OECD Food, Agriculture and Fisheries Papers No. 151

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OECD

OECD FOOD, AGRICULTURE AND FISHERIES PAPERS

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Concentration and Market Power in the Food Chain

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Concerns about market power and competition in the agri-food sector are widespread, with commentators regularly suggesting that farmers are in a structurally weaker position than other actors, who therefore benefit at their expense. The evidence reviewed in this paper indicates that downstream segments of agri-food chains are indeed typically more concentrated than farm-level production. Nevertheless, while competition problems were found in some instances, the current evidence does not support the claim that stronger actors in the chain systematically abuse their stronger position at the expense of farmers. An in-depth understanding of how value chains are organised is essential, as many widely used indicators provide little relevant information. In many areas, further research would be welcome, as current evidence does not cover all countries and sectors equally well.

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> **Key messages**
>
> - Downstream segments of agri-food chains (such as processing, wholesale, and retail) are usually more concentrated than farm-level production, which leads to widespread concerns over the perceived weak position of farmers in these value chains.
> - The evidence reviewed in this paper does not show systematic and large abuses of market power by other players at the expense of farmers. However, as in other sectors, there can be competition problems in specific cases.
> - There are long-term structural challenges in agriculture (such as the tendency for agricultural prices to fall over time due to productivity growth) which could be misinterpreted as competition problems. Hence, it is important to carefully evaluate the main causes of problems in the sector.
> - Many widely used indicators such as the 'farm share of the food dollar' provide little relevant information on whether there are competition problems. Instead, competition issues are best analysed using an in-depth study of a specific value chain, such as market studies conducted by competition authorities.

1. Introduction

Market concentration and market power in the food chain are recurring concerns for stakeholders, academics and policy makers alike (OECD (2005[1]), OECD (2014[2]), Howard (2016[3]), Wesseler et al. (2015[4]), MacDonald (2017[5]), Saitone and Sexton (2017[6]), Sheldon (2017[7]), Adjemian et al. (2016[8]), Bonanno et al. (2018[9])). A typical concern is that farmers have a structurally weak position relative to other actors in the food chain (such as processors and retailers) and may receive a lower price for their products than would be the case in a more competitive market, as a result of buyer power exerted by more powerful actors. It has also been suggested that farmers' weak position might mean that they have to accept trading practices which are deemed unfair, such as unfavourable payment terms or contracts which offer only weak protection against unilateral actions by buyers (Agricultural Markets Task Force, 2016[10]).[1]

Despite these concerns, several recent reviews of the academic literature have concluded that there is not much empirical evidence to support the hypothesis of a widespread problem of buyer power in agricultural product markets. There thus appears to be a gap between concerns around buyer power on the one hand, and the academic literature on the other hand. In theory, a number of possible explanations exist. A first possibility is that the existing empirical evidence is incomplete, perhaps because studies have tended to cover sectors where problems are less pronounced. A second possibility is that perceptions and empirical studies are capturing different aspects of reality, for example because empirical work has focused on prices paid to farmers while buyer power perhaps manifests itself as unfair trading practices. A third possible explanation is that buyer power is indeed only a minor issue in agri-food chains, perhaps because other factors offset the structurally weaker position of farmers. In that case, the perception of buyer power is perhaps an incorrect diagnosis of problems caused by other factors.

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[1] The discussion of buyer power in agricultural markets has some similarities with concerns around monopsony power and competition policy in labour markets, surveyed in OECD (2020[110]).

This paper reviews the available evidence on competition in agri-food chains, with a particular focus on whether downstream food chain actors are exploiting buyer power at the expense of farmers. Section 2 discusses available information on competition in agri-food chains. Different types of evidence have been used, ranging from summary statistics of market concentration to detailed studies by competition authorities. The section evaluates the strengths and weaknesses of different types of evidence and assesses what can be learned from this information about the question whether buyer power leads to lower prices paid to farmers. Section 3 discusses potential effects in the form of unfair trading practices. Section 4 then discusses how specific aspects of the way value chains are organised (i.e. the "architecture" of food chains) can influence the efficiency and distributional consequences of market power, including potential "offsetting" effects which could explain why buyers may not fully exploit their stronger position relative to farmers. Section 5 provides a brief sketch of other structural challenges in agri-food chains which could easily be misinterpreted as competition problems yet require very different policy responses.[2]

A recurring theme throughout this review is the importance of understanding the specifics of how a value chain is organised. Modern agricultural value chains differ from the "textbook model" of competitive markets with homogeneous products which is often the implicit benchmark used in policy debates. Over the past decades, changing trends in consumer demand and in the strategies of retailers and processors have led to a reorganisation of the architecture of agri-food chains, with a greater emphasis on product differentiation, quality standards, and the use of contracts. These and other features of the architecture of food chains (such as the role of cooperatives) are relevant to understanding market power and market concentration in the food chain (Bonanno et al. (2018[9]), Sexton (2013[11])). Understanding competition in a specific food chain, as well as the potential effect of policies, therefore requires a deeper understanding of the architecture of the chain. Detailed sectoral investigations conducted by competition authorities are therefore generally the most reliable source of evidence, while standardised indicators (such as concentration levels) can be misleading.

2. Evidence on competition in agri-food chains

To assess competition in agri-food chains, several empirical approaches have been used. These can roughly be divided into *structure*, *conduct*, and *performance* indicators. Indicators of market structure (e.g. the combined sales of the four largest firms, or other indicators of market concentration) are commonly used in policy debates, even though the link between market structure on the one hand and firms' conduct (e.g. pricing behaviour) and performance (e.g. profitability) on the other is not as straightforward as is sometimes assumed. For this reason, the academic literature on competition and market power has long favoured estimates of firms' conduct, assessing whether companies are behaving as if they are in a competitive market, rather than as if they have market power. Data on firms' performance in terms of profitability can provide complementary information.

This section reviews available evidence from all three approaches as it relates to the question of whether other actors in agri-food chains are using market power at the expense of agricultural producers. First, indicators of *structure* (market concentration measures) are presented. Next, available evidence on the *conduct* of firms buying agricultural products (the dominant approach in the technical literature) is discussed, followed by evidence on firm *performance* using information on profit margins along the food chain. In addition to indicators on structure, conduct and performance, policy discussions also often refer to the farm share of the food dollar or food euro, and price transmission indicators; these indicators are discussed next. Finally, specific sectoral investigations by competition authorities are discussed. These

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[2] Throughout this paper, the terms "food chain", "agri-food chain" and "agricultural value chain" are used interchangeably.

use a combination of data on structure, conduct, and performance, and may rely on otherwise confidential information to assess competitive conditions in a specific agri-food chain. While all types of evidence can shed some light on the functioning of markets, detailed sectoral investigations are preferable given the wealth of contextual information they can provide.

2.1. Structure: Indicators of market concentration

Information on market structure is commonly used as an indicator for (potential) market power. For instance, it has often been pointed out that the food chain is characterised by an "hourglass" shape, with a large number of farmers supplying a limited number of processors, wholesalers, and retailers which then sell to a large number of consumers. Measures of market concentration, such as the combined market share of the four largest firms in a market, or the Hirschman-Herfindahl Index (HHI), are commonly used by economists and competition authorities as indicators of competitive conditions in markets.[3]

Despite the widespread use of market concentration statistics, reliable data for the food chain are often hard to find. For the United States, nation-wide concentration ratios for food manufacturing industries are available from Economic Census data, compiled every five years. These estimates have been analysed by Rogers and Sexton (1994[12]), Crespi et al. (2012[13]) and Saitone and Sexton (2017[6]). Saitone and Sexton (2017[6]) note that in 2012, of the 37 food manufacturing industries covered by the data, 29 were unconcentrated as measured by a HHI below 1 500; five were moderately concentrated (i.e. a HHI below 2 500); and three (specialty canning, flavouring syrup and concentrate manufacturing, and other snack food manufacturing) were highly concentrated (i.e. a HHI above 2 500).[4] However, as Saitone and Sexton (2017[6]) point out, these nation-wide estimates are not very relevant from the point of view of analysing buyer power in agricultural markets. As farm products are often bulky and perishable, the relevant procurement markets are local or regional. Detailed information at these more disaggregated scales is typically not available.

Data on market concentration in retailing in the United States shows that the four leading grocery retailers increased their combined share of the national market from less than 20% in 1992 to close to 40% in 2013, but these estimates suffer from the same problem of defining the relevant geographical market. In several big US cities, four-firm concentration ratios for retailers are 60% or higher Saitone and Sexton (2017[6]).

Estimates for the European Union are available from a study by the European Commission on the economic impact of modern retail (European Commission, 2014[14]). Across a set of 23 product categories, average data for 14 EU Member States showed that market concentration levels in 2012 were generally highest for baby food, frozen ready-cooked meals, cereals and coffee; the lowest concentration levels were found for ham, bread and cheese. Averaged across the 23 product categories, supplier concentration varied from a HHI of less than 1 400 in Germany to more than 2 800 in Denmark with a median of 2 100. In most countries, average concentration had increased between 2004 and 2012.[5]

At the retail level, market concentration as measured by the HHI varied from less than 1 200 in Italy to more than 3 900 in Finland, with a median of around 2 000. In contrast with concentration of food

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[3] The Hirschman-Herfindahl Index (HHI) is defined as the sum of the squared market shares of firms. In the case of a monopolist (or monopsonist) the HHI would reach its maximum of 10 000; in a market with 100 firms with 1% market share each, the HHI would be 100. Guidelines by the US Department of Justice and the Federal Trade Commission for use in assessing mergers indicate that markets are generally considered "highly concentrated" if the HHI is above 2 500, and "unconcentrated" if the HHI is below 1 500. See https://www.justice.gov/atr/horizontal-merger-guidelines-08192010 (consulted 15 Oct 2019).

[4] As a reference, for a market with *n* equal-sized firms the HHI is 10 000 divided by *n*. Hence, a HHI of 2 500 would be equivalent to a market with four equal-sized firms.

[5] Detailed estimates by country and product category are available in the appendix of the same study (European Commission, 2014[14]).

manufacturers, average retail concentration had fallen between 2004 and 2012 as 16 of the 26 Member States for which data was available saw a decline in retailer concentration. (More detailed information for selected EU countries is available from country-specific studies as discussed in Annex B to this chapter.)

Comparable data for other countries are generally difficult to find, although for some countries detailed studies exist. In Mexico, for instance, a study by the Federal Economic Competition Commission (COFECE) published in December 2015 presents estimates of concentration levels at various stages of the agri-food chain.[6] Using data from the economic census, concentration appears to vary considerably by product category. For instance, the estimated HHI is less than 1 500 (indicating unconcentrated markets) for cane sugar, vegetable oils and fats, cookies and pastries, among others. Markets appear moderately concentrated for products such as beer, prepared foods other than frozen foods, and condiments and dressings, among others. For some product categories such as snacks, breakfast cereals, and industrial baking, the data suggests highly concentrated markets. As the report points out, the HHI estimates from the census may underestimate true market concentration in some markets.

Data on market concentration can provide useful context about the competitive conditions in a market. However, there are several drawbacks to using these indicators to investigate the effects on farmers of potential buyer power by other food chain actors. A first shortcoming, as noted earlier, is that publicly available estimates of market concentration rarely capture the relevant market. This is true not only in terms of geographical scale (procurement markets for agricultural products will rarely correspond with national or regional market definitions used in census data), but also for product definitions. Product categories used for concentration estimates in food manufacturing are not always the relevant ones from the farmer's point of view; it is not obvious how competitive conditions in wheat markets could be assessed based on concentration data from markets for bread, pasta, and frozen pizza.

An additional caveat in interpreting concentration data is that market structure by itself is not necessarily a good predictor of competitive conditions (Sheldon, 2017[7]). Some markets may be highly concentrated but may see fierce competition, for instance because a smaller firm is challenging an incumbent; or because the threat of entry by other firms limits companies' ability to move prices away from competitive levels.[7] In some markets, rapid innovation may mean that firms with a dominant market position can quickly be replaced by a more innovative rival. Moreover, the long-run incentive for a processor to maintain a stable supply of raw materials may trump the short-run incentive to exploit market power (Crespi et al. (2012[13]), Mérel and Sexton (2017[15]), Sexton and Tian (2018[16])). Even if a positive correlation is found between market concentration or market share and firm profits, this does not prove causality: it could be that more cost-efficient firms gain a higher market share while also making higher profits.

The evolution of the US meatpacking (meat processing) industry for cattle and hogs provides an illustration of the difficulty in using concentration ratios as indicator of market power (Box 1).

Interpreting the causal link between market structure, firm conduct, and firm performance is therefore often problematic. This explains why economists over the past four decades have moved away from such "structure-conduct-performance" studies in favour of alternative empirical approaches (Berry, Gaynor and Scott Morton, 2019[17]), such as those underlying the empirical studies on firm conduct reviewed below.

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[6] See https://www.cofece.mx/cofece/images/Estudios/COFECE_reporte%20final-ok_SIN_RESUMEN_ALTA_RES-7enero.pdf#pdf (accessed 25 September 2019).

[7] At the same time, this possibility should not be overstated; incumbent firms could also charge high prices until entry occurs and then drastically cut prices. The mere threat of doing so could deter entry despite high profit margins.

Box 1. Concentration and buyer power in the US meatpacking industry

The US meatpacking (meat processing) industry has seen a strong increase in concentration in recent decades (Figure 1). The share of steers and heifers slaughtered by the four largest firms has increased from less than 40% in 1980 to 85% in recent years; for cows and bulls, this share has grown from around 10% to close to 60%. For hogs, slaughter by the four largest firms has grown from one-third of the total in 1980 to around two-thirds today.

Figure 1. Market concentration in US livestock slaughter, 1980-2015
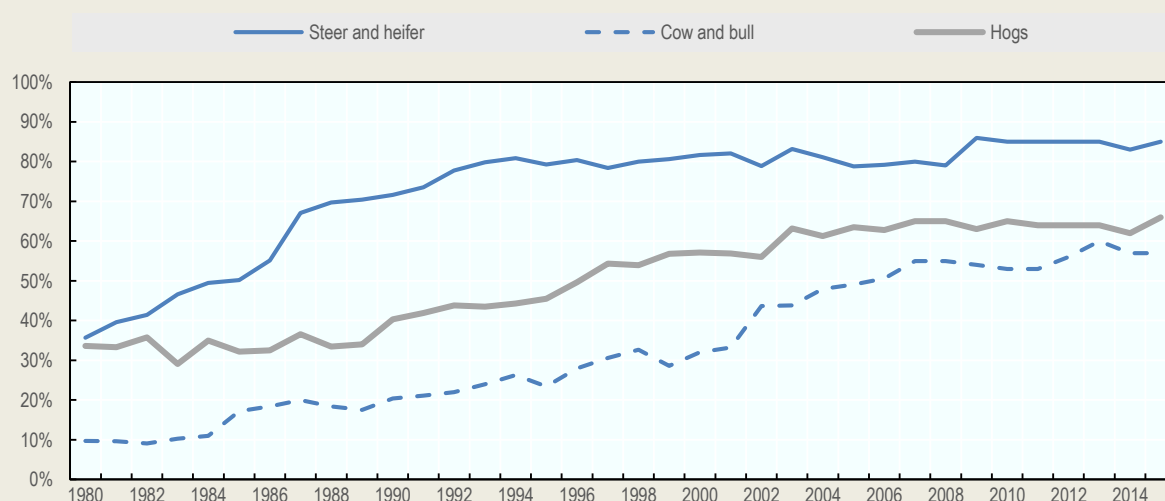
Note: Four-firm concentration ratio based on commercial slaughter in the United States.
Source: USDA Grain Inspection, Packers and Stockyards Administration, Statistical Report (various years) and Annual Report 2016.

In workshops organised jointly by the US Department of Agriculture and the Department of Justice in 2010 to explore potential competition issues, hog and cattle producers repeatedly mentioned the concentration and centralisation of meatpacking as a concern (US Department of Justice, 2012[18]).

A large number of studies have looked at the effects of concentration in US meatpacking, including studies commissioned by the US government. Perhaps surprisingly, a review of this literature concluded that "[s]tudies on market power in meatpacking indicate that concentration in procurement of livestock (cattle or hogs) has not adversely affected prices received by producers or prices paid by consumers. Indeed, there is evidence that producers may be better off because of lower processing costs due to the concentration and introduction of new technical innovations" (Wohlgenant, 2013[19]). More recent empirical work by Ji et al. (2017[20]) is consistent with these findings, and even suggests that markets have become more competitive since the 1980s despite higher concentration. Yet allegations of anti-competitive conduct by meatpackers have continued. In 2018, several buyers of pork products sued the leading US pork processing firms for alleged manipulation of prices, including alleged coordination through price and quantity reports from a market reporting service; this lawsuit is still ongoing (Vinson & Elkins, 2020[21]).

