high-level analysis undertaken in these type of studies is that many factors can lead to an increase in price spread (or a decline in farm share). For example, in addition to
changes in relative market power along a food supply chain, an increase in farm-to-retail price spread could reflect productivity in the farm sector increasing at a faster rate than in the processing or retailing sectors, an increase in the price of inputs in the processing or retailing sectors or a change in consumer preferences that require more value-adding by processors or retailers.

Although monitoring changes in farm-to-retail price spreads may be useful, because a widening in spread could be an early indicator that competition issues are emerging within a supply chain, further research will always be needed to confirm whether this is the case.

Another option that could help identify whether market power is a problem is to collect data on costs and prices beyond the farm gate. This approach could allow an analysis that differentiates between sectors (for example, the processing and retail sectors), and identifies the range of factors influencing costs and prices within these sectors. It could also facilitate the estimation of profit margins in different sectors. However, the data required for this type of analysis are commercially sensitive, likely to be difficult to obtain and expensive to collect and validate. Collecting this type of data may be possible and worthwhile following identification of a potential problem, but it is unlikely to be feasible for general ongoing monitoring and analysis.

A more realistic option may be to replicate another methodology developed by the USDA ERS, which uses input–output data to decompose costs and profits between different sectors within a supply chain and to estimate returns to primary factors, including capital and labour. This type of analysis would be more expensive than the high-level analysis described in this paper but it would also be more informative than the farm share/price spread analysis in identifying the range of factors influencing prices, and lead to a more informed debate about the various factors influencing prices, including market power. It would also allow a more detailed analysis of the cost factors influencing the competitiveness of Australia’s food exports. If the methodology implemented was consistent with that used by the USDA ERS, it would allow comparisons with the United States and other countries adopting this methodology, including France and Canada.
1 Introduction

Concerns about diverging trends in prices received by farmers and retailers in Australia’s food supply chains have generated interest in the connection between farm commodity prices and retail food prices. Prices are a common factor linking raw farm commodities through the various stages of the supply chain to the retail food product.

Price transmission is a major indicator of efficiency, effectiveness and degree of competition within supply chains. If all markets along the supply chain are perfectly competitive, a price change in one sector of the supply chain should be transmitted to other sectors in the supply chain. Although there may be short-term deviations, because of price levelling practices or use of inventory, sustained changes would be expected to be fully reflected in other sectors.

The main reason policymakers are interested in farm commodity and retail price trends is because a change in trend could signify a change in degree of competition in one or more sectors in the food chain. An important role for government is to implement institutional arrangements that lead to efficient markets. Markets can fail when businesses dominating a market inflate output prices or suppress input prices. Given that most farmers are price-takers, an increase in market concentration in the retail or processing sectors could result in farmers receiving lower prices than would occur in a perfectly competitive market. It could also lead to higher retail prices. In Australia, there is significant interest in whether consolidation in the food processing sector could lead to farmers receiving lower prices.

One of the objectives of this background paper is to review local and international experience in monitoring food prices and analysing movements in farm and retail prices for food products. Specifically, movements in farm-to-retail price spread and the farm share of the retail price are discussed. Price spread and farm share are high-level indicators of the cost structure of the food supply chain. The retail price is divided into the value of farm inputs used to produce the retail food item and the marketing bills. For farm inputs, if it takes two units of a raw commodity to produce one unit of a retail food product, the price analysis takes this into account. Marketing bills are payments for value-added services beyond the farm gate that are needed to transform the raw product into a retail product. They include transport, processing and retailing costs.

Identifying inefficiency within food supply chains as a result of an increase in market power in one or more sectors is more complex than identifying an increase in price spread or a reduction in farm share. These changes can occur for a number of reasons. For example, an increase in the price spread could occur because of changes in consumer preferences, requiring retail products to be more highly processed. They could also be the result of an increase in off-farm input costs, such as energy or labour costs, or an increase in productivity in the farming sector relative to the processing or retail sectors.

The methodology used by the United States Department of Agriculture Economic Research Service (USDA ERS) to monitor changes in price spread and farm share is outlined in this paper. The discussion presented in this paper and the analysis in subsequent industry reports is based largely on the USDA ERS methodology. Applying this methodology to Australian data could alert policymakers to competition issues in one or more sectors within Australia’s food supply chains. However, the nature and complexity of markets within supply chains suggest that additional analysis would be needed to confirm whether any participant in the supply chain is exerting market power.
Issues relating to price data within Australia’s food supply chains are also discussed. Calculating farm-to-retail price spread and farm share statistics requires access to a range of data. The main publicly available sources of data are the Australian Bureau of Statistics (ABS) and the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). The ABS collects data on retail food prices and local value and volume of production for agricultural commodities while ABARES collects farm-level data for some commodities via farm surveys. Scanner data and shoppers’ panel data can also be used to estimate retail prices but these data can be costly and access and use can be restricted.

Unfortunately, there is generally a lack of data that will allow a breakdown in marketing costs and facilitate analyses of farm to processing or processing to retailing price spreads. Access to this type of data would help identify the use of market power. However, confidentiality agreements between processors and major retailers are likely to preclude collection of this type of data.

Another potentially rich source of data is input–output data. The USDA ERS has developed a methodology that uses input–output data to decompose costs and profits between different sectors within a supply chain, and to estimate returns to primary factors, including capital and labour. The ABS releases input–output tables every few years detailing the supply and use of products in the Australian economy. This type of analysis would be more expensive than the high-level analysis described in this paper but it would also be more informative in helping identify market power in food supply chains. It would also have the additional benefit of identifying factors influencing the competitiveness of Australia’s food exports.

Chapter 2 of this paper contains some background information on the economic linkages in the food supply chain and the relevance of farm-to-retail price spread and farm share. In Chapter 3, a review of international studies on price spread and farm share is provided. In particular, the findings on price spread and farm share of food products in the United States, France, the Netherlands, Canada, Finland and South Africa are discussed. Chapter 4 includes a review of previous studies in Australia on food prices, discusses data availability and identifies issues associated with using existing data for analysing long-term price spread and farm share for food. Some options for further research are identified in Chapter 5 and Chapter 6 contains some concluding comments.
2 Economic linkages in the food supply chain

2.1 Food supply chain

Food supply chains can be highly complex. Figure 1 represents an indicative supply chain within the food system (DAFF 2012). It starts at the farm, which produces agricultural commodities that are used by processors to manufacture retail food items that are then distributed to consumers via retailers or exporters.

The supply chain illustrated in Figure 1 covers the main components of supply chains for retail food items found in grocery outlets. Depending on the food item, some or all of the processes are required. Some food items bound for export (such as wheat) are only lightly processed in Australia, undergoing further processing overseas. Others targeted for domestic consumption (such as fresh bread) involve a high level of processing within Australia. Transport is an important component of some food supply chains.

2.2 Price transmission in the food supply chain

Price transmission refers to how market shocks or price changes at one stage of the supply chain are passed through to other stages of the supply chain or to horizontally related markets. Economists are interested in price transmission because adjustment to price shocks is an important characteristic of the functioning of markets (Vavra & Goodwin 2005).

The two main types of price transmission are horizontal and vertical price transmission:

- **Horizontal price transmission** refers to spatial price relationships—that is, links between prices at different locations. The law of one price states that the price of identical goods in different markets should at most differ by the transaction costs of trading the good between different locations (Vavra & Goodwin 2005).

- **Vertical price transmission** focuses on price relationships between different sectors within a supply chain. In the food supply chain, these relationships are between the agricultural, food processing and distribution sectors.

Since the food supply chain is a series of vertically related markets, the focus in this report is on vertical price transmission. Vertical price relationships are characterised by the magnitude, speed and direction of adjustments (up or down) along the food supply chain to market shocks generated at different levels of the marketing process (Vavra & Goodwin 2005). Key aspects of vertical price transmission include:
how much of a price change at one stage of the food supply chain is transmitted to the other stages of the supply chain (the magnitude of the price adjustment)

- how long does it take for a price change at one stage of the supply chain to be transmitted to other stages of the supply chain (the speed of the price adjustment)

- are price increases/decreases transmitted differently in terms of speed, magnitude and direction (is the adjustment symmetrical or asymmetrical).

Price transmission can be used as an indicator of efficiency, effectiveness and the degree of competition in food processing and distribution. The Commission of the European Communities (2009) lists a number of factors affecting the magnitude, speed and asymmetry of price transmission within food supply chains.

First, vertical price transmission can be affected by market structure and industry consolidation within the food supply chain. Specifically, competition issues within any market or in vertical linkages between any of these markets can affect the magnitude, speed and asymmetry of how price changes are passed through food supply chains (OECD 2014a). For example, market power exercised by processors or retailers in input or output markets may contribute to asymmetric price transmission. This asymmetry could be reflected in increases in farm-level prices being passed on immediately by processors and retailers while price increases at the retail level are only partially transmitted back to the farm.

Second, vertical price transmission can be affected by the cost structure of food production. The structure of the food supply chain and the range of food products available to consumers have changed dramatically in recent decades, which has led to significant changes in the cost structure of food production. This is reflected in an increase in the importance of off-farm costs, including processing (often labour and energy intensive) and marketing costs. As processing and marketing costs have increased over time, farm share has been declining. With increased processing and marketing, the number of agents in the supply chain beyond the farm gate has increased. As a result, price signals passed from agent to agent may take place with significant delays if adjustment is costly or subject to constraints (Vavra & Goodwin 2005).