2.2. Conduct: Evidence on firms' quantity and pricing behaviour

While concentration data can be a useful starting point, they should be complemented by more detailed studies of competitive conditions in markets. The difficulty of reliably predicting firm conduct and performance on the basis of market structure data led to the development of empirical techniques to directly estimate firm conduct. These techniques (collectively known as the "New Empirical Industrial Organisation") have been used by several dozen empirical papers to analyse whether buyers of agricultural products are behaving in anti-competitive ways.

Multiple reviews of this literature have concluded that there is little evidence of a systematic problem of buyer power at the expense of farmers. McCorriston (2014[22]), summarising the literature in the context of the 2013 OECD Roundtable on Competition Issues in the Food Chain Industry (OECD, 2014[2]), concluded that "[e]mpirical evidence on the existence of buyer power is generally lacking". A more recent review by Sheldon (2017[7]) notes that "there is little robust empirical evidence for food processing firms exerting buyer power," while Sexton and Xia (2018[16]) similarly conclude that empirical studies "have tended to find only mild departures from perfect competition".

The methodology underlying these studies starts from the observation that under conditions of perfect competition, the price paid to a supplier for an input should equal its *marginal value product*. For instance, if the purchase of an additional live cow by a slaughterhouse would result in an additional 1 000 dollars of wholesale beef sales and an additional 200 dollars of costs (for labour, energy, other inputs, etc.), then, under conditions of perfect competition, the price of a live cow should be 800 dollars; if prices paid to suppliers are consistently lower than this marginal value product, this would be interpreted as evidence that buyer power is being exercised by the slaughterhouses to keep prices below their competitive levels (by deliberately restricting their purchases). Economic theory suggests that the gap between the price paid to suppliers and the marginal value product should be zero under perfect competition, and equal to the inverse of the farm supply elasticity under perfect monopsony, with intermediate values for oligopsonistic markets. Estimates of farm supply elasticities can thus be used to identify a "conduct parameter" equal to zero when buyers behave as in perfect competition and equal to one when they behave as perfect monopsonists.[8] Studies may also derive a parameter (known as the Lerner Index) capturing by how much farm prices would be higher if the market were characterised by perfect competition.

A detailed review by Perekhozhuk et al. (2017[23]) includes 38 studies on buyer and/or seller power in agricultural product markets, for a total of 93 estimates. Excluding estimates referring only to seller power by processors, their sample contains 36 conduct parameter estimates of buyer power. Most studies indeed only find modest deviations from competition; the median conduct parameter estimate is 0.05, indicating that firms are behaving more or less in line with what would be expected in a perfectly competitive market. This confirms the conclusion of other reviews that most empirical studies do not find significant deviations from perfect competition.

At the same time, these studies have tended to find relatively large price effects. The median estimate is 0.24, suggesting that under perfect competition farm prices would be 24% higher than those currently observed. This result is explained by the relatively low supply elasticities across studies.[9] The median supply elasticity in the studies is 0.17, implying that a 1% reduction in demand is estimated to decrease

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[8] The discussion here simplifies the various analytical techniques which have been used in the New Empirical Industrial Organisation literature. For a more detailed discussion, see Perekhozhuk et al. (2017[23]).

[9] As mentioned earlier, under the assumptions of the methodology used, buyer power is exerted by restricting purchases in order to lower prices. The estimated price effect is thus a combination of the overall level of demand reduction (which depends on the conduct parameter) and the impact a reduction in demand has on farm prices (captured by the elasticity of farm supply). Even a small demand reduction could result in large price effects if farm supply is highly inelastic, as appears to be the case in the studies reviewed by Perekhozhuk et al. (2017[23]).

farm prices by nearly 6%, a large effect.[10] This explains why studies have tended to find large price effects, but only modest levels of market power.

The interpretation of these findings is thus somewhat puzzling from a policy perspective. On the one hand, the estimated conduct parameters indeed suggest only small deviations from competitive behaviour; on the other hand, the estimated price effects suggest relatively large economic losses for farmers as a consequence of these small deviations. But if firm behaviour is indeed close to the competitive benchmark, it might be difficult to improve competitive conditions in these markets further, despite the potential gains for farmers from doing so.[11]

Moreover, the empirical studies covered by these reviews are not necessarily representative of all agricultural sectors. For instance, while livestock and meat products account for one-third of the estimates in Perekhozhuk et al. (2017[23]), their review included no estimates for some other sectors (e.g. fruits and vegetables). Geographically, the estimates come disproportionately from Australia and the United States, which together account for 20 of the 36 estimates. A broader sectoral and geographical coverage is therefore desirable.

Estimates with a better sectoral coverage are available from a working paper by Cechura et al. (2014[24]). Rather than focusing on a single sector, this approach uses firm-level data on some 8 000 firms in 24 EU Member States in four food processing sectors (slaughtering, fruits and vegetables, dairy, and milling) in the period 2003-2012. The results suggest a typical mark-down (i.e. a reduction in the price paid to farmers relative to the competitive benchmark) of 16% for slaughtering; 11% for fruits and vegetables; 7% for dairy; and 7% for milling, with some variation across countries and across firms within a given country. The authors conclude that these results show "quite small market imperfections", especially for dairy and milling (although the results do not permit an assessment of the relative role of buyer power and farm supply elasticity in the estimated markdown).[12]

To gather additional information, a systematic search of the academic literature was conducted. This search turned up 42 relevant papers with an emphasis on empirical research into buyer power affecting farmers. Sixteen of these were not included in the literature reviews of Perekhozhuk et al. (2017[23]), Sheldon (2017[7]) or Sexton and Xia (2018[16]); these are summarised in Annex A. Some of the studies find evidence of economically significant levels of market power and/or price distortions. This is the case, for instance, for the study by Kaditi (2012[25]) on the food chain in Greece as well as Dai and Wang (2014[26]) and Lan and Wang (2019[27]) on Chinese food chains. Similarly, Sexton et al. (2003[28]) found evidence of

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[10] More precisely, among the 36 oligopsony estimates, 32 reported a market power (conjectural elasticity) estimate (average 0.13, median 0.05) and 25 reported a Lerner Index (average 0.33, median 0.24). The Lerner Index is defined as the ratio of market power to the supply elasticity. In 21 cases both a conjectural elasticity estimate and a Lerner Index estimate are available, which allows deriving the supply elasticity (average 0.31, median 0.17). Perekhozhuk et al. (2017[23]) also report 8 estimates which include a mix of oligopsony and oligopoly effects; these are harder to interpret as some of the reported estimates are negative.

[11] An additional difficulty is that a strong increase in farm prices would in most cases be expected to lead to a long-term increase in supply, thus pushing prices back down. This raises the question of the time horizon. In the short run, farm supply is likely to be highly inelastic (consistent with the studies reported by Perekhozhuk et al. (2017[23])), but this is not true over the long run. This tension and its implications for the analysis of competition are explored by Mérel and Sexton (2017[15]); see also the discussion on "maintaining a stable supply base" in Section 4.

[12] The results of this study should be interpreted with caution, however. First, by construction, the dataset only includes food processing firms which are required by law to submit balance sheet information; depending on the country, this may exclude a non-negligible number of firms. Second, the methodology cannot distinguish quality differences or differences in product portfolio across firms, which is likely to cause some measurement error. Third, the reported results are not weighted by firm output, which means the markdowns cannot be interpreted as representative for the market as a whole. As a final caveat, the results in this paper have not been published in a peer-reviewed journal (which would normally guarantee an independent verification of the underlying methodology). Nevertheless, the study is a valuable contribution, not in the least because it covers a wide range of sectors and countries using a consistent methodological framework.

buyer power in the iceberg lettuce chain in the United States. However, most other studies found modest levels of buyer power across a range of sectors and geographies, from dairy in Brazil to beef packing in Canada. In particular, several papers studying the US livestock sector confirm that buyer power, if it exists, has on average relatively small effects on prices (Box 1).

This systematic search also shows that many geographies and sectors are not well represented. Among the 42 empirical studies identified, 21 focused on the United States; for many large European countries (e.g. France, Spain, Italy), only one or two studies could be identified. Similarly, of the 42 studies, 22 focused on livestock or meat, and 10 on dairy, with much less evidence on fruits and vegetables, grains, or other sectors. There is thus a clear need for more empirical research with a broader sectoral and geographic coverage.

The empirical literature thus does not permit a straightforward conclusion. On the one hand, the literature generally does not find strong evidence of anticompetitive behaviour by buyers of agricultural products, as concluded by McCorriston (2014[22]), Sheldon (2017[7]), and Sexton and Xia (2018[16]). On the other hand, the same studies often do find large price effects resulting from small deviations from the competitive benchmark. Additional studies reviewed here show diverse results, with some studies finding buyer power in specific geographies or food chains but not in others. A clear shortcoming of the existing literature is that studies do not cover all geographies and sectors equally well. [13]

2.3. Performance: Evidence on profit margins along the food chain

The approach underlying the studies on firm conduct has robust support in economic theory. However, one drawback in interpreting the results is that it ignores fixed costs. When an industry is characterised by fixed costs, then pricing according to the perfect competition benchmark might mean that firms are not able to cover these fixed costs. This makes the benchmark somewhat less useful from a policy perspective. An alternative benchmark is provided by *monopolistic* or *monopsonistic competition*. In a market characterised by such conditions, firms have some degree of pricing power, but entry and exit into the industry cause profits to fall to levels consistent with perfect competition. Under monopsonistic competition, prices paid to suppliers are lower than their marginal value product, but this markdown is used to cover the fixed costs of production, and "excess" profits are competed away by the entry of new rivals. Arguably, this offers a more realistic benchmark to evaluate actual market conditions.

Accounting data from firms could be used to assess profit margins. Such an analysis has some pitfalls, however, and economists have been reluctant to rely on accounting measures of profit in evaluating market power, for various reasons. First, accounting data rarely allow a distinction between different products and markets served by a firm; for multi-product firms active in several geographical markets, accounting profits could hide important differences across markets and products. Second, *accounting* profits are not the same as *economic* profits. While both concepts refer to "revenues minus costs", they differ in particular in their interpretation of costs. For instance, in contrast with accounting profits, economic profits should deduct *opportunity costs* of all production factors, including capital provided by shareholders and labour provided by owner-operators.[14] Third, the way firm performance is presented in accounting data (including the level of detail) may be influenced by differences in accounting standards, fiscal optimisation, or other factors such as corporate governance (Verriest, Gaeremynck and Thornton, 2013[29]). Accounting data on profit

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[13] While the focus of this paper is on OECD and G20 countries, a review of food crop markets in Sub-Saharan Africa similarly concluded that the available evidence is "broadly supportive of the notion that crop markets are competitive," with highly variable trading profits, high rates of entry and exit into trading, and co-movements of prices between markets suggesting effective arbitrage (Dillon and Dambro, 2017[101]).

[14] Other differences exist between the two approaches. For instance, a one-time investment may be depreciated over time in the accounting approach, which is not the case in the economic approach.

margins should therefore be interpreted with caution. Nevertheless, accounting data can be an interesting source of information and a starting point for further investigation.

The French Observatory of Prices and Margins in the Food Chain

Detailed information on profit margins along the food chain is not often available, as such data is typically difficult and expensive to collect.[15] One notable exception is France, where such information is collected by the "Observatory of prices and margins in the food chain".[16] Reports by the Observatory include information on prices and margins at different stages of the food chain, both in the aggregate and for individual chains (e.g. for pork, beef, dairy, etc.) (OFPM, 2019[30]). The Observatory reports indicators of gross margins for some specific products (i.e. the difference between the value of inputs and outputs at different stages of the chain), and also reports on net profit margins, after deducting all other expenses, of businesses at different stages of value chains. While the results cannot necessarily be extrapolated to other countries, information from the Observatory provides unique insights into the functioning of food chains in France.

A general finding across food chains in France is that profit margins as a percentage of sales tend to be relatively low at various stages in the chain. For the French food processing industry as a whole, pre-tax profits amounted to some 3-4% of sales in the period 2010-2016. For wholesalers, pre-tax profits were around 2% of revenues, while for French supermarkets the corresponding figure varied around 1%.

These numbers may seem surprising given that retail prices for food products are considerably higher than the producer prices received by farmers. For example, data from the Observatory indicates that pork sold in supermarkets costs 2.5 – 3 times as much as the price paid by processors to farmers. However, various other costs are incurred in the process of transforming an agricultural product to a final product available for purchase by consumers. Once the costs of salaries, rent, utilities, marketing, transport etc. at various stages of the food chain are taken into account, pre-tax profits are considerably lower than what the price gap would suggest. Between 2013 and 2018, estimated pre-tax profits for slaughterhouses processing pork varied between -1.2% and 1.5% of sales – i.e. in some years the industry is on average loss-making. Firms transforming pork meat into delicatessen (*charcuterie*) registered pre-tax profits between 1.9% and 2.9% in recent years. At the retail level, after staff and other overhead costs are allocated, the pre-tax profit margin for delicatessen is 8.3%, while other pork meat has a negative margin of -4.2% of sales.[17]

While the precise figures differ by food chain, the same pattern broadly holds across products. In nearly all the processing or wholesaling segments analysed by the Observatory, pre-tax profit margins are less than 5% of sales.[18]

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[15] See Oosterkamp et al. (2013[97]) for a discussion of the costs and benefits of different initiatives to improve the transparency of pricing and margins along the food chain.

[16] See https://observatoire-prixmarges.franceagrimer.fr

[17] This does not mean that French supermarkets are losing money on the sale of pork meat other than delicatessen; many fixed costs would be incurred regardless of whether, or how much, pork meat is sold. But it does indicate that the sale of pork meat by itself is not sufficient to recover these fixed costs; this is done through higher margins on other products (e.g. delicatessen, poultry meat, and to a lesser extent fruits and vegetables).

[18] Slaughterhouses processing cattle reported pre-tax profits varying between 0.3% and 2.3% of sales in recent years; for poultry meat, figures varied between 0.9% and 3.3%. Dairy companies specialised in producing butter and milk powders had similarly low profit rates (between 1.2% and 3.6% in recent years), but profits were higher for producers in other segments such as cheese (5.9%-7.9% of sales). For the milling industry, pre-tax profits varied from –0.1% to 2.2% of sales, while pasta producers saw profits between 3.8% and 5.8% of sales. For fruits and vegetables wholesalers, pre-tax profits are around 2%.

At the retail level, after deducting salaries and overhead costs, the pre-tax profit rate in French supermarkets varies from -8.5% for fish and seafood to 8.5% for poultry meat; for all food products taken together the corresponding figure is 1.2%.

The low profit margins expressed as a percentage of sales do not necessarily mean that firms in these sectors are making abnormally low profits. Businesses with a low profit margin as a percentage of sales may still generate a normal or high rate of return for shareholders if sales are high relative to capital invested, as is often the case in retail.[19] But the findings do raise doubts about the hypothesis that other actors along the food chain are capturing large profits at the expense of farmers. In particular, the low profit margins suggest that even if market power is exerted along the chain, there is only limited scope for raising prices paid to farmers without either causing other food chain actors to register losses, or raising prices for consumers.

The Spanish Observatory of Food Prices

An additional source of information is the Spanish Observatory of Food Prices (*Observatorio de Precios de los Alimentos*), which has conducted detailed decompositions of prices and margins for a broad range of food items such as bread, milk, beef, pork, poultry, eggs, fifteen types of fruits and vegetables, and fifteen types of fish and seafood.[20] Profit margins along the food chain broadly follow the pattern seen in France, with relatively low margins at all stages. For drinking milk, for instance, net profits of the dairy (processing) industry in 2011-12 were estimated at 2% of revenues, while estimated net profits at the retail level were negative (-10%). For artisanal bread, the estimated net profit of the milling industry in 2011 was negative (-13%), with 4% profit margins for bakeries and 6% for retailers. Estimates for the beef supply chain in 2009 showed a 1-3% net profit margin for slaughterhouses and a 2-5% net profit margin for supermarkets. Other value chains similarly show profit margins which are usually below 10% and often in the 0-5% range, although exceptions exist. For instance, for tomatoes, middlemen and retailers make net profits in the 5-13% range, in stark contrast to losses for primary producers (-29%); for salmon, retailer profits are estimated at 19-29% of the final sales price (although profit margins are negative for some other types of fish).

Prices and margins in Dutch food chains

A detailed study by Baltussen et al. (2014[31]) explored price formation of potatoes, apples, bread, eggs, cucumbers, bell peppers, poultry and onions in the Netherlands, and includes information on prices and margins along different stages of the supply chains in 2011-13.

The data are consistent with the findings in France and Spain. Net profit margins for processors and wholesalers are again typically low, with net profit margins of 1-3% for potato wholesalers, between -1% and 1% for fruit and vegetable wholesalers, and 1-4% for egg wholesalers, while the milling industry registered losses of -8% in 2011 and profits of 1% in 2012 and 2013. At the retail level, estimated net profits for supermarkets are around 1-2%. The authors conclude that data limitations make it hard to draw

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[19] More specifically, the Return on Equity (ROE) is defined as profits relative to equity (i.e. the capital invested by shareholders), and can be expressed as: (Profits/Equity) = (Profits/Sales) x (Sales/Assets) x (Assets/Equity). Return on Equity is therefore not only a function of the profit margin as a percentage of sales, but also of the ratio of sales to total assets (a ratio which is typically high in retail businesses) and the ratio of assets to shareholder equity (which depends on the firm's financing decisions, i.e. to what extent it relies on debt).

[20] See https://www.mapa.gob.es/es/alimentacion/servicios/observatorio-de-precios-de-los-alimentos/default3.aspx.

strong conclusions, but that the findings do not raise major concerns around competition problems in the food chains.[21]

These examples from France, Spain, and the Netherlands focus on their domestic markets, but for several agricultural commodities (such as cereals and oilseeds) global trading firms play an important role. Available information on their profit margins is discussed in Box 2.

Box 2. Margins of major agricultural commodity traders

The so-called "ABCD" firms (ADM, Bunge, Cargill, and Louis Dreyfus Company) are among the world's major agricultural commodity traders. These firms own and operate worldwide networks of port terminals and grain silos, and have, in many cases, also expanded into processing (e.g. the crushing of oilseeds into protein meal and oilseed oil; the production of starches, sweeteners and biofuels; etc). In view of their prominence, these firms are often seen as exerting major buyer power over the farmers from whom they source commodities (Howard, 2016[3]).

Precise analysis of the type conducted by the Observatory in France is difficult, in part because both Cargill and Dreyfus are privately-held, and hence do not need to disclose detailed financial information. However, the available financial data again suggest relatively small profit margins.

ADM reports revenues and profits for different segments in which it is active; some of these (e.g. nutrition, carbohydrate solutions) have higher margins. However, the core agricultural commodity trading activities ("origination") brought in USD 25 billion in revenues in 2018 and USD 546 million in operating profits (2.2%).[1]

Bunge similarly reports information for several segments. Its core "Agribusiness" segment registered USD 32 billion in revenues in 2018 and USD 645 million in earnings before interests and taxes (EBIT), or a 2.0% profit margin.[2]

In its 2018-19 financial year, Cargill reported USD 113 billion in revenues and USD 2.6 billion in (after-tax) profits, or a profit margin of 2.3%, although it is not possible to provide more detailed information for its different business activities.[3]

Dreyfus registered USD 36 billion in sales in 2018, making a gross margin of USD 1.3 billion (3.6%), and after-tax profits of USD 357 million (1.0%); data for the different segments is again not available.

These figures need to be interpreted with caution, as they add together a wide range of different activities in different geographies. Nevertheless, these relatively low margins do not suggest systematic and large deviations from competitive conditions in agricultural commodity trading.

1. See https://assets.adm.com/Investors/Shareholder-Reports/2018/ADM-Annual-Report-Letter-to-Stockholders-2019-Proxy-Statement-and-2018-Form-10-K-final-.pdf (consulted 12 Sep 2019).
2. See https://www.bunge.com/investors/annual-reports (consulted 12 Sep 2019).
3. See https://www.cargill.com/about/financial/five-year-financial-summary (consulted 12 Sep 2019).
4. See https://www.ldc.com/files/9815/5346/7696/LDC_AR2018_S.pdf (consulted 12 Sep 2019).

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[21] Studies for Belgium find similarly low profit margins along the food chain for pork (Observatoire des Prix, 2015[98]) and beef (SPF Economie, 2019[99]).

2.4. Other indicators

Two other indicators commonly cited in the context of competition in the agri-food chain are the farm share of the "food dollar" or "food euro" (i.e. consumer expenditures on food), and measures of the degree to which price movements in one stage of the food chain are transmitted to other stages. While these indicators may prove a useful starting point, by themselves they cannot answer the question of whether there are competition problems in a sector.

The farm share of the food dollar

Farmers' revenues only constitute a small share of consumers' overall expenditures on food. This low share of the "food dollar" or "food euro" has sometimes been interpreted as a problem by itself, or as a clear indication of an unfair treatment of farmers. These interpretations are problematic, however. First, the farm share measures only farm revenues, not farm incomes; if production costs increase for all farmers, the farm share might increase without an increase in farm incomes. Second, a declining share of total food expenditures may be consistent with stable or increasing farm incomes, for example when total food expenditures or farm productivity are increasing.[22] Without information about what is causing the trend, it is not possible to interpret a declining farm share as equivalent to a decline in producer surplus (Brester, Marsh and Atwood, 2009[32]). Third, a declining farm share could be caused purely by market forces. Productivity growth in agriculture, in combination with increasing costs of distribution and retail, or an increasing service content of food purchases (e.g. an increasing share of food consumed in restaurants) could lead to a declining farm share even without market power along the food chain.

The farm share of food expenditures is therefore not a reliable measure of farm incomes, nor a reliable indicator of problems of market power along the food chain. Moreover, as evidence from the French Observatory on Prices and Margins shows, the low share of final consumer spending going to farmers does not necessarily mean that other stages of the supply chain are reaping large profits. For this reason, the farm share of the food dollar cannot be used to draw conclusions about whether agricultural markets are competitive or suffer from buyer power.

Price transmission

Another indirect indicator is *price transmission*, i.e. the question of whether and to what extent changes in farm prices are passed through to consumer prices and vice versa. A low degree of price transmission has often been interpreted as a sign of an uncompetitive market. Some theoretical models indeed suggest that price transmission will be lower in the presence of market power (McCorriston, Morgan and Rayner, 1998[33]).

A large empirical literature has explored price transmission in the agri-food chain and has found many instances of imperfect and asymmetric price transmission (Meyer and Cramon-Taubadel, 2004[34]) This question received renewed attention in the wake of the 2007-8 food price crisis, which also stimulated policy initiatives to improve price monitoring and price transparency (OECD, 2015[35]).

However, the link between price transmission and imperfect competition is not as obvious as is sometimes thought, and reviews of the literature are unanimous in warning against drawing conclusions about market power based on findings of imperfect price transmission (Vavra and Goodwin (2005[36]), Meyer and Cramon-Taubadel (2004[34]), Bakucs et al. (2014[37]), Lloyd (2017[38])).

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[22] Work by the OECD on Global Value Chains has similarly demonstrated that additional value addition by services may lower agriculture's share of the food dollar while increasing overall agricultural value-added (Greenville, Kawasaki and Jouanjean, 2019[102]).

A first problem is that even in markets with high degrees of market power, perfect price transmission can occur. For example, if a buyer and a seller have agreed to use a "cost-plus" contract (where the price equals costs plus a fixed profit margin), changes in costs will by definition be perfectly transmitted, even if one of the parties has considerable market power (which would be reflected in the level of the fixed profit margin). In Australia, almost all private label milk supply contracts between processors and supermarkets are structured in this way, with changes in farmgate milk prices passed on directly to the supermarket.[23] In this setup, there is perfect price transmission, but the relationships between retailers and processors are unlikely to be characterised by perfect competition. As another example, firms may use "two-part tariffs", where payments consist of a per-unit price and a fixed payment (Rey and Vergé, 2005[39]). Such contracts are common between supermarkets and their suppliers, who often pay a "slotting fee" to the supermarket. Depending on the specifics of the contract, changes in costs could again be perfectly transmitted to the per-unit price, even if one of the parties has market power (which in this case would be reflected in the magnitude of the fixed payment). Hence, perfect price transmission does not guarantee the absence of market power.

On the other hand, imperfect price transmission does not prove the presence of market power. Market power can indeed reduce price transmission (assuming "standard" pricing behaviour, i.e. excluding cost-plus contracts or two-part tariffs). But the benchmark degree of price transmission under perfect competition is not obvious and depends on a number of factors, including whether there are economies of scale in the food sector; and even a competitive sector could exhibit "undershifting" (i.e. incomplete transmission of increases in farmgate prices to retail prices) (Gardner (1975[40]); McCorriston et al. ((1998[33]), McCorriston et al. (2001[41])).[24]

Reviewing forty years of theoretical and empirical research on price transmission in the food chain, Lloyd (2017[38]) concluded that "[a]lthough uncomfortable, theoretical analysis highlights the fact that, without careful consideration of the range of factors involved, little can be inferred about market power from the low (or high) value of the price transmission coefficient alone." Price transmission studies are thus best seen as providing a "first pass" test (Lloyd et al., 2009[42]), to be complemented with more detailed investigations.

2.5. Sectoral investigations by competition authorities

In addition to their usual tasks of reviewing mergers and investigating antitrust issues, competition authorities in many countries have the possibility to conduct *market studies* (OECD, 2018[43]). When such market studies are available, they are usually a valuable source of information on competitive conditions in the sector, especially where the competition authority is able to compel market participants to provide information.

Market studies can range from short, informal assessments to lengthy, formal processes with stakeholder involvement and empirical analysis. The goal of a market study is not in the first place to investigate wrongdoing. Rather, market studies can help in competition advocacy (e.g. by uncovering policy or regulatory bottlenecks which unnecessarily restrict competition in a market) and can help improve a competition authority's understanding of a sector. However, market studies can also indirectly help enforcement efforts by uncovering evidence that leads to an investigation. In some jurisdictions, competition authorities are required to conduct a market study upon request by the government. There is

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[23] See https://www.accc.gov.au/focus-areas/inquiries/dairy-inquiry-0 (accessed 25 September 2019).

[24] It is worth noting that perfect price transmission from the farm-gate price to downstream prices does not imply that the *elasticity* of price transmission is equal to one; rather, under perfect price transmission this elasticity equals the cost share of the agricultural product (McCorriston, Morgan and Rayner, 1998[33]). Unfortunately, this elementary point appears to be sometimes overlooked in applied work (Kinnucan and Zhang, 2015[109]).

also considerable variation in the powers competition authorities have to conduct market studies. In several jurisdictions, competition authorities can issue mandatory information requests to stakeholders (OECD, 2018[43]).

In recent years, the food chain or specific sub-sectors have been the subject of market studies in Argentina (dairy, beef, oilseeds), Australia (beef, dairy, wine grapes), Bulgaria (food retail), the Czech Republic (food retail), Germany (food retail, dairy), Italy (dairy), Latvia (dairy, retail), Mexico (the entire food chain), Poland (price formation in fruit markets), Slovenia (food retail and Unfair Trading Practices), South Africa (grocery retail) and Sweden (food retail). These studies are described in more detail in Annex B.[25]

One example of such a market study is the inquiry by the Australian Consumer and Competition Commission (ACCC) into the functioning of the Australian dairy industry.[26] In April 2016, Australia's two largest dairy processors retroactively reduced the prices paid to farmers, leading to severe reductions in incomes for more than 2 000 dairy farmers. These events formed the catalyst for the ACCC's market study. The ACCC used compulsory information gathering powers to obtain evidence, including through private hearings where witnesses (e.g. managers of dairy processing firms) testified under oath. Because of these investigative powers, the ACCC's analysis could rely on otherwise confidential information. For instance, the ACCC could analyse contracts between processors and retailers to understand how changes in farm-gate prices were transmitted to supermarkets; the ACCC was also able to analyse prices paid by processors to individual farmers. In its final report, published in 2018, the ACCC concluded that the sector suffers from significant imbalances in bargaining power at each level of the chain, resulting in market failures and inefficiencies, as farmers are discouraged from making productivity-enhancing investments. As neither existing competition laws or voluntary codes of conduct sufficiently address these issues, the ACCC recommended that a mandatory code of conduct should be introduced.[27]

Across the different market studies reviewed in Annex B, several indicated concerns around competitive conditions. Eastern European countries in particular highlighted the issue of unfair trading practices along the food chain. At the same time, several market studies did not find evidence of competition problems; this was the case for Argentinian assessments of the beef, oilseed and yerba mate sectors and the Italian assessment of the dairy sector.

Market studies by competition authorities should not be seen as data points from which a general conclusion about competition in agri-food chains can be drawn. In most cases, specific concerns about potential competition problems led to the investigations, which means there may be a selection bias in terms of the sectors studied: these are probably more likely to include cases where competition problems may exist. Market studies should thus not be seen as a representative sample. Rather, they show the value of an in-depth study to assess whether there are competitive problems in a specific instance.

2.6. Conclusion

The available empirical evidence does not unanimously reject the idea that other actors in the food chain are exerting buyer power at the expense of farmers; several studies do suggest some degree of buyer power in some markets, and the evidence seems to suggest that even small deviations from competitive

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[25] In addition to competition authorities, market studies may also be undertaken by e.g. policy analysts, market research agencies or academic researchers. The discussion here is limited to those studies conducted by competition authorities, as these often have more powerful investigative tools at their disposal.

[26] See https://www.accc.gov.au/focus-areas/inquiries/dairy-inquiry-0 (accessed 25 September 2019).

[27] It is worth pointing out that the ACCC study did not find clear evidence of processor buyer power or collusion between processors. Rather, the report emphasised governance issues, e.g. relating to the complexity of contracts and the opacity of pricing decisions. As discussed in more detail in the next sections of this report, such issues tend to be highly context-specific.

conditions could lead to relatively large effects on prices paid to farmers. However, taken as a whole, the available evidence (including data on profit margins of actors in the food chain and detailed studies by competition authorities) does not support the idea that problems of buyer power are common and large.

At the same time, it is true that not all sectors and regions have been equally well-represented in the empirical literature to date. Even if there is little evidence of systematic and widespread competition problems, important competition issues may still exist in specific markets. The data available in the public domain is often insufficient to uncover such issues. Analyses based on indirect measures such as market concentration, the farmer's share of the food dollar or price transmission do not give an accurate picture of competitive conditions in agricultural markets. By contrast, market studies conducted by competition authorities offer a more powerful tool to assess competitive conditions, in particular where competition authorities can compel stakeholders to provide evidence.[28]

3. Unfair trading practices

An issue which has received growing attention, particularly in the European Union, is the extent to which food supply chains suffer from "unfair trading practices" (UTPs). This broad term has a wide range of definitions but usually denotes practices where one trading partner unilaterally imposes costs, risks, or difficulties on another trading partner – e.g. by delaying payment, by unilaterally changing contract terms, by shifting risks to the other party, or by terminating contracts or commercial relationships abruptly and without justification (Sexton, 2017[44]). The European Commission has noted that UTPs can broadly be defined as practices that "grossly deviate from good commercial conduct, are contrary to good faith and fair dealing and are unilaterally imposed by one trading partner on another" (European Commission, 2014[45]). Policies to prevent or ban UTPs exist in a number of jurisdictions, including in the EU.

3.1. Conceptual issues

The term "unfair trading practices" is somewhat confusing as policy discussions on the topic often blend the two separate concerns of economic efficiency and fairness. As highlighted by Sexton (2017[44]), in any economic transaction the parties are simultaneously trying to maximise the total gains associated with the transaction (the "size of the pie") while also trying to capture the largest possible share of the gains. The first aspect relates to economic efficiency, while the second aspect relates to the distribution of the gains (and hence fairness).

Economists have long shied away from discussing fairness in the context of individual market transactions, preferring instead to focus on efficiency, for which clearer standards and objective criteria exist. While both may be valid concerns, it is important to distinguish them analytically. Attempts by one trading partner to increase its share may end up reducing total surplus: this is the case, for example, in the classic theoretical model of monopoly or monopsony behaviour. However, attempts to capture a greater share of the surplus do not necessarily lead to efficiency losses. Parties with more bargaining power could in some circumstances obtain a greater share of the total gains through contractual instruments which do not lead to efficiency losses, such as contracts which allow perfect price discrimination, as discussed in Section 4.