A number of other factors may explain why price changes, notably from farm level to other downstream stages through to the retail level, are not perfectly transmitted or exhibit some degree of asymmetry in competitive markets, especially in the short-run. The Commission of the European Communities (2009) has identified these factors:

- menu costs and price levelling practices—price changes at the farm or wholesale levels could be absorbed to minimise the costs associated with frequent changes in retail prices (for example, costs associated with advertising and labelling), consumer disruption and uncertainty over whether the source of the shock is permanent

- perishability—some food products have a short shelf life. If consumers are very sensitive to price changes, an increase in price will increase the risk that retailers are left with unsold stock and spoiled products

- internalisation of price variation—some output prices may be kept constant in the face of increasing input prices. This may be the case where farmers need to fulfil long-term contracts or want to maintain market share. This will result in reduced margins

- public intervention to support producer prices and/or control supply—these factors can cause asymmetry in price transmission. For example, if agents anticipate governments will intervene by setting a floor price when there are sharp falls in producer prices, retailers may not reduce the retail price of food.
2.3 Farm value, farm share and price spread

Farm value is a measure of the payment farmers receive for the farm product equivalent of retail food sold to consumers (see Box 1 for definitions of the pricing concepts discussed in this section). Farm value for an individual food item is expressed in dollars to allow for comparison with the item’s retail price. Farm value usually represents a larger quantity than the retail unit because the farm product will need to be transformed into a retail product. For example, to produce one kilogram of refined sugar at the retail level, 1.07 kilograms of raw sugar is required. To produce one kilogram of raw sugar around 7.25 kilograms of sugar cane is needed at the farm level. Therefore, if the price a farmer receives for a kilogram of sugar cane is 5 cents ($0.05 a tonne), the farm value of a kilogram of refined sugar that, for example, costs $1.50 at the retail level, would be 39 cents (7.25 x 1.07 kilograms of sugar cane at 5 cents a kilogram at the farm level).

Farm share is the proportion of farm value in the retail price of the food item purchased in retail grocery stores. In the example above, the farm share of the retail price is 26 per cent (($0.39 / $1.50) x 100). Farm share can vary significantly between retail food items. In general, farm share decreases as the degree of processing increases (Elitzak 1999). For example, milk is the principal ingredient in drinking milk and cheese. The additional manufacturing required for cheese should be reflected in a lower farm share of the retail price for cheese than milk. Farm share is also influenced by other factors such as product perishability and transport and retailing costs (Elitzak 1999).

The farm-to-retail price spread is the difference between the retail price and the farm value at a given point in time. It represents the marketing bills incurred post farm gate through to the retail level. These bills include charges for assembling, processing, transporting, marketing and retailing the farm product (Elitzak 1999). In the sugar example, the marketing bill for refined sugar is $1.11 a kilogram ($1.50 - $0.39).

An increase in the farm-to-retail price spread (the marketing margin) or a decline in farm share can occur for a number of reasons, including an increase in bargaining power by processors or retailers over farmers. Other potential factors include an increase in productivity in the farming sector relative to the processing or retailing sectors, an increase in the price of inputs in the processing or retailing sectors relative to the farming sector or a change in consumer preferences that require more value-adding by processors or retailers.

Considering the range of factors that can influence long-run farm-to-retail price spread and farm share, it is likely to be difficult to identify the precise contribution of any particular factor to any change in farm-to-retail price spread (OECD 2014a). Despite these complexities, it may still be useful to monitor changes in farm-to-retail price spread because a widening in this spread could be an early indicator that competition issues are emerging within a supply chain. However, further research would be needed to confirm whether this is the case.
Box 1 Definitions of farm share pricing concepts

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail price</td>
<td>Retail price is the amount consumers pay for a food item in retail grocery stores.</td>
</tr>
<tr>
<td>Farm value</td>
<td>Farm value is the payment farmers receive for the farm product equivalent of a retail food item sold to consumers.</td>
</tr>
<tr>
<td>Farm share</td>
<td>Farm share is the proportion of the amount consumers pay for a food item in retail grocery stores that farmers receive.</td>
</tr>
<tr>
<td>Farm-to-retail price spread</td>
<td>Farm-to-retail price spread is the difference between the retail price and the value of farm inputs used to produce a food item.</td>
</tr>
</tbody>
</table>

Source: Elitzak 1999

2.4 Price spread and price transmission

Figure 2 illustrates the high-level cost structure of a food supply chain where the price consumers pay for a food item comprises the farm value and farm-to-retail price spread. It also presents a stylised representation of the food supply chain as a series of vertically related markets where a change in price at any stage within the supply chain can affect prices at other stages.

Figure 2 Price spread and price transmission along the food chain

Price spread is fundamentally linked to price transmission, which is linked to competition within and between markets. Perfect vertical price transmission is defined as a situation where a change in price at one level of the supply chain is completely and instantaneously transmitted to prices at other levels of the supply chain (see Box 2 for an example). Where this is the case, margins between prices at different levels of the supply chain may rise or fall, depending on the elasticities of supply and demand in different sectors of the supply chain (elasticities refer to how prices respond to a change in supply or demand for a product). In reality, some delay in
price transmission and more complex linkages between farmgate and retail prices in perfectly competitive markets is likely in the short-run because of the type of factors identified in section 2.2. However, in the long run price transmission is expected to be complete, resulting in a new price spread between farmgate and retail prices.

Box 2 Perfect vertical price transmission and price spread

Figure 3 illustrates the relationship between perfect vertical price transmission and price spread. To simplify the illustration, a two-sector model of the beef marketing chain is assumed. The industry is separated into a slaughter cattle (farm) sector and a retail sector. Fixed input proportions between slaughter cattle and retail beef are also assumed. The retail sector is represented by consumer demand for beef (\( D_R \)) and the supply of beef (\( S_r \)) by retailers. The farm sector is represented by beef processors’ demand for slaughter cattle (\( D_F \)) and the supply of slaughter cattle (\( S_f \)). The intersection of supply and demand at each level determines market clearing prices (\( P_r \) and \( P_f \)) and market-clearing quantity (\( Q_o \)). The difference in equilibrium prices (\( P_r - P_f \)) represents the farm-to-retail price spread or marketing margin (\( M_o \)).

Suppose rising incomes lead to the retail demand curve for beef shifting upward and to the right from \( D_r \) to \( D_r' \). With perfect competition, the derived demand curve for slaughter cattle also shifts upward and to the right from \( D_f \) to \( D_f' \). With the assumed elasticities of supply and demand in Figure 3, the increase in the consumer price is larger than the increase in the farmgate price, so the farm-to-retail price spread increases from \( M_o \) to \( M_1 \).

Figure 3 Effects of increased consumer demand on the marketing margin (elastic supply)

With different elasticities the slopes of the supply and demand curves would be different and the price spread may rise or fall. For example, if the supply curve for slaughter cattle was more inelastic than the supply curve for retail beef in Figure 3, the shift in demand would lead to a reduction in the farm-to-retail price spread. This is illustrated in Figure 4.
Imperfect price transmission may also contribute to changes in price spread that can persist in the short and long run. This can occur if processors or retailers have market power over farmers or consumers and pursue oligopolistic or oligopsonistic pricing strategies (Agra CEAS Consulting 2007). In the case of a retail sector oligopoly (few sellers), the farm-to-retail price spread widens because of increasing consumer prices. With farm product market oligopsony (few buyers), the farm-to-retail price spread widens because of decreasing farmgate prices, reflecting a weakening in farmers’ bargaining power.

Imperfect competition within and between markets in food supply chains could also be reflected in asymmetric movements in the rate of change of the price spread. This asymmetry occurs when the response to a price change at one level of the marketing chain depends on the direction of the price change at other levels of the supply chain. For example, where retailers have buying power, this asymmetry could be reflected in increases in farm-level prices being passed on immediately and in full by retailers while price increases at the retail level are only partially and slowly transmitted back to farmers.

Given that most farmers are price-takers, an increase in market concentration in the retail or processing sectors could result in farmers receiving lower prices than would occur in a perfectly competitive market. It could also lead to higher retail prices. However, changes in the magnitude of the price spread may also occur in perfectly competitive markets.

### 2.4 Costs and margins in the food value chain

Ideally, any analysis to identify competition issues within supply chains and whether farmers are getting a fair share of the retail food dollar should focus on profit margins because market power is usually reflected in super normal profits.
Unfortunately, the cost and price data needed to analyse profit margins within supply chains are usually commercially sensitive, precluding this type of analysis. In the absence of this data, it may be possible to look at other factors to assess the risk that a business could unduly influence prices. For example, it may be possible to identify the market share of the business or whether there are any significant barriers to entry—such as high start up costs because of the capital intensive nature of the industry. It may also be possible to assess the potential for a business to consistently restrict competition (ACCC 2016a).

These same commercial sensitivities often preclude higher level analysis, such as an examination of farm-to-processor or processor-to-retail price spreads. As a result, price analysis is often confined to examining farm-to-retail price spread and farm share. Even this relatively simple analysis can be constrained by a lack of data. Analysing price spreads within supply chains requires consistent and systematic effort in collecting appropriate data. Chapters 3 and 4 provide an overview of efforts in Australia and overseas to monitor and analyse food prices.
Food price data are needed to calculate farm-to-retail price spread and farm share statistics. Many countries have agencies that have at least some food price monitoring function (OECD 2014c). However, few have dedicated agencies that collect, monitor, analyse and publish information on price spread and farm share. The most notable is the USDA ERS, which has been publishing this type of information for more than 50 years, and in more recent years has developed a framework that has become the benchmark for calculating farm-to-retail price spread and farm share.

International studies on farm share have revealed two broad trends across countries and over time. First, the more processed food products are, the lower the farm share of the food product. Second, farm share for many food products has been declining over time.

International studies investigating price spread, farm share and value-added in food supply chains have helped identify the contribution different industries and sectors make to the price of food. This information has also been used to improve dialogue between participants in the supply chain, and to add transparency to ongoing debate.

In this chapter, progress in monitoring food prices and reporting price spread and farm share in five countries is discussed in some detail. However, this is not an exhaustive list of countries that publish food price information and analysis. For a complete list, see OECD (2014c).