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[28] The importance of sector-specific studies is also emphasised by Berry et al. (2019[17]) in their discussion of recent literature on market concentration and market power in the broader economy. Given the heterogeneity of different industries, careful industry-specific studies are required; even a similar outcome (e.g. rising markups across various industries) may be caused by different mechanisms (e.g. mergers versus technological changes) with different policy implications.

The potential efficiency effects of UTPs are best understood in the context of "hold-up problems". For example, a buyer may agree to purchase perishable goods from a supplier at a certain price, but may attempt to renegotiate the price at the moment of delivery. In the absence of alternative buyers, the supplier may have no choice but to accept the lower price. If the lower price had been announced in advance by the buyer, the supplier might have opted not to go through with the transaction or may have sought out other potential buyers. Once the perishable goods are delivered, however, the supplier has very little bargaining power, and the buyer has the opportunity to unilaterally change the contract terms. Such hold-up problems can cause economic inefficiencies, because suppliers will be unlikely to engage in transactions with buyers whom they suspect may unilaterally renegotiate after delivery. Some economically efficient transactions may thus become impossible because of the expectation of hold-up problems, and parties may be discouraged from investing in relationship-specific assets (e.g. suppliers may refuse to invest to meet buyer-specific quality standards if they fear becoming the victims of a hold-up). That is, the efficiency losses associated with hold-up problems are *not* caused by transactions where hold-up actually takes place, but rather by the absence of economically efficient transactions due to the expectation of future hold-ups.[29]

Hold-up problems could in principle be avoided through contracts, if these contracts specified what needs to happen in all possible circumstances and if these contracts could be easily enforced. Under those conditions, contracts could still be negotiated in such a way that one party captures a disproportionate share of the benefits of the transaction. But contractual conditions would be clear, and there would be no uncertainty, so the transaction would only go ahead if the terms are better than the alternatives available to both parties. That is, there is still a potential question of fairness, but no longer a question of economic efficiency. In reality, these conditions are never fulfilled, and transactions always take place to some extent in a context of incomplete contracts and/or imperfect contract enforcement, creating the possibility of hold-ups.

That hold-ups are possible does not mean that they are likely to occur, however. Several other factors can counteract the temptation of a party to renege on a contract. If a buyer expects to deal with the supplier in the future, the importance of maintaining a stable relationship can outweigh the short-term benefits of engaging in hold-up behaviour. Even if the buyer does not expect to work with the same supplier, a hold-up could hurt the buyer's reputation and make other suppliers less likely to work with the buyer. These reputational costs will be greater if there are competing buyers and fewer suppliers (Sexton, 2017[44]) (Swinnen et al., 2015[46]).

Structural conditions thus influence the likelihood that hold-ups will occur. At the same time, market power (as traditionally understood) is neither necessary nor sufficient for hold-up to occur. What matters is that in a given transaction, one party is in a weaker position after e.g. information has been disclosed or investments have been made, so that the other party can take advantage of this. Even actors without market power may thus have the opportunity to hold up a counterparty. For example, research in developing countries has shown that both smallholders and buyers commonly fail to fulfil the terms of their contracts (Barrett et al., 2012[47]).

The debate around UTPs thus shows that it is important to make a distinction between *market power* and *bargaining power* (Bonanno, Russo and Menapace, 2018[9]). As traditionally understood, market power refers to a situation where one firm is so large relative to the market that its decisions on how much to purchase or to sell can influence market prices, which in turn means that the optimal strategy for the firm is to restrict quantities to reduce prices paid to suppliers and/or increase prices paid by its customers. *Bargaining power*, on the other hand, refers to the power to obtain concessions from another party by the

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[29] In turn, the existence of UTPs at one stage of the value chain could have knock-on effects at other stages. For example, if middlemen fear hold-up by retailers, they may decide to invest less in developing a strong supplier network of farmers, which in turn limits farmers' options. For a detailed discussion on such "pass-through" effects, see Russo (ed.) (2020[51]).

use of threats. In the context of UTPs, firms which are too small to exert market power may nevertheless have bargaining power. This point is explored in more detail in Section 4.

Many (and perhaps most) of the trading practices described as "unfair" can be seen as hold-up problems. This includes unilateral and retroactive changes to contract terms and conditions (including the price); buyers delaying payment after goods have been received; buyers taking advantage of confidential information (trade secrets) of the supplier; and buyers unilaterally, abruptly and without justification terminating an ongoing commercial relationship. As the preceding discussion shows, there are clear efficiency arguments for reducing the prevalence of such hold-up problems, as these create uncertainty, prevent efficient transactions from taking place, and may deter investment.

In addition to hold-ups, some practices which have been described as "unfair" include contractual terms which are deemed to be excessively disadvantageous to one party, such as "reverse margin" practices – clauses which require a supplier to pay a fee to the buyer, for example in exchange for services offered by the buyer such as promotional activities. Both theoretically and empirically it is much less clear whether such practices negatively affect efficiency. If a stronger party can simply negotiate a more advantageous price, it is unclear why it would resort to additional contract terms to extract more surplus if doing so has a negative effect on efficiency (Sexton, 2017[44]).

A related question is whether prices or other contract conditions which are disadvantageous to one party can by themselves be seen as a UTP, even if there is no efficiency loss associated with these contract terms. Conceptually, this is a difficult question to study, as "fairness" is often in the eye of the beholder and it may be difficult to develop objective criteria which can help to assess fairness in the context of an individual transaction.

3.2. Available evidence on UTPs

In general, reliable empirical evidence on the extent of UTPs in agri-food chains is scarce, as highlighted by several authors (Sexton, 2017[44]) (Falkowski, 2017[48]) (Ménard, 2017[49]). Relatively little is known about the prevalence of various types of UTP; about whether these are more common in agri-food chains than in other sectors; or about the impacts on producers or consumers of UTPs and of policies to curtail them. Evidence on the impacts of UTPs on farmers is mostly anecdotal and in some cases outdated (Falkowski, 2017[48]).

Some surveys exist which ask about the prevalence of UTPs, and these tend to find relatively high rates of prevalence in EU countries. A number of such surveys are reviewed by Di Marcantonio et al. (2018[50]); in most surveys, a majority of respondents report having experienced one or more UTP. However, these surveys generally ask only the perspective of one party to a transaction (Sexton, 2017[44]). Moreover, the definition of UTPs can vary across studies, and not all UTPs are equally common or equally severe. Di Marcantonio et al. (2018[50]) surveyed 1 248 dairy farmers in four EU countries (France, Germany, Poland and Spain) and found that nearly all (98%) reported at least one UTP. In particular, close to 90% of farmers reported that the contract does not define any safeguard for the farmer if the buyer fails to fulfil the contract, while close to 20% of farmers reported that the price is set unilaterally by the buyer in the contract. By comparison, the share of respondents reporting actual UTPs during or after contract execution is considerably lower. For example, only 2.7% of farmers reported that the buyer unilaterally changed the price; 1.2% reported a unilateral change in required quality; and 1.5% reported a unilateral change in required quantity.

Several of the in-depth studies by competition authorities listed in Annex B found instances of unfair trading practices in agri-food sectors. This was the case for several European countries (Bulgaria, the Czech Republic, Germany, Latvia, Poland, Slovenia and Sweden). As suggested by Ménard (2017[49]), the greater attention to UTPs in Europe could in part be because of a higher degree of fragmentation of farm production

in many European countries. But concerns over UTPs are not exclusive to Europe. As discussed in Annex B, the Australian Competition and Consumer Commission (ACCC) expressed concerns over unfair trading practices in the wine grape sector, including unfavourable payment terms and contract terms which shift risks to growers. In general, however, evidence on the prevalence of UTPs is relatively scarce.

There is a similar need for more evidence on the impact of UTPs. For many types of UTPs, there is little or no evidence available on the actual impact on suppliers and consumers. This matters, because for some practices which have been described as unfair, the economic effect may be ambiguous in theory. This is true, for instance, for the reverse margin practices mentioned earlier: there appears to be no consensus in the literature on the efficiency and distributional implications of these practices (Falkowski, 2017[48]).

A recent proposal to improve the knowledge base on UTPs suggests the use of both broad-scope empirical analyses across sectors (e.g. using a generic survey) and more in-depth empirical analyses for a specific sector (e.g. using expert panels to design a sector-specific survey, combined with interviews and economic analysis to understand the architecture of the specific value chain). Each approach in isolation has strengths and weaknesses. A broad-scope empirical analysis using large surveys could provide a general assessment over time and across sectors and countries, but may miss important sector-specific detail. An in-depth empirical analysis is more time consuming to set up and is less comparable across sectors given the attention to sector-specific detail, but may be more insightful about conditions in a sector for precisely that reason. Combining both approaches could thus yield an efficient monitoring system for UTPs (Russo (ed.), 2020[51]).

3.3. Policy approaches

Policymaking to reduce the prevalence of UTPs encounters several challenges. A first challenge is the difficulty of identifying what constitutes an unfair trading practice, especially given limited evidence on the prevalence and impacts of various behaviours which have been described as unfair. Policymakers need to strike a balance between two types of errors: the risk of prohibiting practices which are in fact efficient, and the risk of not banning practices which are in fact welfare-reducing (Sexton, 2017[44]).

The conceptual discussion of hold-ups caused by incomplete contracts or imperfect contract enforcement suggests some possible approaches to reduce the prevalence of UTPs by focusing on better contracts and better enforcement. Stimulating the use of written contracts, providing contract templates, and ensuring low-cost access to courts or arbitration services could help in this regard. In addition, the role of reputation could be strengthened by creating transparency about hold-ups caused by market participants. However, one challenge is that firms which experienced UTPs may be unwilling to report this for fear of retaliation (Swinnen and Vandevelde, 2017[52]).

Countries differ in their policy approaches regarding UTPs. Swinnen and Vandevelde (2017[53]) distinguish four main approaches. First, some countries do not have any specific policies or initiatives in place to reduce UTPs. Second, some countries have only voluntary approaches such as platforms where supply chain stakeholders can engage in a dialogue, and potentially develop non-binding good practices or provide arbitration. Third, some countries have tasked competition authorities with monitoring and/or policing UTPs although without specific UTP legislation (relying instead on other legislation such as competition law). Fourth, some countries have gone further and have introduced specific UTP legislation. In addition to these different regulatory approaches, countries also differ in enforcement: in some cases, enforcement can only happen through the courts; in other cases, the competition authority or a dedicated authority is responsible.

In April 2019, an EU directive was adopted to regulate unfair trading practices in business-to-business relationships in the agricultural and food supply chain (EU Directive 2019/633). This Directive lists ten practices which are prohibited under any circumstance, and six practices which are allowed only if the

buyer and supplier agreed on them beforehand. Among the ten practices which are always prohibited are e.g. payments later than 30 days for perishable agri-food products; payments later than 60 days for other agri-food products; unilateral contract changes by the buyer; the misuse of trade secrets by the buyer; and commercial retaliation by the buyer. Among the six practices which are only allowed if explicitly agreed to beforehand are the return of unsold products by the buyer and various payments by the supplier to the buyer for promotion, marketing and advertising activities. EU Member States will have to designate an authority to oversee the enforcement of these prohibitions.

Many, but not all, EU countries had pre-existing regulations to ban unfair trading practices (Swinnen and Vandevelde, 2017[53]). Prior to the introduction of the EU Directive 2019/633, EU countries spanned the entire spectrum, with for example no specific initiatives in Denmark, voluntary initiatives in Belgium, enforcement by competition authorities but without specific legislation in Germany, and specific legislation with a dedicated enforcement authority in Croatia or France (Swinnen and Vandevelde, 2017[53]). The EU Directive 2019/633 reduces this heterogeneity by introducing common rules for all EU Member States and requiring each country to designate an authority to oversee enforcement, although individual countries can still go beyond the EU Directive by introducing more stringent rules.

In the United Kingdom, unfair trading practices are regulated by specific legislation and a dedicated enforcement agency, the Groceries Code Adjudicator, with the explicit mission to ensure that large retailers respect the Groceries Supply Code of Practice in their dealings with suppliers.[30]

Most OECD countries outside of the EU do not appear to have specific approaches, although some exceptions exist. In Japan, Article 19 of the Antimonopoly Act prohibits unfair trading practices, which includes a broad range of behaviours including abusing a superior bargaining position to delay payment, reduce payment, or change trade terms in a way which is disadvantageous to the counterparty.[31] These rules are enforced by the competition authority, the Japan Fair Trade Commission.

Similar rules exist in Korea, where unfair trade practices are prohibited by Article 23 of the Monopoly Regulation and Fair Trade Act; the list of prohibited practices includes unfairly taking advantage of a transaction partner. The "Guidelines for Assessment of Unfair Trade Practices" (2015) specify various practices which may be considered a violation of the act, including e.g. situations where one party unilaterally changes contract terms. The Fair Trade Commission of Korea enforces these rules.[32]

In Australia, small businesses are protected against unfair contract terms, defined as terms which cause a significant imbalance in the parties' rights and obligations; are not reasonably necessary to protect legitimate interests; and cause detriment to a small business. While the ultimate decision on whether a contract is unfair is made by a court or tribunal, possible examples include contract terms which give one party an unilateral right to vary the price or other contract terms.[33]

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[30] See https://www.gov.uk/government/organisations/groceries-code-adjudicator/about (consulted 25 August 2020).

[31] See the English translation of the Antimonopoly Act available at https://www.jftc.go.jp/en/legislation_gls/amended_ama09/index.html (consulted 18 February 2020). Unfair trade practices are defined in Article 2 and prohibited in Article 19.

[32] See http://www.ftc.go.kr/eng/index.do (consulted 18 February 2020) for English translations of the Monopoly Regulation and Fair Trade Act and the Guidelines.

[33] See https://www.accc.gov.au/business/business-rights-protections/unfair-contract-terms (consulted 18 February 2020).

3.4. Conclusion

Section 2 reviewed empirical evidence on whether buyers exert market power in agricultural markets at the expense of farmers. However, these studies have focused on prices, while problems may also manifest themselves through unfair trading practices.

Discussions around these UTPs have been most active in the European Union, although several other jurisdictions have policies in place to limit practices which are deemed unfair. The definition of what constitutes an UTP is not always clear, and a wide range of behaviours have been described as unfair (Sexton, 2017[44]). Yet, one important category of behaviours include "hold-up" problems, which can occur in a situation of incomplete contracts and imperfect enforcement. Economic theory suggests that the possibility of such problems can prevent efficient transactions from taking place, creating an efficiency rationale for limiting their prevalence. For many other practices, the theoretical and empirical evidence on efficiency and distributional effects is less clear. In cases where behaviours do not have a negative efficiency impact, there might still be a separate "fairness" consideration, although this concept is considerably more ambiguous and open to conflicting interpretations than the concept of economic efficiency.

The focus on UTPs highlights another important aspect of modern agri-food chains. In contrast with simplified models of anonymous markets, transactions take place in value chains with specific "architectures" which in turn affect outcomes, including the risk of hold-ups as well as the likelihood that a party would actually exploit the opportunity to engage in a hold-up. Importantly, the opportunities for hold-up do not have an obvious connection to the traditional concept of market power. Even firms too small to be able to influence the market price may have the possibility to engage in UTPs. This suggests that in addition to market power as traditionally understood, analysts must consider bargaining power within a value chain. Details of how transactions are organised within such value chains can shape both efficiency and rent distribution in ways not captured by the traditional market power analysis underlying the discussion in Section 2. This theme is explored in more detail in the next section.

4. Market power, bargaining power, and food chain architecture

Discussions of the potential effects of market concentration in agri-food chains often implicitly or explicitly assume that transactions of agricultural commodities are organised in spot markets – that is, in a setting where a large number of producers supply a homogeneous product sold at a single price at a single point in time. In reality, agri-food chains show a remarkable diversity of organisational forms (Menard and Klein, 2004[54]). While some agri-food chains conform to the spot market model, many do not. Agri-food chains differ on a number of dimensions, such as whether transactions are organised using production contracts, marketing contracts, or no contracts at all; whether buyer-specific quality standards are used; whether farmers are organised in cooperatives; whether an international reference price exists, and so on. Variation on these and other dimensions leads to different food chain "architectures". In turn, these architectures matter for efficiency and rent distribution between different stages of the chain. This section first briefly reviews trends in the architecture of food chains, and then presents conceptual arguments showing how different architectures affect outcomes.

4.1. The changing architecture of agri-food chains

As economies develop, the organisation of agri-food chains undergoes a series of transformations (Reardon and Timmer, 2012[55]). Urbanisation and a growing opportunity cost of time favour a "one-stop

shop", leading to the rise of supermarkets at the expense of traditional marketing channels. As consumers' incomes grow, so does the demand for products of higher quality and greater diversity. Supermarkets in turn reorganise their procurement systems by moving towards more centralised procurement systems (where supermarkets often "cut the middleman" and interact directly with suppliers) and increasing vertical coordination, e.g. through the introduction of strict quality requirements and production contracts (Vavra (2009[56]), Sexton and Xia (2018[16]), Swinnen et al. (2015[46]), Beghin et al. (2015[57])).[34]

Some of these trends have been ongoing for several decades. For example, Hoffman (1940[58]) provided an early analysis of how supermarkets were reshaping the organisation of agricultural markets in the United States. These trends have been especially pronounced in recent decades, however.

The rise of contracting in agricultural markets is of particular importance to understand the changing architecture of agri-food chains (Vavra, 2009[56]). In 1969, around 11% of US agricultural production was covered by contracts; by 2013, this share had increased to around 35%. The use of contracts varies by sector, and is lower in cereals than in meat, with especially high rates of contract use in poultry and pork production (MacDonald, 2015[59]), while beef production relies much less on vertical coordination mechanisms such as contracts (Crespi and Saitone, 2018[60]). Data for European countries show a wide heterogeneity in the use of contracts, even in the same sector. For example, the share of farmers using contracts with processors in the pig meat sector ranges from about 10% in Germany and Ireland to more than 70% in Finland and more than 80% in Spain (Fischer et al., 2009[61]). The literature shows clear efficiency benefits from the use of contracts (Otsuka, Nakano and Takahashi, 2016[62]); nevertheless, concerns have been voiced around the possibility that farmers could be "locked in" to a relationship (and could then become vulnerable to unfair trading practices, as discussed in the previous section), as well as the possibility that some farmers will be "locked out" – unable to contract with any processor and therefore unable to find a market for their products (Sexton and Xia, 2018[16]).[35]

Quality concerns are an important cause of the growing use of contracts. Contracts often specify production practices to be followed, and may include incentive payments linked to measurable quality aspects of agricultural products (Goodhue, 2011[63]). These quality concerns are in part related to tighter public regulations, but are in large part due to growing private standards (Beghin, Maertens and Swinnen, 2015[57]). Quality requirements and other standards imposed by retailers are higher than the relevant public standards (Fulponi, 2006[64]). Another indicator of the growing importance of quality in agricultural markets is the rise of collective reputations, notably in the form of geographical indications (GIs) (Winfree and McCluskey (2005[65]), Menapace and Moschini (2012[66])).

As an organisational form, the cooperative pre-dates many of these trends, yet it continues to play an important role in many countries. In the European Union, cooperatives have an estimated market share of nearly 60% in the dairy sector and 40% in wine and in fruit and vegetables in 2010, with lower shares in other sectors (Bijman et al., 2012[67]). There is again considerable variation across countries: in the European Union, dairy cooperatives account for more than 90% of the market in countries such as Sweden, Ireland, Denmark and Austria, but less than 30% in other countries (e.g. Slovakia, Lithuania, Hungary).

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[34] The discussion here focuses mostly on developed economies, although similar trends have been documented in the context of transition and developing countries; see Reardon and Timmer (2012[55]), Beghin et al. (2015[57]), and Swinnen (2007[69])

[35] In the context of developing countries, a large literature has explored the welfare effects of contract farming; see e.g. Swinnen (2007[69]) and Bellemare and Bloem (2018[108]) for overviews. For a recent cross-country perspective, see Meemken and Bellemare (2020[107]).

4.2. How food chain architecture influences efficiency and rent distribution

The changing architecture of agri-food chains matters for understanding the effects of market concentration and market power on both efficiency and rent distribution in the chain. This section presents three examples illustrating how the effects of a buyer with strong monopsony power may differ from what would be expected in the standard analysis. The discussion here is mostly conceptual, as relatively few empirical studies so far have investigated these issues.

Uniform pricing versus price discrimination

Much of the discussion and analysis surrounding market power in agri-food chains implicitly or explicitly relies on the standard economic analysis of a monopsonist who sources products from a perfectly competitive supply of farm products. Figure 2 illustrates the standard analysis.

For simplicity, the analysis here assumes that the monopsonist does not incur any other costs, and sells the resulting products at a constant retail price P – that is, the monopsonist in this example is a pure "middleman" with buyer power but without seller power. In a perfectly competitive market, the quantity purchased from farmers would be found at the point where P intersects the farm supply curve, leading to a quantity Q_{PC} and a farmgate price W_{PC}, which in that case equals the retail price P. This is the perfect competition benchmark against which other market structures can be assessed.

The monopsonist realises that its purchasing decisions can influence the farmgate price: by artificially restricting its purchases, it can depress the farmgate price. The optimal purchase volume for the monopsonist is therefore lower, at Q_M, leading to a lower farmgate price W_M. This outcome maximises the monopsonist's profits, shown by the grey rectangle in Figure 2.

### Figure 2. Buyer power with uniform pricing
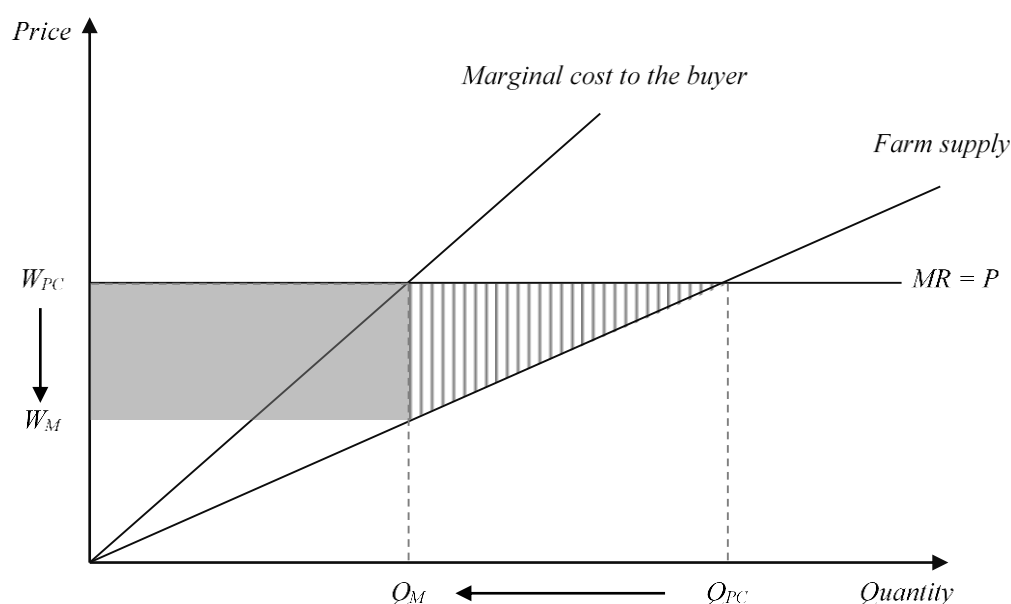
Compared to perfect competition, this monopsony situation affects both efficiency and distribution. First, the artificially restricted quantity results in an efficiency loss, indicated in Figure 2 by the vertically shaded triangle. Consumers would be willing to pay for additional units, and their willingness to pay exceeds

farmers' opportunity cost to produce this missing volume. Strategic action by the monopsonist prevents these efficiency-enhancing transactions from happening. Second, the reduced farmgate price leads to a transfer: the monopsonist now captures profits equal to the grey rectangle in Figure 2 at the expense of farmers.[36]

In addition, monopsony may also affect the inclusion of farmers in the value chain. For example, the farm supply curve drawn in Figure 2 could reflect a situation with a large number of farmers, each selling a small volume at a constant cost, but with farmers differing in their cost structure. In this setup, the reduction of quantities purchased by the monopsonist would be equivalent to excluding the least efficient farmers from the market.

These well-known effects depend on the specific assumption that the monopsonist buys products using uniform pricing, i.e. paying the same price to each supplier. Under a different architecture of the food chain, both efficiency and distributional effects may change. Figure 3 illustrates a monopsony situation similar to that in Figure 2, and again assumes that the supply curve reflects a situation with many farmers supplying a small volume at a constant cost, with different cost levels for different farmers. The main difference now is the assumption that the monopsonist can use *perfect price discrimination*, paying a different price to each farmer. This could emerge, for example, when the monopsonist uses contracts with individual farmers and has good information about each farmer's production costs.

Figure 3. Buyer power with perfect price discrimination
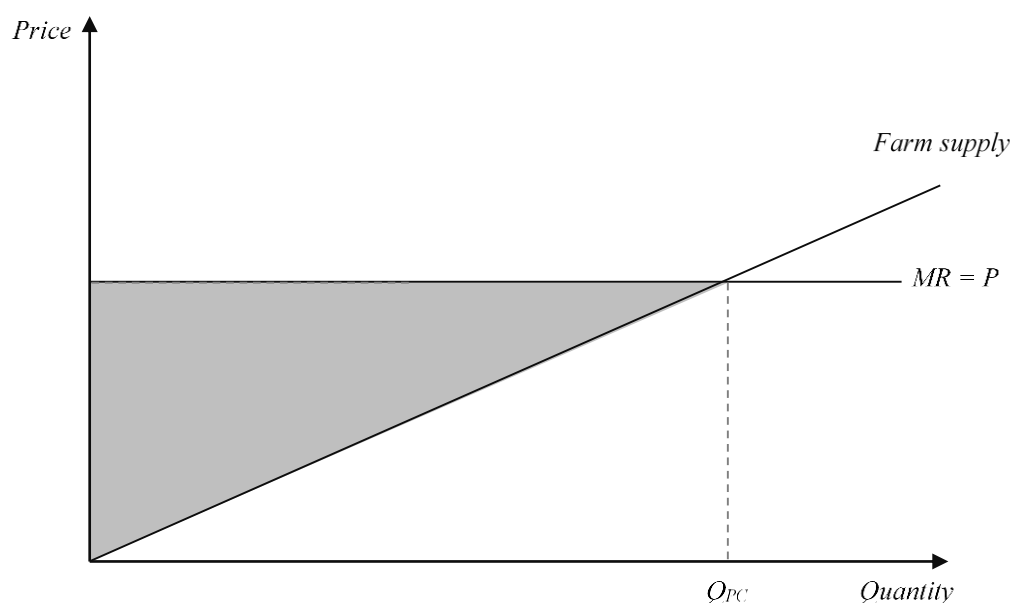
Under such conditions the monopsonist no longer needs to restrict volumes in the market to achieve a favourable farmgate price. Instead, the monopsonist will now maximise profits at quantity Q_{PC}, i.e. the same quantity as would obtain under perfect competition. There is no longer a single farmgate price in this setting. Rather, the monopsonist bargains with individual farmers to split the surplus which results from their transaction. This surplus equals the difference between P and each farmer's cost level, and is represented graphically by the vertical distance between P and the farm supply curve. The farm gate price for an individual farmer will lie between these curves, with the exact price determined by the relative

[36] The gap between the monopsonist's marginal revenue (MR) and the wholesale price W_M corresponds to the "mark-down" estimated by the academic studies on firm conduct reviewed in Section 2.

bargaining power of the monopsonist and the farmer. As an illustration, Figure 3 assumes that the monopsonist appropriates the entire surplus for each farmer, leading to monopsony profits equal to the grey triangle shown in the figure. However, other divisions are possible, including cases where different divisions are used for each supplier.

The shift from uniform pricing to perfect price discrimination has profound implications for efficiency and distribution in this market. First, because the monopsonist now finds it profit maximising to set quantities equal to Q_{PC}, there is no longer an efficiency loss associated with buyer power, and all farmers who would be included in the value chain under perfect competition are now also included in the monopsonist's value chain.

Second, rent distribution between farmers and the monopsonist depends on their relative bargaining power. If farmers have no bargaining power, the monopsonist can appropriate 100% of the surplus, leaving farmers as a group worse off than if the monopsonist had interacted with them using uniform pricing. At the other extreme, in the (admittedly unlikely) scenario where the monopsonist has very little bargaining power, farmers' profits could approximate those under perfect competition. Regardless of the relative bargaining power, the rent distribution *among* farmers looks different from the case with uniform pricing: the least efficient producers are now included, and since each farmer receives a different farmgate price, payoffs for individual farmers look different than in Figure 2.

This simple theoretical example thus shows that knowing the architecture of a value chain is essential for predicting the efficiency and distributional effects of market power. In this example, whether the monopsonist buys from farmers using uniform pricing or perfect price discrimination determines whether or not there is an efficiency loss, and influences the distribution of rents, albeit in complex ways.

Maintaining a stable supply base

A second example of how the architecture of a food chain may matter is related to buyers' need to maintain a stable supply base. As pointed out by Sexton (2013[11]), in modern agricultural markets, a buyer may have invested a considerable amount of capital in specific assets, such as a meatpacking plant optimised for processing cattle. With such investments, the buyer has an incentive to operate the plant at full capacity to achieve cost efficiencies. This requires a steady supply of agricultural inputs (in this example, live cattle). For the buyer to switch to a different supplier could then be risky and costly given the transaction costs of finding a reliable supplier. The buyer and its suppliers may end up with a long-term "symbiotic" relationship, where it is in the long-term interest of the buyer to pay a price to the suppliers to make sure the suppliers stay in business. If not, the buyer could be undermining its future supply of agricultural products, which would threaten its own profitability. The result may be that a monopsonistic buyer pays its suppliers a price which is higher than what would be expected given the market structure.

In sectors where this effect is important, competition between buyers may have paradoxical effects on suppliers, because two opposing effects are at work when the number of buyers increases. On the one hand, more competition among buyers should normally lead to a higher price for farm products. On the other hand, buyers now have less incentive to maintain a stable supply base: if a buyer pays a higher price to keep suppliers in business, these suppliers may decide to sell to competing buyers in the future. With multiple buyers, the existence of a stable supply base could thus become a common pool resource subject to a "tragedy of the commons".[37]

When a large number of buyers are competing with each other, the erosion of the incentive to maintain a stable supply base may not matter much for suppliers as the price in the market will be close to the

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[37] In principle, the buyer could negotiate a long-term exclusivity contract with the supplier, in which case the existence of a stable supply base is no longer a common pool resource. Depending on the circumstances, such contracts may not be feasible or may be difficult to enforce.

benchmark of perfect competition anyway. But if only a handful of buyers are active, suppliers may find themselves in the worst of both worlds, with not enough competition to receive competitive prices yet "too much" competition to convince buyers to invest in their suppliers (Mérel and Sexton, 2017[15]). Having a small number of buyers compete may thus under some conditions be worse than having a single monopsonistic buyer with an incentive to maintain its suppliers.

The mechanism described here only applies under certain specific circumstances. In particular, a monopsonistic buyer may still end up exploiting its buyer power if it cannot reap the benefits from maintaining a supply base of agricultural products or if the firm is not sufficiently forward-looking. This would be the case, for example, in a declining industry (Mérel and Sexton (2017[15]); Sexton and Xia (2018[16])). Some sectors and regions may thus be more prone to competition issues than others, even with an identical market structure.

Overcoming market failures

A third example of how the architecture of food chains shapes the efficiency and rent distribution effects of market power relates to situations where buyers invest in their suppliers to upgrade their quality (Swinnen et al., 2015[46]). As described earlier, modern agri-food chains are often characterised by demanding quality standards. In some markets, farmers may not be able on their own to obtain the necessary inputs (e.g. high-quality seed, agronomic advice, fertiliser, equipment, credit) to produce products which meet these high standards. In such cases, a buyer may provide the necessary inputs to the farmer in return for an agreement by the farmer to sell the final product to the buyer at an attractive price. As in the previous example, this creates a symbiotic relationship between the buyer and the suppliers, with important implications for efficiency, rent distribution, and the likely effects of competition.