3.1 United States

The USDA ERS has collected and published farm-to-retail price spread data for food originating from US farms since the 1940s (Elitzak 1999). Food prices have long been a concern in the United States. In 1946 policymakers responded by introducing the Agricultural Marketing Act, which mandated that the USDA measure the cost of marketing US agricultural commodities (Schnepf 2013a). Commodity price spikes in 2007–08 and 2011–12, high levels of food price inflation and media attention on high retail food prices have renewed interest in the spread between farmgate and retail prices in recent years (Schnepf 2013a, b).

Trends in US farm share and marketing bill

Between 1953 and 1997, consumer spending on domestically produced farm foods in the United States increased by 114 per cent in real terms (Figure 5) to reach US$782 billion (in 2014 dollars). Elitzak (1999) divided consumer expenditure on domestically produced farm foods into the marketing bill component and farm value. The marketing bill grew steadily from 1953 to 1997, increasing by around 2 per cent a year to reach US$615 billion in 1997 (in 2014 dollars), while farm value peaked in the 1970s and remained largely unchanged in the decade to 1997. Consequently, farm share decreased from 38 per cent in 1953 to 21 per cent in 1997.

A key reason behind the rising marketing bill in the United States is a supply response to increased consumer demand for convenience and value-added services (such as pre-packaged meals and food eaten at restaurants). For example, the proportion of expenditure on food consumed away from home has steadily increased in the United States since the 1930s (Schnepf 2013b). Demand for convenience at food retailers has also been rising. Kuchler (2011) investigated how demand for loose leaf and bagged salad changes in the United States in
response to changes in income. He found that, in the short-run, a rise in income increased demand for convenience qualities but not for the total quantity of salad consumed.

Productivity along the food supply chain has also influenced farm share in the United States. A study by Hahn (2004) found that the widening gap between farm and retail prices for beef between 1970 and 2003 occurred mainly because of increases in retail prices rather than wholesale prices. Hahn (2004) explained this trend by rises in productivity at the farm and wholesale (for example, meat packing) levels relative to the retail level (where there is evidence of declining productivity). Part of the decline in productivity at the retail level was because of an increase in the number of food services, which are labour intensive (Hahn 2004).

Figure 5 Marketing bill series (in 2014 dollars), United States, 1953 to 1997

Sources: Elitzak 1999; Federal Reserve Bank of St. Louis 2016

Farm share for individual food items

The USDA ERS provides information on farm-to-retail price spread and farm share for a range of food items using data published by the US Bureau of Labour Statistics and agencies within the USDA. To compute farm-to-retail spread and farm share, the USDA ERS compares the retail price of food with the value of the quantity of agricultural commodities needed to manufacture it, less the value of by-products (see Appendix A and USDA ERS (2015a, b) for more information).

Farm-to-retail price spread for specific foods, such as bread and beef, may require at least a decade of data to show meaningful trends. For example, Roeger and Leibtag (2011) modelled the long-run relationship between farm-to-wholesale and wholesale-to-retail prices for beef and bread between 1972 and 2008. The results confirmed a long-run trend of retail prices diverging from wholesale prices and wholesale prices diverging from farmgate prices. Significant changes
in the relationship between retail and wholesale prices tended to occur around every 10 years, starting in 1980.

While long-run analysis indicates an overall decline in farm share of retail prices, there does not appear to be an overall short-run trend in farm shares across commodity groups. Rather, farm share trends seem to be commodity specific (Table 1). For example, farm share for milk in the United States has increased in recent years, with rising farm value not being matched with an equivalent rise in retail prices. Conversely, farm share for sugar fell to its lowest level in more than a decade in 2013, with farmgate prices declining by 31 per cent compared with only 7 per cent for retail prices. Farm share for bread has also risen over the past decade, reflecting high wheat prices since 2007, which were only partially passed onto consumers, while farm shares for fresh potatoes and fresh oranges exhibited no significant trend over this period.

Table 1 Farm share of food expenditure for select foods, United States, 2000 to 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Sugar (%)</th>
<th>Milk (%)</th>
<th>Beef (%)</th>
<th>Bread (%)</th>
<th>Fresh potatoes (%)</th>
<th>Fresh oranges (%)</th>
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</tbody>
</table>

Source: USDA ERS 2015a
Note: See USDA ERS 2015a for detailed descriptions of foods.

Figure 6 Farm share for milk, cheese and ice cream, United States, 2001 to 2013

Source: USDA ERS 2015a
Variation in farm shares between food groups can be considerable (Table 1), generally reflecting the level of processing beyond the farm gate, with foods that receive higher levels of processing typically having a lower farm share. For example, Figure 6 shows that farm share for dairy products decreases as the level of processing increases, from milk to cheese to ice cream. Fresh fruit and vegetables seem to be exceptions, with farm share appearing to be low despite little post-farm processing. According to Schnepf (2013a), the low farm share accruing to perishable products reflects post-farm handling and transport costs.

**Farm share for market baskets**

In addition to calculating farm-to-retail price spread and farm share for individual commodities, the USDA ERS provides retail cost and farm value indexes and farm share for aggregated 'market baskets' of commodities. The market basket is a representative grouping of what the average US consumer purchases for at-home consumption in a year for a food group. Because the quantity and type of goods in a basket are fixed, the market basket series data show the change in prices received by farmers compared with retail prices over time. The USDA ERS provides market basket data for dairy, fresh fruit and fresh vegetables.

**Table 2 Farm share for market baskets, United States, 2000 to 2013**

<table>
<thead>
<tr>
<th>Year</th>
<th>Milk and dairy (%)</th>
<th>Fresh vegetables (%)</th>
<th>Fresh fruit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>28</td>
<td>26</td>
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<td>2012</td>
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</tr>
<tr>
<td>2013</td>
<td>33</td>
<td>27</td>
<td>35</td>
</tr>
</tbody>
</table>

*na Not available.

Source: USDA ERS 2015a

Similar to individual commodities, short-run trends in farm share for market baskets are idiosyncratic (Table 2). Additionally, the components of each market basket can influence farm share of each market basket. Stewart (2006) highlights the importance of updating product quantities for each market basket to reflect changing patterns in consumer purchases. Using updated baskets for fruit and vegetables reflecting US consumer purchases between 1999 and 2003, Stewart (2006) estimated farm shares to be 23.5 per cent for vegetables and 26.6 per cent for fruit in 2004. This compared with 19 per cent for vegetables and 20 per cent for fruit using baskets reflecting 1982 to 1984 purchases. The increase in market basket farm share is in part the result of the updated baskets, which include greater quantities of items for which producers tended to receive higher prices. Current market baskets for fresh fruit and vegetables are based

**Macroeconomic approach to farm share in the United States**

USDA ERS has published marketing bill series data since the 1940s (Canning 2015). This divides total consumer food expenditure on foods produced in the United States into farm value and supply-chain marketing components. Because the type and amount of food that US consumers purchase are allowed to change from year to year in this series, the marketing bill is a measure of the total cost of marketing food rather than just a change in price of a fixed basket of goods (Elitzak 1999).

Because of data limitations, estimation issues and evolving interest in supply chain relationships, the marketing bill series was replaced with an expanded data series, the food dollar series (Canning 2015). The new approach uses input–output analysis and data from the US Bureau of Labour Statistics to generate estimates for shares of the food dollar accruing to different industries in the food supply chain.

The food dollar series is composed of three primary data series:

- the marketing bill component, which measures food dollar shares accruing to farms and the downstream supply chain (similar to the original marketing bill series)
- the industry group series, which divides the food dollar into value added for 12 industry groups (including farm production)
- the primary factor series, which divides the food dollar into shares accruing to imports, taxes, wages and property income (for example, compensation to owners of machinery, structures and natural resources).
The food dollar series shows that farm share in the United States declined in the late 1990s to reach a low of 15.1 per cent in 2002 (Figure 7). Since 2002 farm share has trended upward. In 2013, 17.4 cents of each food dollar accrued to farm value and 82.6 cents to the marketing bill. This trend is in contrast to the general long-run downward trend in farm share observed in Figure 5. This could be a short-term rise in farm share, which is not unprecedented, with farm share rising rapidly in the mid 1970s only to continue its downward trend in the 1980s and 1990s. In 2008 and 2011 farm share was estimated to increase by around 1 percentage point, coinciding with commodity price spikes in those years.

A key benefit of the new series is the ability to see how value is added across the food supply chain. Table 3 shows how value is added within the supply chain across industry groups and primary factors. Data from the food dollar series are available from 1993 to 2013 and are updated annually (Canning 2015).

Table 3 shows that, for each food dollar, value added from farm production in 2013 was 10.5 cents. This compares with 15.5 cents for food processing and 9.2 cents for wholesale services. Food service was the largest component of value added, accounting for 31.5 cents in 2013. This was much higher than value added by the retail sector, which accounted for 13.1 cents. Salary and benefits are the largest component of value added by primary factor, partly reflecting the large share of food service in value added.
### Table 3: Food dollar value added by industry group and primary factor, United States, 2013

<table>
<thead>
<tr>
<th>Industry group</th>
<th>Total (¢)</th>
<th>Imports (¢)</th>
<th>Output taxes (¢)</th>
<th>Property income (¢)</th>
<th>Salary and benefits (¢)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All industries</td>
<td>100</td>
<td>5.9</td>
<td>8.8</td>
<td>36.7</td>
<td>48.6</td>
</tr>
<tr>
<td>Agribusiness</td>
<td>2.1</td>
<td>0.5</td>
<td>0.1</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Farm production</td>
<td>10.5</td>
<td>0.9</td>
<td>0.1</td>
<td>7.9</td>
<td>1.7</td>
</tr>
<tr>
<td>Food processing</td>
<td>15.5</td>
<td>0.8</td>
<td>0.9</td>
<td>6</td>
<td>7.8</td>
</tr>
<tr>
<td>Packaging</td>
<td>2.6</td>
<td>0.8</td>
<td>0.1</td>
<td>0.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Transportation</td>
<td>3.3</td>
<td>0.2</td>
<td>0.1</td>
<td>1.2</td>
<td>1.8</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>9.2</td>
<td>-0.1</td>
<td>1.6</td>
<td>3.2</td>
<td>4.6</td>
</tr>
<tr>
<td>Retail trade</td>
<td>13.1</td>
<td>0.3</td>
<td>2.2</td>
<td>3.6</td>
<td>7</td>
</tr>
<tr>
<td>Food service</td>
<td>31.5</td>
<td>0.6</td>
<td>3.1</td>
<td>8.1</td>
<td>19.7</td>
</tr>
<tr>
<td>Energy</td>
<td>5.2</td>
<td>1.6</td>
<td>0.5</td>
<td>2.2</td>
<td>0.9</td>
</tr>
<tr>
<td>Finance and insurance</td>
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<td>0.2</td>
<td>0.1</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Advertising</td>
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<td>0.2</td>
<td>0.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Legal and accounting</td>
<td>1.3</td>
<td>0</td>
<td>0.1</td>
<td>0.5</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Note: Data accounts for total food expenditure, which includes both away-from-home and at-home expenditures. Source: Canning 2015

### 3.2 France

The French Observatory is a French Government agency that monitors and reports on consumer and farmgate prices as well as farm share for a range of agricultural commodities.