An example of such "interlinked contracts" is the development of the Romanian dairy sector in the late 1990s (Van Berkum, 2007[68]). At the time, dairy farming in Romania was small-scale (96% of farms owned only one or two cows), used basic technology, and produced low-quality milk. When the French multinational Danone entered the market, it invested in quality upgrading and technology transfer for its milk suppliers, for instance by financing the purchase of compound feed and by advising farmers on hygienic practices, cleaning, and fodder management. In a later stage, contracts also included technological investments such as cooling equipment and milking installations. Similar examples have been found around the world, especially in transition and developing countries (Swinnen, 2007[69]).

In addition to buyers investing in suppliers, more complex arrangements have been documented. These can involve technology firms (e.g. seed companies), processors (e.g. sugar refineries, malting companies), buyers (e.g. retailers, brewing companies), and other actors such as financial institutions, sometimes in complex triangular structures (e.g. with buyers negotiating directly with input suppliers and guaranteeing payment on behalf of farmers). Swinnen and Kuijpers (2019[70]) review the available evidence on different types of such setups.

These architectures can help overcome market failures such as credit market imperfections which make it difficult for farmers to invest directly in upgrading their quality. But if contract enforcement is weak (e.g. because of high transaction costs of writing contracts and collecting evidence), these agreements risk falling apart due to hold-up problems. Once high-quality inputs have been delivered to the farmer, the farmer might divert the inputs (e.g. selling the fertiliser) or side-sell the final product to other buyers. To prevent hold-up, contracts need to be designed to be self-enforcing, i.e. offering the farmer a payoff higher than what can be gained from diverting the inputs or side-selling the final product (Swinnen et al., 2015[46]).

The result may again be that farmers receive a price higher than what would be expected given the market structure. Using the conceptual distinctions introduced in the previous section, farmers' capacity for hold-up increases their bargaining power relative to the buyer (and hence their potential pay-off), although the risk of hold-up may lead to efficiency losses if the buyer decides not to contract in the first place.

As in the previous example, the effects of competition are ambiguous under this type of value chain architecture. If multiple buyers are active, the investment by one buyer in upgrading the quality of its suppliers could end up benefiting its competitor, who might be able to buy the resulting high-quality product without having contributed to the investments. While more competition among buyers should normally benefit farmers, it could also reduce buyers' incentives to invest in quality upgrading and could even lead to a complete breakdown of such investments.[38] Again, which effect dominates in a particular context is an empirical question.

In reality, contractual arrangements between suppliers and buyers in agri-food chains can combine several elements of the previous examples and can include additional features, as illustrated by MacDonald (2014[71])'s description of the organisation of the US poultry industry. In this industry, the use of production contracts is almost universal. Processors provide independent contract growers with chicks, feed, vaccine, and veterinary and technical assistance, while growers provide housing, labour, and utilities and are responsible for growing the chicks to market weight. Growers have exclusive contracts with processors, and these contracts often include premiums and discounts related to the efficiency of the grower. Most contracts define these performance-based adjustments relative to the average performance of other suppliers. For example, if a grower had a higher mortality rate than other growers, there is likely to be a reduction in the payment. Partly as a result of such practices, prices received by growers show a large variation. In 2011, the median fee amounted to 5.55 cents per live-weight pound, but the 10% of growers with the lowest payments received no more than 4.32 cents while the 10% of growers with the highest payments received at least 7 cents per pound.[39] Contract durations also vary, and average contract length is usually longer if there are fewer processors in the region and if growers have less experience. For growers with less than 5 years of experience in a region with a single integrator, average contract length is 84 months, while growers with 20 years of experience in a region with more than three integrators have contracts with an average duration of only 11 months. Longer contracts may thus be one method used by processors to ensure a stable supply, as longer contracts can reassure new growers that they will not become the victims of hold-up after having made important investments in growing houses (MacDonald, 2014[71]). At the same time, the industry is not immune to competition problems, and has recently been investigated for alleged price fixing by processors.[40]

4.3. Implications for studying competition in agri-food chains

Agri-food chains can be organised in different ways, leading to a diversity of "architectures". As the examples show, the architecture of a chain can affect its efficiency and rent distribution. This has important implications both in terms of analysis and policy.

On the analytical side, most empirical studies such as those surveyed in Section 2 explicitly or implicitly rely on the traditional view that farm products are bought and sold on a spot market where a buyer could restrict its purchases to reduce the market price. As this section has argued, many agricultural products are no longer transacted via spot markets due to the importance of contracts and other forms of vertical coordination. It is not clear whether the usual analytical techniques are still appropriate to study competition in these different food chain architectures (Bonanno, Russo and Menapace, 2018[9]). As was noted in Section 2, price transmission studies in particular may give misleading conclusions if pricing deviates from

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[38] As in the previous example, a key assumption here is that buyers cannot impose exclusivity on their suppliers. In a context of weak contract enforcement (as in the transition and developing countries where these setups have been described), this seems a plausible assumption.

[39] As essential inputs (chicks, feed, etc.) are typically provided by processors to the growers, poultry contracts thus offer another example of a situation where price transmission approaches fail to shed light on the competitive situation.

[40] See https://www.justice.gov/opa/pr/senior-executives-major-chicken-producers-indicted-antitrust-charges (consulted 25 August 2020).

the spot market model. The use of aggregate statistics can also be highly misleading. The examples in this section thus reinforce the case for specific in-depth studies of sectors where competition problems are suspected, e.g. through sectoral investigations by competition authorities.

In turn, a clear policy implication is that discussions on competition in agri-food chains need to take into account the specifics of how any given food chain is organised. The potential impact of policy measures will differ depending on the architecture of the food chain; policies which may be beneficial in one setting could be ineffective or might even be counterproductive in another setting. As one example, in a perfectly competitive market the introduction of a minimum price will lead to surplus production and efficiency losses. In a monopsonistic market with uniform pricing, by contrast, a minimum price can be welfare-improving by inducing a monopsonist to increase volumes (thus reducing the efficiency loss related to the monopsonist's use of buyer power). In this scenario, a minimum price also redistributes rents from the monopsonist to farmers, who all gain unambiguously if output expands. If the monopsonist uses perfect price discrimination, on the other hand, a minimum price would not be welfare-improving (as there is no efficiency loss to begin with), but would redistribute rents from the monopsonist to some, but not necessarily all, farmers. Understanding the architecture of an agri-food chain is thus indispensable for developing effective policies.

## 5. Structural challenges in agri-food chains

Structural challenges unrelated to competition can cause economic difficulties for farmers and may be misinterpreted as being due to market power. For example, the slow adjustment of farms to changing economic conditions (such as the emergence of more cost-efficient competitors, or a reduction in demand) may result in widespread profitability problems. Even if markets are characterised by competitive conditions, many farmers might experience this situation as one where low bargaining power prevents them from obtaining a price which covers their costs.

Adjustment processes in agriculture are often relatively slow. In both developing and developed countries, most farms are family farms, and entry and exit decisions are strongly influenced by the life cycles of farm households. Entry usually occurs when a young operator decides to take over a farm and expand it, and exit happens when an older operator decides to retire. Moreover, capital invested in farming usually cannot easily be redeployed for other purposes. Overall, agriculture is therefore often characterised by low resource mobility, i.e. slow adjustments to changing economic conditions (Chavas, 2001[72]). Agricultural support policies may also keep farms in business which otherwise would have exited (DeBoe, 2020[73]).

One indication of slow adjustment processes is that many agricultural producers around the world register *negative* economic profits after taking into account the opportunity costs of their own labour, land and capital (and despite agricultural support policies). Persistent negative economic profits would explain the widespread perception that farmers are at a structural disadvantage, but this pattern is not by itself proof of the existence of buyer power in agricultural markets.

As the evidence reviewed in this report suggests, market power may not be the main factor. Various other factors can create challenges for farmers, and slow adjustments in the sector can exacerbate their effects. One example of such a challenge is the tendency for agricultural prices to fall in the long run, after adjusting for inflation (Figure 4). Over the past decades, global agricultural productivity growth has outstripped demand growth for most agricultural commodities, and as a result real agricultural commodity prices have experienced a declining trend over time despite occasional episodes of price volatility (OECD/FAO, 2019[74]). These lower prices have been a boon for billions of consumers around the world, yet it is undeniable that lower prices put pressure on farmers who do not manage to increase their productivity.

Figure 4. Long-term evolution of commodity prices, in real terms
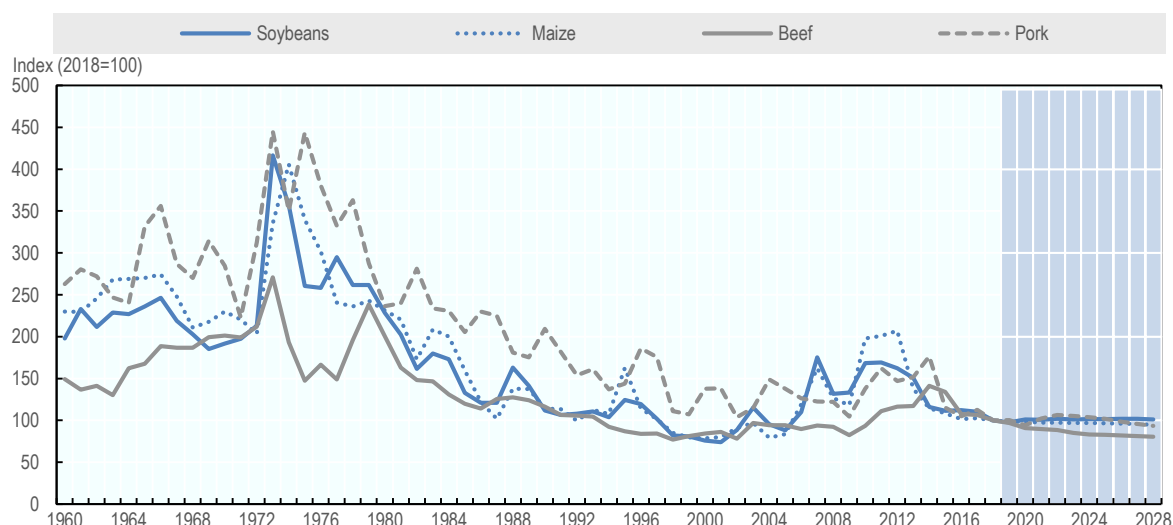
Note: Historical data for soybeans, maize and beef from World Bank, "World Commodity Price Data" (1960-1989). Historical data for pork from USDA QuickStats (1960-1989).
Source: OECD/FAO (2019), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.

An illustration of such productivity effects is found in the literature documenting the growing importance of economies of scale in various agricultural sectors in OECD countries, and the corresponding growth in average farm sizes (Bokusheva and Čechura, 2017[75]) (Macdonald, Hoppe and Newton, 2018[76]) (Chen et al., 2019[77]) (Bokusheva and Kimura, 2016[78]). The economics underlying these trends is illustrated in Figures 5 and 6 using estimates of the cost structure of Dutch and US dairy farming (based on van der Meulen (2018[79]) and MacDonald et al. (2016[80]) respectively). Despite important differences between the farming systems and policy context in these countries, in both cases there is clear evidence of economies of scale: while smaller farms may earn enough revenues to cover paid costs, in both countries only the largest operations earn enough to compensate the labour provided by the owner-operator as well as the opportunity costs of capital invested in the farm.[41] Average revenues per unit of product do not seem to vary much between smaller and larger firms. Rather, differences in profitability appear to be driven more by cost differences.

Smaller operations will struggle in this context, even when the buyer side of the market is competitive. Yet, from the point of view of an individual small producer, it might seem that the problem is that prices are too low and that there is no room to bargain for a higher price. In other words, it seems plausible that problems related to differences in productivity and competitiveness might appear as problems of market power to those who are adversely affected.

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[41] US data for 2016 suggests average costs have fallen faster for smaller farms, leading to a "flattening" of the cost curve. However, economies of scale remain strong despite this recent trend (James MacDonald, personal communication).

Figure 5. Economies of scale in Dutch dairy farming, 2014-16
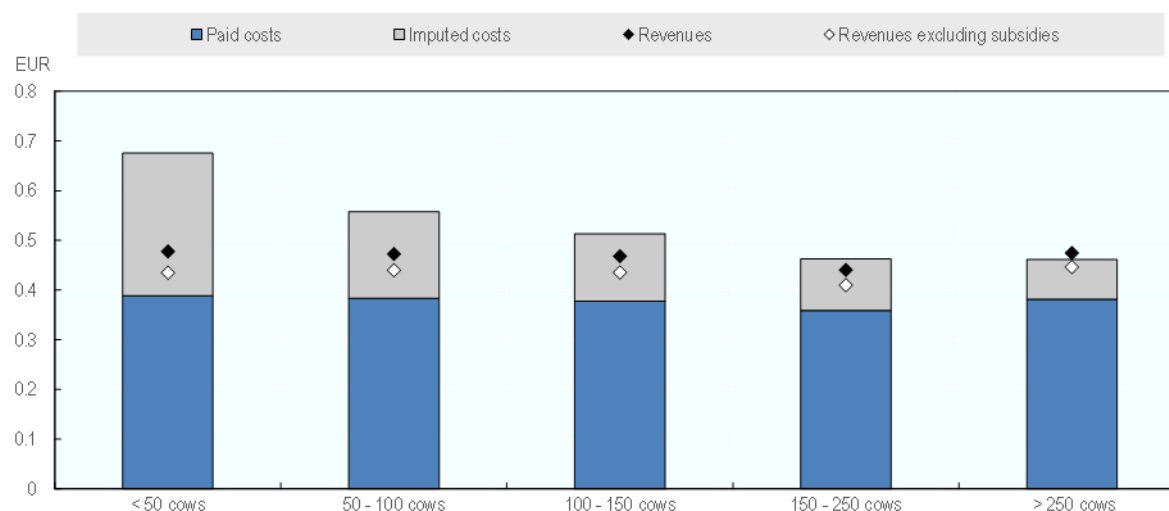
Note: Expressed in EUR per kg of milk sold.
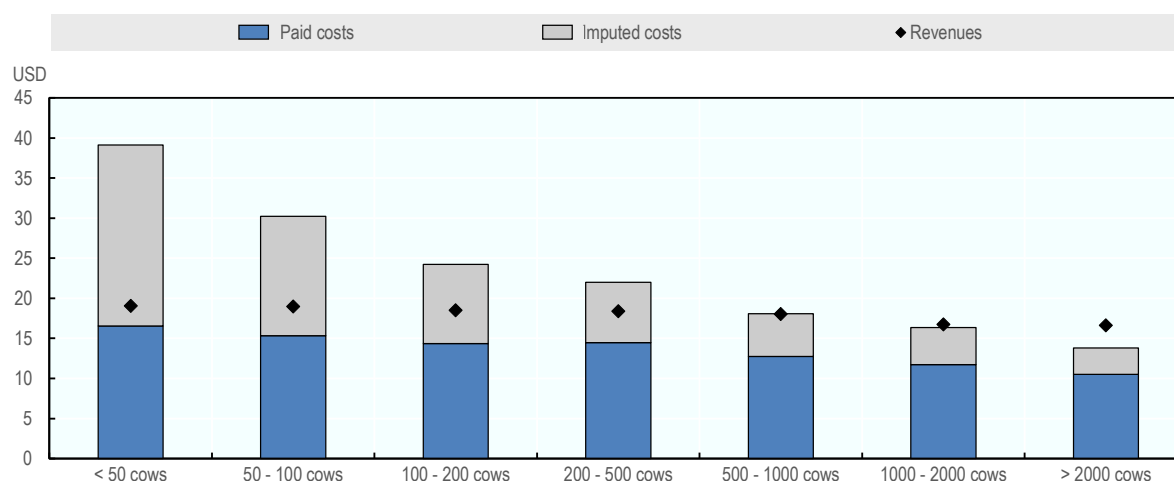Source: van der Meulen (2018)

At least one market study by a competition authority on (perceived) competition problems in agriculture indeed concluded that such cost competitiveness problems were more important than competition issues. In 2016, the Italian competition and markets authority (AGCM) published a study on the dairy sector, inspired by complaints by sector participants that raw milk prices and final dairy product prices were disconnected.[42] The AGCM acknowledged that milk producers have in general a weak bargaining position, but its review discovered that no stage of the chain seemed able to generate high profits, and conditions overall appeared reasonably competitive. By contrast, the AGCM's in-depth assessment revealed that productivity and cost competitiveness were a more serious issue facing the sector. Even in 2013, at a time of relatively high milk prices, some two-thirds of Italian milk producers were struggling to be profitable. These were smaller producers, who jointly accounted for only one-third of production; larger producers benefited from economies of scale and were better able to withstand low prices. AGCM recommended structural reforms to improve cost competitiveness and increase value-added in the sector.