The French Government created the Observatory in 2010 amid volatile commodity prices and asymmetrical price movements in agricultural commodity and retail food prices (FranceAgriMer 2015). The aim of the Observatory is to measure and explain price changes along the entire food supply chain and to make this information public to improve efficiency in food supply chains.

The two main approaches used by the Observatory to analyse food prices are (i) sectoral analysis of retail prices and costs in food supply chains (price spread and farm share for individual commodities), and (ii) the ‘food euro’, which is a macroeconomic measure of aggregate value added by different participants in the food supply chain, including at the farm level (similar to the USDA’s food dollar series).

Price spread is calculated for a number of food groups, including fruit and vegetables, dairy products, beef, pork and poultry. The Observatory provides price data (including prices received, costs and margins) along the post-farm food supply chain.
Table 4 Farm share for select foods, France, 2001 to 2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Camembert (%)</th>
<th>Milk (%)</th>
<th>Beef (%)</th>
<th>Bread (%)</th>
<th>Pork (%)</th>
<th>Ham (%)</th>
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<tr>
<td>2014</td>
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<td>40</td>
<td>48</td>
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<td>36</td>
<td>31</td>
</tr>
</tbody>
</table>

na Not available.

Note: See FranceAgriMer 2015 for detailed descriptions of foods listed.
Source: FranceAgriMer 2015

Table 4 shows how farm shares for some food items have changed in France between 2001 and 2014. While farm shares for milk and camembert were similar in 2014 and 2001, farm share varied considerably over this period. The sharp increase in farm share for milk and camembert in 2014 coincided with a spike in commodity prices.

There does not appear to be a strong trend in farm share for beef between 2001 and 2014. Beef farm share was estimated to have increased from 42 per cent in 2009 to 52 per cent in 2013 as beef commodity price increases were not fully reflected in higher retail prices. However, this share fell to 48 per cent in 2014, reflecting a decline in commodity prices and largely unchanged retail prices.

The food euro data series produced by the Observatory is based on the method used by USDA ERS (Canning 2011, 2015), and uses input–output analysis to estimate farm share of food expenditure. Like the USDA ERS’s food dollar series, the food euro decomposes food consumption into value added by all industry groups, imports and taxes.

Farm share of the food euro steadily declined from 1999 to 2007, but increased to around 20 per cent from 2008 onwards (Figure 8). Post-farm value added accounts for the majority of food value added and increased by around 2 percentage points from 2000 to be 61 per cent in 2005, but has generally declined since 2006 as the share accruing to domestic agricultural production and imported food has increased. The share accruing to taxes and imports was largely unchanged between 2000 and 2011.

The declining share of French agricultural production in the food euro mirrors trends observed in other countries. One of the causes of this declining trend has been a greater share of value added beyond the farm gate (most notably in the services sector). Boyer (2015) notes that the Common Agricultural Policy reforms from 1993, which replaced price support with subsidies,
were also a factor in the declining farm share. However, more recently, volatility in agricultural commodity prices has also contributed to changes in farm share. For example, the increase in farm share of the food euro in 2008 largely reflected a general increase in agricultural commodity prices in that year.

Figure 8 Food euro, France, 1999 to 2011

Source: FranceAgriMer 2016

3.2 Netherlands

No dedicated agency monitors and publishes farm share data in the Netherlands. However, LEI Wageningen University has performed a price monitoring function since 2014, publishing monthly price indexes for select foods at three levels of the food supply chain. While LEI largely performs a monitoring function, the Netherlands Competition Authority (NMa) investigates the functioning of food supply chains in the Netherlands on a case-by-case basis. In 2009 in response to concerns over excessive market power and uncompetitive behaviour by supermarkets, NMa commissioned a one-off study detailing margins along the food supply chain.

LEI publishes food supply chain data for nine food products, including potatoes (including processed potatoes), bread, beef, pork, chicken, eggs, milk, fresh vegetables and fresh fruit. Price indexes are constructed using pre-existing data sources. Agricultural prices are collected by LEI and intermediary and consumer prices are sourced from the Statistics Netherlands producer and consumer prices indexes.

Monthly price data are generally available for agricultural commodities, supply chain intermediaries (such as processors, manufacturers and wholesalers) and consumers. For fresh fruit and vegetables, only consumer prices are available. Additional information is also provided for select commodity groups explaining any relevant price movements.

The price indexes for select food supply chains in the Netherlands generally show that agricultural commodity prices are more volatile than manufacturer and consumer prices (Figure 9). For example, the farm price index for bread increased significantly in 2007 and 2008, and
2011 and 2012—reflecting spikes in world wheat prices—while producer and consumer price indexes remained relatively stable. Most research suggests that wheat price has little effect on the retail price of bread because of its very low farm share, but LEI suggests that such a situation could also occur in the Netherlands because supply chain intermediaries (such as manufacturers) cover risks associated with the price and supply of raw materials through the use of contracts (LEI Wageningen University 2016).

Figure 9 Food price indexes, Netherlands, 2005 to 2015

Note: 2010 = 100.  
Source: LEI Wageningen University 2016

The 2009 NMa report on pricing in the agri-food sector includes buying and selling prices for a number of fruit and vegetable products, eggs and bread. Using these data, NMa (2009) was able to estimate margins at the farm, intermediary (such as manufacturing, processing and wholesale) and retail levels. Although the report only identified food price margins over a relatively short period (2005 to 2008), it did show that margins along the supply chain can be variable. Notably, despite changes in farm share between 2005 and 2008, these changes did not necessarily imply a similar directional change in producer margins. For example, while the farm share of bread increased in 2008, rising production costs squeezed producer margins, which resulted in these margins declining year on year (Figure 10).

Figure 10 Bread supply chain margins, Netherlands, 2005 to 2008

Source: NMa 2009
3.3 Finland

No single agency has been dedicated to monitoring food prices in Finland since the abolition of the Price Control Act of 1974 (see Finland response to OECD (2014b)). Currently, Statistics Finland collects consumer food price data and the Ministry of Agriculture and Forestry collects farmgate price data. Ongoing research into food price formation in Finland is conducted by a number of research bodies that receive funding from the Finnish Government. Price monitoring and analysis are conducted for a variety of purposes, including to increase transparency along the food supply chain and to provide information about the share of food prices accrued at different stages of the supply chain (OECD 2014c).

An increase in concentration in the retail sector and rising food imports are commonly referred to when discussing the decline in farm share in Finland (Toikkanen & Niemi 2014). Although the Finnish food retail sector has become more concentrated and exhibits evidence of imperfect competition, a number of studies have concluded that imperfect competition and rising imports are likely to be only two of several factors contributing to reduced farm share (Toikkanen & Niemi 2014).

Kuosmanen and Nieme (2009) analysed price margins for light milk and minced meat in Finland between 1975 and 2005. The analysis showed that farm shares for both items declined over this period, with farm share for minced meat falling from around 40 per cent in the late 1970s to less than 25 per cent in the early 2000s. These trends were analysed in the context of six possible drivers of the farm-retail price gap:

- increased levels of food processing (including convenience and semi-finished products)
- more stringent regulation on food hygiene
- different rates of productivity across the food supply chain
- farm policy reforms (for example, shift from price support to direct payments)
- openness to international trade
- level of competition in the food supply chain.

Among these drivers, Kuosmanen and Nieme (2009) found that openness to international trade, productivity growth and improved food hygiene were the main causes of increased farm-to-retail price spread in Finland.

In line with Kuosmanen and Nieme (2009), other researchers have found that farm shares for a number of foods in Finland have declined over time. Niemi, Jansik and Huan-Niemi (2011) analysed marketing margins for a number of food products in Finland for the period 1996 to 2010. They found that marketing margins had increased, while producer prices remained relatively stable (Figure 11). Toikkanen and Niemi (2014) also found that the gap between producer and consumer prices widened for beef, eggs, potatoes and liquid milk between 1995 and 2012.
3.4 Canada

A key concern for the Canadian Government is how food prices are distributed along the food supply chain and to what extent price changes are transmitted to producers. In particular, the Canadian Government is concerned about how the entry of large US food retailers (such as Walmart and Target) into the Canadian market will affect producer prices (see Canadian response to OECD (2014b)).

No single institution monitors food prices across the entire food supply chain in Canada. Statistics Canada monitors retail food prices and Agriculture and Agri-Food Canada monitors various agricultural commodity prices (see Canadian response to OECD (2014b)).

The Canadian Government and the private sector have published a number of reports examining farm shares in Canada. Using an approach similar to USDA ERS (2015a), Martz (2004) estimated farm share for a number of Canadian food products. More recent studies have used input–output analysis to estimate Canadian farm share (Ghanem & Cross 2008; Kelly, Canning & Weersink 2015). A brief summary of these studies is provided in this section.

Martz (2004) examined trends in Canadian farm share for a number of food products between 1981 and 2003. The analysis showed that retail food prices had generally increased significantly more than the underlying agricultural commodity price. In most cases, agricultural commodity prices in 2003 were largely unchanged from prices in 1981. As a result, farm shares for nine out of the ten food products investigated were lower in 2003 than in 1981. Eggs were the only commodity for which increases in farmgate prices were commensurate with increases in retail prices (Figure 12).
The analysis also showed considerable variation in farm share and price evolution between food products. For example, milk farm share fell from around 55 per cent in 1981 to around 40 per cent in 1990, where it remained until 2003. For beef (sirloin steak), farm share was 20 per cent in 1981. It remained between 16 per cent and 18 per cent between 1983 and 2001, before falling to 13 per cent in 2003. In May 2003 farm prices fell following the discovery of bovine spongiform encephalopathy in Canadian cows, while the retail price for sirloin steak remained relatively high. In July and August 2003 the farm share of sirloin steak dipped below 10 per cent, before recovering later in the year.

A number of recent and ongoing studies have used input–output analysis to derive estimates for farm share of consumer food expenditure. Farm share estimates differ between these studies, partly reflecting differences in methodology and the breadth of commodities considered.

Against a background of rapidly rising agricultural commodity prices in 2007 and diverging consumer food prices, Ghanem and Cross (2008) used input–output data to examine which industries contributed to the value added of every dollar spent on each type of food product. Estimates are obtained for farm shares accruing to producers for a range of food items purchased at grocery stores, including fish, meat, dairy products, fruit and vegetables and bread. Meat and dairy had higher farm shares (around 15 per cent) while bread and fruit and vegetables had very low farm shares. Manufacturers and farmers receive only one-third or less of revenues from consumer spending on bread and fruit and vegetables. Value-added services (largely by the retail and wholesale sectors) accounted for between a half and three-quarters of the retail price.

In more recent work on Canadian farm shares, Kelly, Canning and Weersink (2015) used Canning’s (2011) input–output methodology to investigate drivers of farm share of consumer food expenditure for Canadian agricultural products between 1997 and 2010. Farm share estimates are derived for commodity groups and as a total for all food products.

With respect to commodity groups, Kelly, Canning and Weersink (2015) estimated farm share for five crop-based and seven livestock-based food products. The findings were similar to other Canadian studies on farm share—less processed livestock products typically had a higher farm share than highly processed crop products such as bread. Eggs had by far the highest farm share at around 60 per cent in 2004, compared with Martz’s estimate of 80 per cent. Farm share for
milk was estimated to be 33 per cent, which is lower than other estimates. Kelly, Canning and Weersink (2015) suggest this might be the result of the choice of food products used in the estimation and methodological differences among researchers.

In addition to estimating farm share for individual foods, Kelly, Canning and Weersink (2015) estimated farm share for food at an aggregate level. For all food products (including food-at-home and food-away-from-home), farm share was estimated to have fallen from 19 per cent in 1997 to 17 per cent in 2010 (Figure 13). As expected, food away-from-home was found to have a far lower farm share than food-at-home. The decline in farm share for food-away-from-home was also greater than for food-at-home. Kelly, Canning and Weersink (2015) suggest that the steady decline in the overall average was the result of increased demand for convenience foods (such as prepared meals) and food-away-from-home. Evidence suggests an increase in consumer demand for convenience food products in Canada. For example, consumption of prepared meals increased by 12.5 per cent between 1997 and 2008 (Kelly, Canning & Weersink 2015).

Figure 13 Farm share, all food, Canada, 1997 and 2010

Agriculture and Agri-Food Canada is currently collaborating with USDA ERS to create a Canadian food dollar series following Canning’s (2011) methodology.

3.5 South Africa

Food price monitoring and analysis in South Africa is the responsibility of the National Agricultural Marketing Council (NAMC). The South African Government approved the establishment of a Food Pricing Monitoring Committee in 2002 in response to rising food prices following a sharp devaluation in the South African Rand at the end of 2001 (see South African response to OECD (2014b)).

Although rising food price inflation was a concern, a key focus for price monitoring activities has been food security. With around 50 per cent of South Africa’s population living below the poverty line in the early 2000s, food security was an important issue (see South African response to OECD (2014b)). Quarterly reports published by NAMC continue to contain commentary on the effect of food price inflation on very poor consumers.

The broad objectives of the council’s food price monitoring activities are to increase price transparency along the supply chain, provide price information to stakeholders (including
consumers and market participants) and to enable actions by competition authorities and legal services (see South African response to OECD (2014b)).

As part of its food price monitoring program, NAMC reports on food price spreads and farm shares for 26 basic food items on a quarterly and annual basis. NAMC uses a price spread approach similar to USDA ERS (2015a) to estimate farm shares. Table 5 shows farm share for some of the food items monitored by NAMC.

**Table 5 Farm share, South Africa, 2009 to 2013**

<table>
<thead>
<tr>
<th>Product</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>White bread (%)</td>
<td>16</td>
<td>16</td>
<td>18</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Beef (%)</td>
<td>44</td>
<td>43</td>
<td>44</td>
<td>46</td>
<td>43</td>
</tr>
<tr>
<td>Cabbages (%)</td>
<td>17</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Potatoes (%)</td>
<td>32</td>
<td>25</td>
<td>24</td>
<td>26</td>
<td>31</td>
</tr>
<tr>
<td>Full cream milk (%)</td>
<td>35</td>
<td>35</td>
<td>34</td>
<td>37</td>
<td>37</td>
</tr>
</tbody>
</table>

Note: See NAMC 2014 for full food group details.
Source: NAMC 2014.
4 Price spread and farm share in Australia

Similar to some other countries, farmers and consumers in Australia are concerned about diverging trends between farmgate and retail prices and the potential for market concentration in the processing and retailing sectors to lead to higher retail prices and lower farmgate prices (see Figure 14 for the long-term decline in the prices farmers receive relative to the prices they pay for inputs). In particular, there is growing concern about consolidation in the processing sector, with the Senate Committee on Rural and Regional Affairs and Transport recently investigating the effect of consolidation in the red meat processing sector on market competition and farm returns. The committee is due to report in March 2017.

Figure 14 Australian farmers’ terms of trade, 1974–75 to 2014–15

Source: ABARES 2015

4.1 Previous studies

The Australian Government and peak industry bodies have reviewed pricing within Australia’s food supply chain in recent years, with some studies analysing farm-to-retail price spread and farm share. However, the timeframes analysed in these studies have been relatively short. No study has systematically examined long-term trends in farm-to-retail price spread and farm share. The findings of the main studies are summarised in this section.

Australian Government Department of Agriculture, Fisheries and Forestry’s 2004 commissioned study Price determination in the Australian food industry

In the report Price determination in the Australian food industry commissioned by the Australian Government Department of Agriculture, Fisheries and Forestry, Whitehall Associates identified the major factors affecting food prices in the Australian domestic food sector (Spencer 2004). These factors include farm production, value-chain integration, marketing, regulation and compliance, international trade, technology and innovation and consumer and retail market
dynamics (see Spencer (2004) for a detailed discussion on how these factors affect prices). Value-chain integration refers to vertical integration of activities in the supply chain. For example, it may be possible to increase efficiency by vertically integrating production and processing activities. Food prices can also be influenced by marketing. There are increasing pressures on food manufacturers and retailers to differentiate their products, to increase the quality and convenience of their products and to globalise consumer brands. Moreover, food costs and prices can be affected by the level of exposure to international trade. For example, an increase in the world price of beef should be reflected in an increase in farmgate prices for cattle and retail prices for beef. Consumer and retail dynamics, including growth in private label food products, increased demand for convenience meals and greater concentration in the retail sector can also influence costs and prices.

The report compared prices at the farm, wholesale and retail levels for eight food groupings (dairy, meat, fresh horticulture products, processed fruit and vegetables, grain and oilseed products, eggs, sugar products and rice), and calculated farm shares for a number of food products within those groupings, including packaged milk, cheddar cheese, beef, apples, oranges, fruit juice, packaged flour, cooking oil, margarine, eggs and rice. With the exception of milk, the data used to calculate farm shares were only available for one to two years. Farm shares for packaged milk and retail beef are presented in this section (for other food products, see Spencer (2004)).

While the time period is too short to make any conclusions about long-term trends, farm share for 2-litre drinking milk for the years 1997, 2000 and 2003 declined (Figure 15). Over the same period, the processor share remained relatively stable, while the retailer share increased. The dairy industry was deregulated in June 2000. This involved removing the Domestic Market Support Scheme—which generated a monetary transfer from domestic consumers of dairy products to producers of manufacturing milk—and state regulations on the pricing and sourcing of domestic drinking milk (ABARE 2000). Following deregulation, the farmgate price of drinking milk fell significantly, but so did the differential between farmgate prices paid for milk used in fluid milk products and manufactured milk products (ABARE 2001). To ease adjustment, the Australian Government introduced the Dairy Industry Adjustment Package in July 2000. This package was funded by a consumer levy on fluid milk purchases over eight years.

Figure 15 Shares of retail milk prices, 1997, 2000 and 2003

![Figure 15 Shares of retail milk prices, 1997, 2000 and 2003](image)

Note: Figures based on 2-litre drinking milk
Source: Spencer 2004
For beef, farm share for breeding and fattening cattle accounted for just over half of the retail sales value in 2003 (Figure 16). In the same year, the processor share was around 10 per cent while the retail share was just under 40 per cent.

Whitehall Associates acknowledged a serious lack of price data for food supply chains in Australia. They also acknowledged that the quality of any price data available varies significantly across sectors, limiting the decision-making value of the information contained in their report.