Obviously, the specific conclusions by the AGCM on Italian dairy cannot necessarily be extrapolated to other sectors and other countries. But as the examples in this section illustrate, structural challenges might be an alternative hypothesis to understand the economic difficulties facing farmers. It is essential for analysts to keep this alternative hypothesis in mind when investigating claims of competition problems in the food chain. Detailed sectoral studies thus again emerge as the best analytical approach, as only a detailed study can assess the relative contribution of buyer power versus broader structural problems in a given sector.

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[42] See
https://www.agcm.it/dettaglio?db=C12564CE0049D161&uid=8479B59509CFFF40C1257F77004F18B0&view=vw02 01&title=IC51-INDAGINE%20CONOSCITIVA%20SUL%20SETTORE%20LATTIERO%20CASEARIO&fs= (accessed 25 September 2019).

Figure 6. Economies of scale in US dairy farming, 2010

Note: Expressed in USD per hundredweight (45.4 kg) of milk sold; data excludes organic farms.
Source: MacDonald, Cessna and Mosheim (2016).

6. Conclusion

Concerns about market power and competition in the agri-food sector are widespread, with commentators pointing out that farmers are in a structurally weaker position than other actors, who therefore presumably benefit at the expense of farmers (IPES-Food, 2017[81]) (Kelloway and Miller, 2019[82]) (Lianos and Darr, 2019[83]). Downstream segments of agri-food chains are indeed typically more concentrated than farm-level production. Yet, as the evidence reviewed in Section 2 has shown, empirical studies have generally not found evidence of systematic and large competition problems. Several popular indicators (such as the "farm share of the food dollar" or the degree of price transmission along the food chain) provide useful information but do not directly capture whether buyer power is exerted or not, and are therefore misleading if used for that purpose. More detailed studies on firm conduct, as well as evidence on profit margins along the food chain and sectoral investigations by competition authorities, present a more nuanced picture. While competition problems were found in some sectors in some countries, the current evidence does not support the claim that stronger actors in the chain systematically abuse their stronger position at the expense of farmers.

There are several possible explanations for the divergence between perceptions and empirical evidence. A first possibility is that existing studies fail to cover sectors with important competition problems. As highlighted in Section 2, the available empirical evidence indeed does not cover all countries and sectors well. While several academic papers investigate competition issues in livestock and dairy sectors, there has been much less research on cereals or fruits and vegetables. Countries other than the United States have also received much less attention in the literature. Yet, while more empirical work would be welcome, it seems unlikely that a broader range of empirical studies would overturn the conclusions from existing work. If anything, it could be argued that researchers have probably tended to investigate sectors suspected to exhibit competition problems, so that sectors not yet covered by research are perhaps less likely to suffer from such problems. This is also the case for sectoral investigations by competition authorities, which presumably focus disproportionately on sectors where competition problems were suspected. If there is a selection bias at work, it could thus be argued that this bias probably overstates rather than understates the extent of competition problems in agriculture.

A second possible explanation is that competition problems manifest themselves not in lower prices but as unfair trading practices, such as delayed payments or unilateral contract changes, which are not captured by most of the existing empirical studies. Several sectoral investigations by competition authorities pointed to the existence of unfair trading practices, and some jurisdictions, notably the European Union, have introduced policies to limit such practices. As discussed in Section 3, empirical evidence on the prevalence and impact of unfair trading practices is generally limited, making it hard to draw strong conclusions about their quantitative importance. Moreover, the term "unfair trading practices" refers to a broad range of issues, which differ in their prevalence and impact: survey data for the EU dairy sector suggests that while incomplete or potentially disadvantageous contracts are widespread, the actual extent of abuses is much smaller.

A third possibility is that competition problems are indeed not a major factor but that other structural challenges in agri-food chains are misinterpreted as competition problems. While the higher concentration in downstream segments of agri-food chains may increase the risk of anticompetitive behaviour, this is not inevitable. As discussed in Section 4, how market concentration or market power affect efficiency and rent distribution depends on the "architecture" of agri-food chains, and some factors can cause concentrated markets to behave more competitively than would be expected. For example, when buyers in agricultural markets have an incentive to maintain a stable base of reliable suppliers, they may refrain from fully exploiting their buyer power and may even invest to overcome market failures (e.g. by providing inputs to suppliers). But if buyer power is not a major problem, what explains the widespread perceptions to the contrary? Section 5 highlighted a possible explanation: some structural challenges in agri-food chains (such as the long-term downward trend in agricultural prices, or important differences in cost competitiveness) may be misinterpreted as competition problems, but may require very different policy responses.

This is not to say that competition problems are never an important factor in agri-food chains – indeed, several studies covered in Section 2 found instances of such problems. But whether farmers are hurt by a lack of competition cannot be answered in the abstract; rather, this needs to be studied on a case by case basis for specific value chains where problems are suspected. The important role of the "architecture" of agri-food chains makes it necessary to move beyond simple conceptual models and aggregate statistics (in particular misleading statistics such as the "farm share of the food dollar"). The most convincing empirical investigations, such as sectoral investigations by competition authorities, take an in-depth look at the architecture of a specific agri-food chain, with due attention to aspects such as the use of contracts and pricing mechanisms, and with consideration of alternative explanations such as cost competitiveness problems.

Finally, the focus in this paper was on the potential effects of buyer power on prices and trading practices, but market concentration and competition also exert potentially important effects on innovation (MacDonald, 2017[5]). The link between competition and innovation is likely to be non-linear. A firm without current or potential future competitors will have little reason to invest in costly research and development (R&D) efforts. By contrast, in a highly competitive market any innovation may be quickly copied by other firms, making it difficult for the innovator to recover the costs of R&D in the absence of intellectual property protection (which provides a temporary monopoly). Intermediate levels of competition may thus support the highest rate of innovation (Aghion et al., 2005[84]). During the recent mergers in the global seed, biotechnology and pesticide industry, competition authorities were particularly concerned about potential effects on innovation (OECD, 2018[85]). In the context of agri-food chains, innovators may use vertical integration or contract farming to control the quality of products and capture more of the value of their innovation and, as in other sectors, some degree of market power may be needed to incentivise innovation. In other words, innovation may have important implications for both the architecture of agri-food chains and the evaluation of market power or market concentration (Zilberman, Lu and Reardon, 2019[86]). These linkages between the architecture of agri-food chains and innovation thus constitute a promising area for future research.

Annex A. Additional evidence on buyer power in agri-food chains

The literature reviews by Perekhozhuk et al. (2017[23]), Sheldon (2017[7]) and Sexton and Xia (2018[16]) suggest that there is no evidence of systematic and large deviations from competitive behaviour in agri-food markets. A literature search was conducted to find additional studies which could shed light on this topic. The goal here was not to arrive at an exhaustive list of studies, but rather to test whether the findings of the three existing literature reviews are indeed representative of the broader literature.

The literature search used EconLit, the leading database of economic literature, maintained by the American Economic Association and covering more than 1.1 million records from 1886 to the present. The literature search used the following search terms: *(market power OR market concentration OR imperfect competition) AND (agriculture OR food OR meat OR livestock OR poultry OR beef OR hogs OR dairy OR milk OR cereals OR grains OR corn OR soybeans OR maize OR wheat OR barley OR rapeseed OR canola OR rice OR fruit OR vegetables).* The scope of the search was restricted to articles published in academic journals after January 2000. After restricting the search further by excluding irrelevant journals, the search yielded 325 articles. Titles and abstracts were then assessed to eliminate irrelevant papers, resulting in 20 relevant empirical studies of buyer power in the food chain. Another 22 papers were added manually based on references in other reports and papers. Of these 42 papers, 26 were included in one of the three literature reviews. The 16 additional studies are broadly in line with the conclusions drawn by the earlier reviews.

Grau and Hockmann (2018[87]) use time-series data for German milk products to estimate buyer power by processors over farmers, and by retailers over processors. They find only small levels of processor buyer power (between 0.04 and 0.07) but considerably higher levels of retailer buyer power (from 0.29 to 0.39), although their methodology does not allow estimating the resulting price markdowns.

The three largest retailers in Austria account for more than three quarters of sales. Salhofer et al. (2012[88]) study whether this high level of market concentration affects retail and wholesale prices for milk products. Their estimates of retailer buyer power are relatively small (near zero for drinking milk, 0.06 for cheese and 0.10 for butter and other products). In combination with inelastic supply curves for these products, however, they conclude that wholesale prices for milk products would be 12% higher under perfect competition.

A study by Sckokai et al. (2013[89]) sheds light on retailers' buying and selling power in the market for two Italian quality cheeses (Parmigiano Reggiano and Grana Padano). They find evidence of selling power (the estimated market power parameter is 0.25, where 0 would correspond to perfect competition and 1 to a monopoly outcome). By contrast, there is no evidence that supermarkets are using buyer power. The authors note that this may be due to the strong brand recognition for these two cheeses (which are protected by a geographical indication), which may limit retailers' power over cheese ripeners.

Kaditi (2012[25]) assessed market power in the Greek food supply chain, using data on nearly 3 000 firms between 1998 and 2007. Her estimates show that buyer power is exerted to some extent by all firms in the supply chain, including the (relatively large) agricultural firms in her sample. The estimates suggest that buyer power exerted by food processing firms reduce prices by around 14%; the corresponding numbers for wholesalers and retailers are 27% and 42%, respectively. Firms along the supply chain also appear to be exerting seller power, with the exception of agricultural firms. Price-cost margins are higher for retailers,

for companies in more concentrated sectors, and for companies which received foreign direct investment (FDI). Kaditi (2012[25]) concludes that the buying power of retailers may adversely affect food suppliers, while retailers do not pass these savings on to consumers.

Sexton et al. (2003[28]) study retailer procurement of iceberg lettuce, fresh tomatoes, and bagged salads in the United States. They conclude that retailers are often able to use their buyer power in procuring perishable fresh produce. Estimates for iceberg lettuce suggest that producers only capture 20% of the surplus (i.e. the retail price minus marketing costs and the cost of harvesting), with the remainder captured by retailers. While the evidence was less clear for other products (e.g. for vine-ripe tomatoes, producers captured some 86% of the surplus), on balance the authors conclude that buyers can use their market power to reduce prices paid to producers.

Ji et al. (2017[20]) revisit issues of market concentration and buyer power in the US cattle procurement market. Studying the period from 1980 to 2009, they find evidence of small deviations from competition, with prices paid to producers some 4-5% lower than would be the case under competitive conditions. Estimates of these markdowns are higher in the early 1980s, when markets were less concentrated. In 1980, markdowns were 5-11%, while these had fallen to around 3% in 2009, when market concentration was considerably higher.[43]

Cai et al. (2011[90]) present an analysis of weekly data for the US beef packing industry between 1992 and 1999. Their analysis suggests that beef packers alternate between periods of competitive behaviour and periods of oligopsonistic behaviour. Relative to competitive periods, cattle prices are about 10% lower during oligopsonistic episodes, which occur about one-third of the time. Cai et al. (2011[91]) extended these results up to 2010, which also allows for an analysis of the impact of mandatory price reporting introduced in 2001. They find that since that date, oligopsonistic behaviour occurs about 58% of the time instead of about one-third of the time prior to 2001 (although unfortunately, no estimate of cattle price markdown is provided). While causality is difficult to demonstrate, the results suggest that mandatory price reporting does not guarantee a more competitive market outcome.

Pork packers in the United States are increasingly relying on marketing arrangements other than spot market transactions, such as through contracts or packer-owned supplies. Zheng and Vukina (2009[92]) study whether such "captive supplies" help pork packers to exercise market power in the spot market. They find that the live hogs spot market price is around 1.1% lower than it would be under competitive conditions, but that the source of this (modest) market power cannot be linked to captive supplies.

MacDonald and Key (2012[93]) investigated market power in poultry production contracting in the United States. Poultry production is increasingly organised through contracts between growers and so-called "integrators", firms which own and operate hatcheries, feed mills, and plants. These integrators provide growers with broiler chicks, feed, and veterinary services, while growers provide labour, capital, management services and most utilities. Growers do not sell broilers to the integrators; rather, they receive a payment for their services. MacDonald and Key (2012[93]) used detailed survey data of growers and find that in regions where only a single integrator is active, growers are paid 7-8% less, on average, than

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[43] Another recent paper on the US cattle industry (Panagiotou and Stavrakoudis, 2017[104]), using a different methodology, estimated a much higher price distortion suggesting that cattle prices would be 23% higher under perfect competition. While the methodology used in this paper is interesting, some of the findings appear counterintuitive. For instance, the implied elasticity of beef output with respect to cattle input is 5.2. This would mean that a 1% increase in cattle purchases increases the industry's beef output by 5.2%, a number which seems implausible. Moreover, the summary data presented by the authors suggests that the cost of livestock input is some 85% of the value of beef sold by beef packers; raising prices by 23% would thus lead to negative profits for beef packers. The authors note that they were not able to include labour in their estimate of the production function, due to convergence problems; it is possible that this has affected the estimates of the production function and explains some of these anomalous figures. Another paper by the authors (Panagiotou and Stavrakoudis, 2016[105]) studied the red meat sector (i.e. cattle and hogs, and beef and pork) and found that the spread between farm and wholesale prices is only 4-5% above what would be expected under competitive conditions, a finding more in line with the bulk of the existing studies.

farmers in regions with four or more integrators. The authors note that while this price difference is relatively small, this may translate into substantial differences in profitability for growers.

Research by Scalco and Braga (2014[94]) on the Brazilian raw milk market did not find evidence of buyer power being exerted by processors at the expense of farmers. More recent work by Scalco et al. (2017[95]) analysed market power in the Brazilian wholesale milk market, and found relatively modest price differences due to buyer power exerted by retailers at the expense of processors; estimates suggest that distortions to wholesale prices were between 4% and 12% of the average price across different Brazilian states.

As in the United States, concentration levels in the Canadian beef packing sector have increased strongly, leading to concerns about buyer power being used at the expense of farmers. However, empirical analysis by Rude et al. (2011[96]) shows that conditions did not deviate from competitive conditions between 1992 and 2001. The authors note that their results are in line with earlier studies which similarly did not find evidence of market power as long as Canadian producers had the option of shipping live cattle to the United States, but did find evidence of buyer power during the temporary ban on Canadian live cattle imports into the United States after bovine spongiform encephalopathy was detected in a Canadian cow in May 2003.

Dai and Wang (2014[26]) found that dairy processing firms in China exert both oligopoly and oligopsony power, but that oligopsony power is more important. The estimated magnitudes are large; the results suggest that milk prices paid to farmers between 1988 and 2007 would be about five times greater under perfect competition. However, as the authors note, the underlying methodology assumes constant returns to scale, an assumption which is unlikely to hold in reality. Lan and Wang (2019[27]) study market power of pork packers in China, the world's largest pork producer. Their results show a buyer market power estimate of 0.23 nationwide. Because of highly inelastic supply, this translates in a large estimated price gap relative to competitive conditions: the results suggest that live hog prices would be almost twice as high as their current levels.[44]

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[44] These magnitudes are somewhat puzzling given other data reported by the authors. Their summary statistics show that the cost of purchasing live hogs, divided by total revenues of pork sales, exceeds 70%. At the same time, the authors find evidence of seller power, implying that the pork price should be 47% lower under competitive conditions. The estimates would thus suggest that pork should be sold below cost under competitive conditions, which is inconsistent with the theory. It is not clear what explains this result.

Annex B. Market studies by competition authorities

The OECD asked 46 competition authorities in July-September 2019 about recent activities concerning competition in the food chain. Replies were received from 40 competition authorities, several of which highlighted recent market studies into (parts of) the food chain.

Argentina

The competition authority of Argentina (National Commission for the Defence of Competition, CNDC) in recent years conducted detailed studies of dairy, beef, oilseeds, and yerba mate (the raw ingredient for mate, a coffee- or tea-like beverage).[45]

While the dairy investigation did not uncover any evidence of anti-competitive behaviours, the CNDC did express concerns about the effect high levels of loyalty between milk producers and dairy companies might have on competition. In addition, the CNDC made a number of recommendations to the Ministry of Agro-Industry, among others to ensure that mechanisms to provide transparency in the dairy sector do not inadvertently allow dairy companies to access commercially sensitive information of competitors, which could facilitate collusion. [46]

The beef study concluded that markets along the beef production chain have competitive characteristics, although it did note that high levels of informality create asymmetries between various actors. [47]

The report on the oilseeds and oilseed oil industry concluded that levels of market concentration are low to moderate, with most prices along the chain evolving in line with international markets. However, the market study did suggest further research on the effects of potential buying power by retailers. [48]

Likewise, the study on problems currently experienced by producers in the yerba mate sector concluded that these problems were not linked to competition issues, but rather by other factors including fluctuations in international demand, a stagnating domestic demand, and growing domestic production.