**Figure 16 Shares of retail beef prices, 2003**

Source: Macarthur Agribusiness cited in Spencer 2004

**Rural Industries Research and Development Corporation’s 2016 commissioned study From farm to retail – how food prices are determined in Australia**

This report was prepared by Freshagenda (Spencer 2016). It is an update to the 2004 food price determination report prepared by Whitehall. The aim of the report is to provide a better understanding of the determinants of prices in key food value chains. There are a number of differences in the content and analysis in the updated report, including:

- a deeper analysis of consumer preferences
- an analysis of changes in the structure and competitive forces in retail markets
- an analysis of practices adopted by grocery retailers
- an analysis of the influence of international trade on food value chains
- an analysis of price transparency along food value chains.

The study found that Australian food is generally relatively more affordable than similar foods in other developed markets; that food prices in Australia appear to have risen more slowly in the past five years compared to a number of similar countries; and that weak consumer sentiment in recent years has led to cautionary consumer spending on food items purchased for meals at home, reduced spending on dining out and higher consumer spending on cheaper food items. This weak food shopper sentiment has in turn led to increased price competition between the major grocery chains. In addition, there have been significant changes to ‘competitive tension in
the grocery retail market with the revitalised financial performance of Coles and the rapid expansion of the Aldi discount chain’.

The study also found that the financial performance of grocery retailers in Australia is not ‘materially out of line with profitability being achieved in other comparable developed retail food markets’. However, the combination of rising operating, ingredient and labour costs and a static retail pricing environment for staple food lines had created ‘significant cost pressure along many food value chains, most significantly on the performance of food manufacturers and marketers’.

In terms of price transparency, the study found that while there may appear to be benefits from increased transparency, there are significant barriers, in particular, the confidential nature of most cost and price data. The study also suggests that ‘mandatory price reporting—a feature of US agriculture—does not appear to have reduced volatility over time or improved market efficiency for primary producers’.

Figure 17 Farm share of retail value

Note: For details on approach and key assumptions of analysis, see Spencer (2016).
Source: Adapted from Spencer 2016

The report also includes farm share of retail value estimates for a range of food items, including beef, lamb, pork, milk, cheese, butter, fruit, vegetables, canola oil, flour, rice and sugar. The periods for which data are available are relatively short, ranging from 2 years to 5 years (see Figure 17). Some estimates vary significantly for the period for which data is available. For example, farm share ranged between 40 and 68 per cent for fruit and between 38 to 60 per cent for vegetables for the two years to 2013-14. Farm share for flour and canola oil remained relatively static. There were also significant differences between meat products, with farm share for beef ranging between 31 and 39 per cent while farm shares for lamb and pork were significantly higher (between 51 and 63 per cent for lamb and 53 to 63 per cent for pork). Farm shares for more highly processed products such as sugar, canola oil, flour and butter were also lower than for less processed products, such as fruit, vegetables and milk.
**ACCC’s 2007 report Examination of the prices paid to farmers for livestock and the prices paid by Australian consumers for red meat**

In 2006 the Minister for Agriculture, Fisheries and Forestry wrote to the ACCC requesting that the commission examine the relationship between prices paid to farmers for livestock and the prices paid by Australian consumers for red meat. The minister was concerned that farmers were receiving minimal returns for livestock while consumers were paying record high prices for red meat. The request was made following a significant increase in the number of sheep and cattle sold in saleyards, which led to a sharp decline in prices paid for livestock in late 2006 (ACCC 2007).

The study found that the short-term divergence between the farmgate and retail price of beef was not inconsistent with historical price movements, and did not necessarily imply a lack of competition. According to the ACCC, the widening of the margin between saleyard prices and retail prices was caused mainly by the long and complex supply chain and the use of direct supply arrangements between retailers and suppliers (ACCC 2007). The meat supply chain is complex, involving a considerable number of processes that transform livestock into fresh meat for consumers to purchase at the retail level. As a result, the price of livestock is a relatively small proportion of the total cost of the final product. This can lead to large percentage decreases in the price of livestock (as was the case in the December quarter 2006) being reflected in much smaller percentage decreases in retail meat prices. Supermarkets are also increasingly using direct supply arrangements to secure consistency in the quantity and quality of supply. Under these agreements, livestock prices are less volatile than those typically observed at saleyard auctions, which provides retailers and producers with greater certainty. As retailers make greater use of direct supply agreements, the effect of saleyard prices on retail prices is likely to be less direct and more muted.

The ACCC also found that there appeared to be sufficient competition at both ends of the supply chain, and that it was unlikely any buyer or seller could unduly suppress the price of livestock and/or set domestic retail red meat prices without regard to competitors. International demand is the key influence on saleyard prices for both cattle and sheep; sales to international markets account for a large proportion of total meat production. Given the alternative markets available to producers, the ACCC considered it unlikely that any one party could suppress livestock prices and/or impose onerous terms and conditions. Similarly, domestic sales are divided between the food service, food processing and retail sectors. Within the retail sector, sale shares between large supermarkets and butchers appeared to be fairly similar. Under these conditions, it is unlikely any party attempting to charge unreasonably high prices could sustain these prices without losing market share (ACCC 2007).

**ACCC’s 2008 Inquiry into the competitiveness of retail prices for standard groceries**

The ACCC’s 2008 inquiry into the competitiveness of retail prices for standard grocery items was motivated by several factors, including whether the gap between farmgate and retail prices for groceries had been increasing and whether small family-run independent supermarket operators and other smaller retailers such as butchers, bakeries and greengrocers could compete with the major supermarket chains (ACCC 2008).

As part of the inquiry, the ACCC was asked to consider all aspects of supply chains in the grocery industry, including the nature of competition at the farm, wholesale and retail levels. The commission used a case study approach to analyse factors influencing costs in the supply chain for a number of standard grocery items, including white full-cream drinking milk, chicken, apples, bread, eggs, nappies, biscuits and beef (for full analysis, see ACCC 2008).
For fresh products, such as meat, fresh fruit and vegetables, the ACCC (2008) found no across-the-board evidence to suggest that retail prices for fresh products were increasing at a faster rate than farmgate prices. The commission also found no evidence to suggest that the major supermarket chains were acting in an anti-competitive way in their dealings with suppliers of fresh products.

For packaged groceries, such as drinking milk, biscuits and bread, the amount received by farmers tended to be small, typically reflecting the importance of other costs in the supply chain, including ‘capital intensive processing, packaging, advertising, delivery and retailing’. At the same time, international supply and demand determined the prices received by farmers for many agricultural commodities (ACCC 2008).

**ACCC’s 2016 report Cattle and beef market study – Interim report**

In October 2016, the ACCC released an interim report examining competition, efficiency, transparency and trading issues in the beef and cattle supply chain (ACCC 2016c). This study stemmed partly from issues raised in the Senate Inquiry into the red meat processing sector. Issues raised in ACCC investigations into JBS Australia’s acquisition of Primo Foods and into allegations that meat processors had collectively boycotted a prime cattle sale at Barnawartha saleyard in February 2015 also contributed (ACCC 2015a,b). The ACCC found no evidence to suggest that processors had entered into an arrangement to not attend the Barnawartha sale or that the JBS-Primo transaction would substantially lessen competition.

The ACCC did not receive sufficient data to identify how profits or margins are distributed throughout the industry (information was provided on a voluntary basis) (ACCC 2016c). However, it did find that 80 per cent of cattle acquired for processing travelled less than 400 kilometres to an abattoir, and that most of these producers have a range of buyers competing for their cattle, including the major supermarket chains, restockers, processors and live exporters. The commission did note that there were fewer buyers in some more remote areas, such as in northern Queensland, and that there was potential for further consolidation through mergers or acquisitions to ‘substantially lessen competition’ in these areas (ACCC 2016c).

While the study did not identify consolidation to be a significant problem, it did identify a number of factors that have the potential to influence prices paid for cattle (ACCC 2016c). One factor was a lack of transparency in cattle pricing and carcase grading. In particular, the study found that price grids are difficult to interpret, shifting a significant amount of risk onto producers when selling cattle. The study also identified concerns about saleyard auctions, including conflicts of interest in saleyard transactions when buyers bid for livestock on behalf of multiple clients. There were also allegations about collusion and bid rigging at an east coast saleyard (the ACCC is continuing to investigate allegations of bid rigging and other anti-competitive conduct outside of this study). The report contains a number of recommendations aimed at addressing these issues, including making price grids publicly available in a timely manner; making price grids easier to understand; introducing more robust auditing for carcase grading; adopting technology that will allow objective grading for carcases; and introducing a mandatory Buyers Register at physical auctions that includes details of commission buyers and livestock agents intending to bid at the sale and the principals commission buyers will be acting for (ACCC 2016c).

**Industry initiatives**

Among the food industries, the meat industry appears to be the most active in monitoring and analysing prices along the supply chain. Meat & Livestock Australia (MLA) produces an in-house series of producer shares of the retail dollar for beef and lamb (Figure 18). The historical average is 34 per cent for beef and 48 per cent for lamb. More recent estimates indicate that
farm shares for beef and lamb were 51 per cent and 58 per cent in the September quarter of 2016 (MLA 2016). Saleyard prices for cattle are currently very high as farmers begin to restock following widespread rainfall in eastern Australia.

**Figure 18 Producer shares of the retail dollar, March quarter 1998 to Sep quarter 2016**

In 2014 the Cattle Council of Australia asked MLA to commission a study examining the potential for greater price transparency in the Australian beef supply chain (Condon 2015). The report *Milestone 5 – Beef Price Transparency: Options to address cattle and beef price transparency* (Todd & Barnard 2016) provides an executive summary of that research. Motivation for the report came from a recommendation of the Senate Inquiry (Rural and Regional Affairs and Transport References Committee) into ‘Industry structures and systems governing grass-fed cattle’ as well as broader industry interest in introducing mandatory price reporting arrangements similar to those operating in the United States (Todd & Barnard 2016).

The review of mandatory reporting in the United States found:

- the methods used by processors to set cattle prices did not change significantly pre and post introduction of mandatory reporting
- mandatory reporting had no effect on processors exerting market power.

Despite these findings, most studies suggest mandatory price reporting has been beneficial to US producers, playing ‘a very small but detectable role in price discovery’ (Todd & Barnard 2016). A key finding of the report is that typically over 95 per cent of price discovery in US cattle markets originates from the Chicago cattle futures market.

Todd and Barnard (2016) found that the benefits of increased price transparency in Australia are also likely to be small because producers already have access to a significant amount of market information (around 45 auction markets are reported weekly, as are over the hooks offer...
prices). Importantly, they found that increased transparency would not have changed the type of market conditions that existed in 2013 and 2014, when a drought-induced increase in supply led to a significant reduction in cattle prices (in 2013–14 the real weighted saleyard price of cattle fell to its lowest level since 1997–98 (ABARES 2014)).

According to Todd and Barnard (2016), increased price transparency is only likely to lead to significant benefits if it leads to creation of a cattle futures market or if it increases confidence in, and understanding of, the assessment of cattle against grids.

The grid system in Australia is complex (there are 104 grid values for the Jap Ox category alone, making it difficult to compare values) compared with that used in the United States, where pricing is based on three factors—the dressed weight of an animal, the USDA grade achieved and the yield grade achieved. The USDA grade and yield grade are determined independently (by a USDA inspector), not by the processor.

According to Todd and Barnard (2016), the greatest benefit from mandatory reporting in the United States was increased use of ‘value-based payments systems’ such as the grid system, and a reduction in the use of auctions and direct sales, where price is determined by live weight. Increased transparency in Australia could also lead to increased use of value-based payments systems if services were provided to make it easier for producers to compare alternative grids, and if measures were put in place to instil confidence in producers that cattle had been fairly assessed against grids.

The report includes a number of options to increase price and market transparency. These include mandatory price reporting (this would require legislation), voluntary price reporting by industry, and data being made available by MLA.

### 4.2 Australian data availability and issues

This review shows that little research has been undertaken analysing long-term trends in food prices, farm-to-retail price spread and farm share in Australia. One of the main reasons for this is the lack of data on prices along the food supply chain and, where data are publicly available, there can be issues associated with its use in price analysis. In this section, the main sources of data that can be used to estimate price spread and farm share for various food products employing a similar approach used by USDA ERS (2015a, b) are identified.

To systematically investigate long-term trends in price spread and farm share, time series data on retail and farmgate prices need to be collected. In Australia, no single entity monitors food prices. The Australian Bureau of Statistics (ABS) collects and publishes retail price data as part of its construction of the Consumer Price Index (CPI), as well as data for a range of commodities that can be used to derive farmgate prices. In addition, a number of other data sources are owned by peak industry bodies, retailers and other private sector entities such as market research companies.

#### Data on retail prices

Retail price data in Australia can be obtained from several sources. These include data compiled by the ABS (Average Retail Prices of Selected Items, cat. no. 6403.0 and ABS Consumer Price Index, cat. no. 6401.0), grocery scanner data obtained from supermarkets and shopper panel data obtained from market research companies.

Retail price data up to June 2011 are available from the ABS publication Average Retail Prices of Selected Items (cat. no. 6403.0), and data after 2011 can be extrapolated using the relevant
subgroup index from the Consumer Price Index (cat. no. 6401.0) (ABS 2014b, c). The CPI subgroup index is considered a good indicator for extrapolation as it tracks the general price movement for that food subgroup. For some food items (including some fruit and vegetables), the CPI subgroup index is not available. Where this is the case, retail prices after 2011 can be extrapolated using wholesale market prices.

Food items in ABS cat no. 6403.0 were classified into seven major groups. Within each group, the ABS collected data for a number of food items sold at selected grocery stores and retail outlets in eight major capital cities. Prices were averaged across a range of grades, qualities and brands offered by a number of retailers in each city.

Grocery scanner data are available from the big supermarket chains. Access to and use of these proprietary data are subject to restrictions and, where available, can be expensive. Similarly, shopper panel data can be purchased from market research companies.

**Data on farmgate prices**

Farmgate prices can be derived from ABS data by comparing local value data for a particular commodity with production level data for a particular year. These data are published in the ABS publications *Agricultural Commodities* (cat. no. 7121.0), *Value of Agricultural Commodities Produced* (cat. no. 7503.0) and, in earlier years, *Agriculture, Australia* (cat. no. 7113.0) (ABS 2014d, e, f).

Data on farmgate prices are also available from industry research bodies and ABARES farm surveys. Meat & Livestock Australia (MLA) collects saleyard prices for cattle and sheep and Dairy Australia collects farmgate data for drinking milk and manufacturing milk. Other industry peak bodies such as Horticulture Innovation Australia, AusVeg, Canegrowers and GrainGrowers may also have data on farmgate prices for their respective industries.

ABARES collects farm-level data using farm surveys. Farmgate prices (unit values) can be derived by comparing the total value of a commodity sold with the total volume of a commodity sold at the farm level. ABARES farm surveys collect data for a range of agricultural industries. There are regular surveys for broadacre livestock and cropping farm businesses, dairy farm businesses, vegetable-growing farm businesses and irrigation farms in the Murray–Darling Basin. Other *ad hoc* surveys have been conducted for the sugarcane, wine grape and honeybee industries.

**Data on export prices**

Data on commodity export prices are collated in the ABS publication *International Trade, Australia* (cat. no. 5465.0) (ABS 2014a). Monthly data are available for all merchandise trade, with export prices reported as a free-on-board (FOB). Where export prices are not available, export unit values can be derived by comparing total export value with total export volume. These prices are generally recorded in dollars per tonne shipped weight.

**Data on conversion factors**

Where available, conversion factors published by the USDA ERS (2015a) that allow the derivation of retail equivalent farm value can be applied to Australian data. However, there are likely to be differences between the US and Australian food transformation processes, so the local industry should be consulted to refine any assumptions on conversion factors.
Data issues

A number of issues relating to the use of existing data will affect any analysis of prices in supply chains. Publicly available data at the farmgate and retail levels tend to be highly aggregated at the city, regional or national level. While more detailed data such as scanner data may be available, it is likely to be expensive and subject to restrictions. Estimates of farm share and farm-to-retail price spread are sensitive to the type of data used, so estimates derived using aggregated national data could be quite different from those estimated using store and farm-level data.

ABS data are often not collected with the intention of creating a time series (ABS 2014c; ACCC 2008). As such, changes are made over time to:

- commodity categories in both retail and farmgate price series, which makes it difficult to create a consistent time series
- definitions of food items and their corresponding units. For example, there have been changes to the unit collected for some commodities in the retail price data series as well as in the form of packaging. The standardisation of commodity units to 1 kilogram (for example, beef, tomatoes, bananas and sugar), 680 grams (for bread) or 1 litre (for milk) to create a consistent price series ignores that different packaging options may have different packing/marketing costs.

The nature of some food products is also unclear. For example, it is unclear whether data on cheese is collected for cheddar or other types of cheese, and whether data on bread is collected for a standard loaf of white bread or more premium products. The ABS cautioned that the average retail prices of selected items should be regarded as no more than approximate indicators of price levels for the items concerned because the selected grades, brands and package size for some items may differ between cities and from one period to the next because of changes in product specifications (ABS 2014c).

Table 6 summarises the main data sources and some of the limitations associated with each of these sources. Other potential sources of data include industry bodies such as Meat & Livestock Australia and Dairy Australia.

Table 6 Data sources and limitations

<table>
<thead>
<tr>
<th>Price point</th>
<th>Sources</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export prices</td>
<td>ABS cat. no. 5465.0</td>
<td>Export values are generally reported in dollars per tonne shipped weight, although this depends on the product</td>
</tr>
<tr>
<td>Retail prices</td>
<td>ABS cat. no. 6403.0</td>
<td>Discontinued in June 2011</td>
</tr>
<tr>
<td></td>
<td>ABS cat. no. 6401.0 (CPI)</td>
<td>Only available for broad categories of food</td>
</tr>
<tr>
<td></td>
<td>Scanner data from supermarkets</td>
<td>Costly, proprietary and restricted</td>
</tr>
<tr>
<td></td>
<td>Shopper panel data</td>
<td>Costly and proprietary</td>
</tr>
<tr>
<td>Wholesale prices</td>
<td>Wholesale prices for fruits and vegetables from major city markets</td>
<td>Very limited data on costs and prices of wholesalers</td>
</tr>
<tr>
<td>Farmgate prices</td>
<td>ABS cat. no. 7113.0, 7121.0 and 7503.0</td>
<td>Limited data on price received by farmers in various horticultural and vegetable industries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aggregated data, making it hard to distinguish between prices of products destined for retail and manufacturing markets</td>
</tr>
</tbody>
</table>
The limitations in Table 6 indicate that the availability of data to estimate price spread and farm share in Australia is not as complete as in some other countries such as the United States and France. In the United States, collecting detailed food price information has been mandated by congress since the 1940s.

To allow for better monitoring of prices along food supply chains, more spatially disaggregated and lower level data would need to be collected.
5 Further research

Several options could improve on the basic farm share and price spread analysis described in this report. As mentioned in the previous chapter, the analysis may be improved by collecting retail scanner data from supermarkets or homescan data from market research companies. However, the issue of having to undertake additional research to confirm the existence of market power would remain.

One option that could help identify whether market power is a problem would be to collect data on costs and prices beyond the farm gate. This type of data could allow a more detailed investigation of costs within a supply chain (for example, differentiate between processing and retailing costs), and potentially facilitate estimation of profit margins in different sectors within a supply chain. However, this type of data is highly commercially sensitive, and as a result, difficult to obtain and relatively expensive to collect and validate. The detailed nature of this type of analysis also suggests that it is likely to be more suitable for one-off analysis of a specific issue than ongoing monitoring.

A more suitable option for ongoing analysis may be to use input–output data to investigate the backward and forward linkages between farm production and the rest of economy. This analysis would combine farmgate price data from the ABS, ABARES or other sources with input–output data compiled by the ABS. Input–output data identifies interdependencies between industries within an economy and between industries and final market sales. As a macroeconomic analytical tool, input–output analysis can potentially decompose all costs and profits between various parties within a food supply chain. This analysis could be undertaken using a similar methodology to that used by the USDA ERS, which generates three time series statistics.

The first allows an analysis of farm value and food marketing bills, similar to the farm share and price spread analysis described in this study.

The second traces the forward linkages of an industry. That is, it traces how the unit value of output from a particular industry is split between various industry groups and final users (both domestically and overseas) within a food supply chain. In its early work, the USDA ERS identified 12 industries, including agribusiness, farm production, transportation, wholesale trade, retail trade and food services. However, it may be possible to apply the analysis to more detailed commodity groups in Australia given that input–output data in Australia is more disaggregated than in the United States.

The third traces the backward linkages of an industry by breaking the unit cost of production into the costs of intermediate inputs (for example, fertiliser, chemicals and agricultural services) and rewards to primary factors, including salaries, property income, imports and output taxes.

Analysis using input–output data would allow a more comprehensive assessment of the factors influencing prices, including market power. For example, it could allow producers in some sectors to benchmark their costs against the industry average (expressed as a percentage of total costs) and, if similar data were available in other countries, to compare costs with international competitors. It could also shed some light on the importance of costs that rely on access to public infrastructure, such as transport costs. Research by ABARES (see Goesch et al. 2015; Nguyen et al. 2015) shows that there are little data available on transport costs in Australia, but where data are available, it shows that these costs can account for a significant proportion of the farmgate value of some commodities. Access to this type of data could provide some high-level guidance to governments on the potential returns from investing in infrastructure, such as the road
network (for example, the Australian input–output tables have data on road transport costs and electricity transmission costs). For example, if the data showed that road transport costs were accounting for a high and increasing proportion of total costs for a particular product, or range of products, this would strengthen the case for additional investment in road infrastructure.

Research based on input–output data could also add significantly to any analysis of whether market power is an issue within a food supply chain, when compared with other industries and countries. For example, the main potential sources of market power in food supply chains are the food processing, wholesaling and retailing sectors. The USDA ERS methodology would allow the value of output (or farmgate price) in these industries to be decomposed and tracked over time. If the analysis showed a significant increase in the split for the retail sector, an interrogation of the primary factor series could identify whether this was because of an increase in returns to capital or labour. An increase in returns to capital in a highly concentrated industry could indicate that the industry is taking advantage of its position in the market. However, confirming that an industry is earning super normal profits would require additional analysis, including comparing profits with asset values. Conversely, an increase in returns to labour could indicate an increase in labour costs because of an increase in the price of labour, or an increase in labour intensive value-adding activities.

Analysis based on input–output data would help industry and government better understand which factors were driving movements in prices, and allow more informed debate about the influence of market power on prices than the high-level farm share/price spread analysis described in this study.
6 Conclusion

Policymakers are interested in long-term trends in farmgate and retail prices because a change in trend could signify a lack of competition in one or more sectors in the food chain, which could lead to farmers receiving lower prices or consumers paying higher prices than would be the case in a perfectly competitive market. For example, if processors or retailers had buying power, this could be reflected in increases in farmgate prices being completely transmitted through to retail prices, while price increases at the retail level because of an increase in retail demand may only be partially (and slowly) transferred back to the farm level. A partial transmission back to the farm gate could be reflected in a widening in the farm-to-retail price spread.

A review of international research analysing prices in food supply chains found considerable variation across countries in the importance they place on this type of analysis. The United States is a world leader in this type of research; the USDA ERS has developed a relatively simple methodology that can be applied to estimate movements in farm share and farm-to-retail price spread in food supply chains.

The review also found that, while few studies systematically analyse movements in farm share or price spread in Australia over the long term, some data are available that could allow this type of analysis. ABARES is currently investigating the potential to estimate farm share and price spread over longer periods by applying the USDA ERS methodology to Australian data, using the sugar and beef industries as examples.

One limitation of this type of high-level analysis is that many factors not related to market power within food supply chains can lead to an increase in price spread (or a decline in farm share). It may be useful to monitor changes in farm-to-retail price spreads because a widening in spread could be an early indicator that competition issues are emerging within a supply chain, but further research will always be needed to confirm whether this is the case.

For further research, it may be possible to get more accurate estimates of farm share and price spread through the use of better quality data, such as retail scanner data from supermarkets or homescan data from market research companies. However, the issue remains that additional analysis will be needed to confirm the existence of market power.

Another option would be to collect data on costs and prices beyond the farm gate. However, this type of data is commercially sensitive, and difficult to obtain, and the detailed nature of this research suggests it is likely to be more suitable for one-off studies investigating specific issues within a particular industry than ongoing monitoring.

A better option may be to use Australian input–output data to decompose costs and profits between various sectors within a food supply chain, and to estimate the returns to capital and labour in each sector. While this type of analysis would be more expensive than the high-level analysis described in this paper, it would also be more informative in identifying factors influencing the competitiveness of Australia's food exports, and would lead to a more informed debate about the various factors influencing prices, including market power. It would also allow a more detailed analysis of the factors influencing the competitiveness of Australia's food exports. If a methodology was implemented that was consistent with that used by the USDA ERS, it would allow comparisons with the United States and other countries adopting this methodology, including France and Canada.
Appendix A: Methodology of USDA ERS price spread series

The USDA ERS compares prices paid by consumers for food purchased through retail food stores with prices received by farmers for their corresponding commodities. Comparisons are made for individual food items and groupings of individual foods—market baskets. These market baskets represent what a typical US household buys at retail in a year. The cost of these market baskets at the retail level are compared with the prices received by farmers for a corresponding basket of agricultural commodities. For detailed documentation of the methodology, see USDA ERS (2015a).

The USDA ERS uses the market basket concept to analyse changes in grocery store food prices and to determine the underlying causes of changes in grocery store prices. The market basket contains the average quantities of food that originate mainly from US farms and are purchased for consumption at home in a base period, and excludes seafood and non-alcoholic beverages. Essentially, the market basket farm value is an index of prices farmers receive for agricultural commodities used for producing food and the market basket retail price is an index of prices consumers spend for groupings of individual foods.

In calculating farm shares for individual foods or for market baskets, the USDA ERS relies on conversion factors to specify the amount of farm commodities in a retail product, and takes into account any co-products/by-products made from these commodities. The conversion factors ensure that like-for-like products are being compared. More details on conversion factors are provided in section A.2.

The USDA ERS uses data from the Consumer Price Index published by the United States Bureau of Labor Statistics to compile the retail price series. For prices at the farm gate, USDA ERS relies on data published by agencies within the USDA, including the National Agricultural Statistics Services and the Agricultural Marketing Service.

The USDA ERS uses a different method to calculate price spreads for beef, pork, broilers, turkeys and eggs. For beef, the USDA ERS starts with a standard animal in calculating price spreads. This standard animal is cut up in a fixed way at the packing plant, and its wholesale cuts are in turn cut up in a standard way at the retail level. The price spread per kilogram of retail meat can be calculated. Alternatively, the total value of the animal at the farm can be compared with the total value of the animal at the wholesale and retail levels. For more details, see USDA ERS (2015b) and Hahn (2004).

A.1 Formulas

The farm value is the total amount received by farmers for the quantities of agricultural commodities provided to produce the corresponding retail food item.

The equation for farm value is:

\[
\text{Farm value} = \text{farm gate unit price} \times \text{quantities of agricultural commodities}
\]

The price spread for a specific commodity is calculated as:

\[
\text{Price spread} = \text{Retail price} - (\text{Farm value} - \text{value of co-products}) \\
= \text{Retail price} - \text{Net farm value}
\]
The value of co-products or by-products is calculated as follows:

\[
\text{Value of co-products} = \text{unit price of co-products} \times \text{quantities of co-products}
\]

The farm share statistic for a specific commodity is:

\[
\text{Farm share} = \frac{\text{Net farm value}}{\text{Retail price}}
\]

**A.2 Conversion factors**

Conversion factors specify the quantities of farm commodities in a retail product and account for the quantities of co-products made from these commodities in some cases. For example, conversion factors specify how much sugar cane farmers supply for each pound of refined sugar sold by retailers. These factors also state how much molasses, bagasse, boiler ash and filter mud can be made from milling the sugar cane but not used in the production of the refined sugar.

Conversion factors essentially convert the quantities of agricultural commodities into retail food equivalent quantities, enabling a like-with-like comparison of the farm value and retail price. Conversion factors for fresh fruit and fresh vegetables reflect spoilage and trimming. For meat, conversion factors specify meat yield from a live animal to a carcase and retail meat cuts as well as the co-products of the animal such as offal and hide.

Assumptions on these factors can affect net farm value and farm share of the retail price. Conversion factors may be adjusted. For example, waste and spoilage may be reduced by improved efficiency in food package and shipping. As a result, food marketers could buy a smaller quantity from farmers to provide the same quantity at retail.

**A.3 Limitations**

The market basket farm-to-retail price spread attempts to measure the costs for performing services connected with a fixed quantity of foods of a constant type and quality (Elitzak 1999). As a result, changes in the value of the market basket are strictly the result of changes in price. Changes in the retail prices of the market basket are components of the CPI for food consumed at home. The market basket farm-to-retail price does not capture the changes in consumption quantities of different food items, for a given market basket. However, the USDA ERS does change the market basket at regular intervals to reflect the changes in consumer preferences.

When farm-to-retail price spread is calculated for an individual food item, a fixed quantity of agricultural commodities are assumed to be used to produce the food item of a particular type and quality, reflected in the use of constant conversion factors. As a result, the farm-to-retail price spread of an individual food item does not reflect any change in production technology or the value-added components in the supply chain of that particular food product.

Price spread and farm share statistics are highly dependent on the data used. As retail prices for the same food can vary in different stores, the farm share of a consumer’s dollar is unlikely to be the same at any two stores.
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