Australia

The Australian Competition and Consumer Commission (ACCC) has conducted recent market studies on the cattle and beef market, the dairy sector, and the wine grapes market.

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[45] See https://www.argentina.gob.ar/sites/default/files/sector_yerbatero_argentino_1.pdf (accessed 25 September 2019).

[46] See https://www.argentina.gob.ar/sites/default/files/im_lacteos.pdf (accessed 25 September 2019).

[47] See https://www.argentina.gob.ar/sites/default/files/mercado_de_la_carne_vacuna_-_english_summary.pdf (accessed 25 September 2019).

[48] See https://www.argentina.gob.ar/sites/default/files/oleaginous_sector_summary.pdf (accessed 25 September 2019).

Cattle and beef is the largest contributor by value to Australian agricultural production. Market participants have in recent years voiced concerns about competition problems, including misuse of buyer power and an unfair distribution of profits along the supply chain. The ACCC released its market study on the cattle and beef sector in 2017, with an update in 2018.[49] The ACCC notes that its study relies on voluntary provision of information by industry participants, and that not enough detailed information was received to allow a decomposition of prices and margins along the chain. Based on the available information, the ACCC expressed its concern that certain practices and issues in the industry risk harming competition and efficiency, notably the lack of transparency on cattle prices as well as the pricing mechanisms and grading systems used by buyers. The ACCC formulated a number of recommendations to improve transparency in the market, but noted in its 2018 update report that the level of voluntary reform so far has been disappointing.

In 2016, the ACCC was requested by the government to hold an inquiry into the functioning of the Australian dairy industry.[50] In April 2016, Australia's two largest dairy processors retroactively reduced the prices paid to farmers, leading to severe reductions in incomes for more than 2 000 dairy farmers. These events formed the catalyst for the ACCC's market study. In contrast with the cattle and beef study, the ACCC used compulsory information gathering powers to obtain evidence for the dairy inquiry, including through private hearings where witnesses testified under oath. In its final report, published in 2018, the ACCC concluded that the sector suffers from significant imbalances in bargaining power at each level of the chain, resulting in market failures and inefficiencies, as farmers are discouraged from making productivity-enhancing investments. As neither existing competition laws nor voluntary codes of conduct sufficiently address these issues, the ACCC recommended that a mandatory code of conduct should be introduced.

In 2018-19, the ACCC conducted a market study of the wine grape sector, investigating competition, contracting practices, transparency and risk allocation in supply chains. A final report was published in September 2019.[51] The ACCC found that bargaining imbalances between growers and winemakers led to potentially unfair and uncertain contract terms, while growers were frequently reluctant to raise concerns with the ACCC out of fear of retribution. The ACCC highlighted a lack of transparency on pricing and quality assessments, unfavourable payment terms (sometimes up to nine months after delivery), and contract terms which disproportionately allocate risk to growers. The ACCC provided recommendations to improve contracting practices, to strengthen competition among winemakers, and to provide more certainty and transparency to growers. In particular, the ACCC recommended strengthening an existing industry code of conduct.

In addition to these market studies by the competition authority, a 2016 report by the Productivity Commission on "Regulation of Australian Agriculture" included a review of competition issues with an emphasis on statutory marketing regulations, collective bargaining, and codes of conduct.[52] Statutory marketing regulations (e.g. regulations which designate a single body as the only authorised buyer and wholesaler of specific agricultural commodities) have mostly been abolished in Australian agriculture but are sometimes suggested as solutions to perceived problems of competition. The Productivity Commission noted the historical inefficiencies and market distortions caused by such regulations, as well as the lack of evidence for the market failures they are supposed to counteract. The use of collective bargaining, although

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[49] See https://www.accc.gov.au/focus-areas/market-studies/cattle-and-beef-market-study (accessed 25 September 2019).

[50] See https://www.accc.gov.au/focus-areas/inquiries/dairy-inquiry-0 (accessed 25 September 2019).

[51] See https://www.accc.gov.au/focus-areas/market-studies/wine-grape-market-study (accessed 25 September 2019).

[52] See https://www.pc.gov.au/inquiries/completed/agriculture/report/agriculture.pdf (accessed 22 October 2019), Chapter 12.

allowed under certain conditions by Australian competition law, is low in agriculture. This may be because of heterogeneity among producers. Regarding codes of conduct, the report noted that voluntary codes can provide a flexible regulatory framework to improve transparency and facilitate transactions in markets. The Productivity Commission also concluded that an emphasis on perceived abuses of market power by wholesalers and retailers overlooks the co-dependence of different actors along the value chain.

Bulgaria

The Bulgarian Commission for the Protection of Competition (CPC) published in 2018 a sectoral analysis on the markets for food and fast-moving consumer goods, with a particular emphasis on the impact of private-label products, pricing mechanisms, and rebates, contributions to marketing budgets and promotional discounts which retailers ask from suppliers.[53] The CPC noted that legislative changes introduced in 2015 were designed to prevent the abuse of a stronger bargaining position, and emphasised its commitment to the application of these provisions. The CPC recommended supply chain participants to engage in initiatives such as the Supply Chain Initiative and voluntary dispute settlement mechanisms. More broadly, the CPC recommended market participants to develop a constructive dialogue between retail chains and branch organisations.

Czech Republic

In the Czech Republic, specific legislation was introduced in 2009 to limit abuses of market power in the agricultural and food sectors. The Office for the Protection of Competition (UOHS) is responsible for monitoring compliance with this law, which was amended in 2016. The UOHS carried out a sector inquiry (published in August 2019) to assess competitive conditions in the supply chains of food and fast-moving consumer goods.[54] The study found that despite the strengthened legislation, a number of unfair practices persist, such as the use of a "back-margin" system (mechanisms which allow retailers to reduce the effective price paid to suppliers) or the practice of retailers requiring their suppliers to buy certain services from the retailer. Overall, the report concludes that even though conditions have not yet evolved to the point where there are no more violations of the law, the new legislation has made it more difficult for stronger actors to squeeze the margins of weaker actors in the chain.

Germany

The German competition authority (*Bundeskartellamt*) conducted a market study on the milk sector in 2012 and on the food retail sector in 2014.

The milk sector inquiry was an in-depth study of the entire supply chain, from the procurement of milk to the food retail sector.[55] The *Bundeskartellamt* notes that the inquiry identified competition problems in the area of market transparency, as market information systems and reference price models may allow the exchange of competitively sensitive data, which could in turn encourage the formation of cartels. The report also notes that there are signs that retail companies are abusing a dominant position by imposing unreasonably long payment terms. By contrast, the report did not find evidence that retailers made

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[53] See http://reg.cpc.bg/DepartmentDecisions.aspx?vp=4 (Decision No. ACT-887-02.08.2018).

[54] See http://www.uohs.cz/download/VTS/Zprava_sektorove_setreni_OMKTS_2019_08.pdf (accessed 25 September 2019).

[55] See https://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Sector%20Inquiries/Milk%20Sector%20Inquiry%20-%20Final%20Report.pdf?__blob=publicationFile&v=7 (accessed 25 September 2019).

agreements on retail prices for dairy products. The *Bundeskartellamt* further warned against potentially harmful effects on competition of several policy and regulatory proposals.

The sector inquiry into the food retail sector (published in September 2014) notes the widespread concerns among the wider public concerning buyer power of retailers, which contrast with the weak empirical basis for these arguments.[56] One possible reason for this lack of empirical evidence may be that necessary datasets are not publicly accessible. The sector inquiry confirms that German food retail is dominated by four large retailers which also hold strong positions in procurement markets, leading to strong bargaining positions relative to suppliers. The *Bundeskartellamt* notes that these findings confirm its practice of exercising strict merger control in this market, while also providing useful insights into the sector which help it in controlling abusive practices.

Italy

The Italian competition and markets authority (AGCM) conducted a market study of the dairy sector (published in 2016) in part based on complaints by sector participants about a disconnect between the evolution of raw milk prices and final dairy product prices.[57] In response, the AGCM's in-depth assessment of the milk chain looked at structural characteristics of the sector, as well as contracts and price transmission. It found that Italian raw milk prices moved perfectly in line with European and international prices. However, the AGCM noted that Italy is (with the exception of the Po valley) not well-suited to dairy production and imports over 40% of its dairy consumption. On average, Italian milk production costs are high, and even in 2013 (when milk prices were relatively favourable) some 65-70% of milk producers were struggling to be profitable. The AGCM notes that these producers accounted for only 30% of milk production, underscoring the enormous variation in size among producers. Larger milk producers benefit from economies of scale and appear better able to withstand low milk prices. The AGCM acknowledged that milk producers have a weaker bargaining position, yet the report notes that *no* stage of the dairy chain seemed able to generate high profits. The AGCM provided several recommendations for structural reforms in the sector to improve cost efficiency and increase the value-added (e.g. through geographical indications).

Latvia

The Latvian Competition Council has produced several market studies on the dairy sector and on unfair trading practices in the retail chain. The most recent study on the dairy sector was triggered by public statements in 2016 by actors in the supply chain that a significant rise in milk prices was expected for 2017. The Competition Council performed a check on objective market conditions to verify these statements and to assess the possibility that market participants were using such public statements to coordinate on higher prices. It concluded that several factors explained a rise in milk prices, but reiterated that competitors must refrain from discussing forecasts on prices and strategy, including through public announcements.[58]

The Prohibition of Unfair Retail Practices Act (NMPAL) entered into force in January 2016 with the aim of creating a better balance between suppliers and retailers. A study in 2017 evaluated the effects of the law

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[56] See https://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Sector%20Inquiries/Summary_Sector_Inquiry_food_retail_sector.html?nn=4143316 (accessed 25 September 2019).

[57] See https://www.agcm.it/dettaglio?db=C12564CE0049D161&uid=8479B59509CFFF40C1257F77004F18B0&view=vw0201&title=IC51-INDAGINE%20CONOSCITIVA%20SUL%20SETTORE%20LATTIERO%20CASEARIO&fs= (accessed 25 September 2019).

[58] See https://www.kp.gov.lv/oldfiles/38/citi%2F2017_mini_piena_uzraudziba.pdf (accessed 25 September 2019).

during its first eighteen months.[59] While there was progress in several areas (e.g. regarding retailers returning goods to suppliers), the Competition Council also identified room for improvement in a number of areas.

Mexico

Mexico's Federal Economic Competition Commission (COFECE) published a detailed market study on competition in the agri-food sector in December 2015.[60] The goal of the study was not to identify anti-competitive practices but rather to collect valuable information about all stages of the food chain in Mexico and to provide recommendations for public policy to promote efficiency and competition in the sector. The recommendations include proposals to improve market price transparency, reduce regulatory burdens which limit competition and trade, and provide public goods (e.g. promoting the development of electronic platforms to facilitate exchanges).

Poland

The Office for Competition and Consumer Protection (UOKiK) published a market study on the milk production and processing market in 2018.[61] The focus of the study was on contractual relations, in light of the 2016 law on counteracting unfair use of superior bargaining power in the agri-food chain. The study uncovered several potentially problematic contract clauses used in the industry such as permanent exclusivity clauses (preventing milk producers from switching to other dairy companies) and clauses allowing buyers to unilaterally terminate contracts while not extending this possibility to the supplier. In addition, the investigation highlighted a lack of transparency on pricing and quality testing.

Another study investigated contracts and price formation in fruit markets.[62] The report notes that fruit producers have a weak bargaining position; and UOKiK has conducted several investigations into violations of the 2016 law on unfair use of superior bargaining power. In addition, the UOKiK study identified various unfair trading practices, such as lengthy payment terms (of up to 180 days), failure to pay, and unclear pricing rules.

Slovenia

The Slovenian Competition Protection Agency (CPA) conducted an inquiry of the food sector in 2014 to gain a deeper insight into relationships between suppliers and retailers in the food trade and retail.[63] The report relied on public data as well as on questionnaires sent to bakeries, processors of red meat and poultry, the dairy industry, suppliers of edible oils, and the biggest retailers. The inquiry showed that retailers have much stronger bargaining power than suppliers. However, no specific barriers for new companies to enter the market exist.

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[59] See https://www.kp.gov.lv/oldfiles/38/citi%2Fnmpal_uzraudziba_2017.pdf (accessed 25 September 2019)

[60] See https://www.cofece.mx/cofece/images/Estudios/COFECE_reporte%20final-ok_SIN_RESUMEN_ALTA_RES-7enero.pdf#pdf (accessed 25 September 2019).

[61] See https://uokik.gov.pl/download.php?plik=21650 (accessed 25 September 2019).

[62] See https://www.uokik.gov.pl/download.php?plik=22959 (accessed 25 September 2019).

[63] See http://www.varstvo-konkurence.si/fileadmin/varstvo-konkurence.si/pageuploads/Raziskave/Povzetek_raziskave_sektorja_prehrane__AVK__2014_.pdf (accessed 16 Oct 2019).

A second study, published in 2017, focused on unfair trading practices in the food chain.[64] The CPA is responsible for monitoring illegal trading practices in the food chain (defined in a 2014 amendment to the Agriculture Act). Based on surveys of market participants as well as publicly available information, the CPA found that suppliers often cannot pass through cost increases to retailers or, when they can, this happens with a delay of several months. Retailers were also found to demand rebates, to charge suppliers for services, and to use payment periods of on average 30-35 days for discount retailers and 60-90 days for classic retailers. The CPA concluded that ongoing monitoring is necessary to prevent the use of illegal trading practices.

South Africa

The Competition Commission of South Africa is conducting a detailed inquiry of the grocery retail market, with a preliminary report published in May 2019.[65] The focus of this inquiry is on competitive conditions at the retail level, although aspects of buyer power are also investigated. The preliminary results show that a combination of features in South African grocery retail may prevent, distort or restrict competition at the retail level. One of the findings of the inquiry is that national retail chains are able to extract more favourable trading terms, even in cases where they were not the largest customers. In addition, national retail chains have started demanding rebates to cover the costs of retail store level activities such as advertising and promotion or access to shelf space.

Sweden

The Swedish competition authority (Konkurrensverket) published a detailed report on 2018 on competition in the food retail sector.[66] Market concentration in grocery retail is high in Sweden, although discount chains have recently been gaining market share. Since Sweden's accession to the EU in 1995, trade in food products has increased and about half of Swedish food consumption is now imported. This increase in trade has helped to keep food price increases in check. The food processing industry is highly diverse, and levels of market concentration vary strongly between sectors. The report further notes that Swedish agriculture faces challenges in terms of its competitiveness, in particular due to higher costs as well as national regulations. The report also found that many firms in the food sector experience unfair trading practices, although these do not necessarily disrupt competition in the food chain. Overall, the competition authority concluded that competition in the food supply chain is well-functioning.

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[64] See http://www.varstvo-konkurence.si/fileadmin/varstvo-konkurence.si/pageuploads/Raziskave/Porocilo_o_raziskavi_NPP_v_verigi_preskrbe_s_hrano_-_nezaupno__AVK__2017_.pdf (accessed 16 Oct 2019).

[65] See http://www.compcom.co.za/retail-market-inquiry/ (accessed 16 Oct 2019).

[66] See http://www.konkurrensverket.se/globalassets/publikationer/rapporter/rapport_2018-4.pdf (accessed 16 Oct 2019).

References

Adjemian, M. et al. (2016), *Thinning Markets in U.S. Agriculture What Are the Implications for Producers and Processors?*, Economic Research Service, United States Department of Agriculture, http://www.ers.usda.gov/publications/eib-economic-information-bulletin/eib148 (accessed on 11 September 2018).

[8]

Aghion, P. et al. (2005), "Competition and Innovation: an Inverted-U Relationship", *The Quarterly Journal of Economics*, Vol. 120/2, pp. 701-728, http://dx.doi.org/10.1093/qje/120.2.701.

[84]

Agricultural Markets Task Force (2016), *Improving market outcomes: Enhancing the position of farmers in the supply chain*, https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/amtf-report-improving-markets-outcomes_en.pdf (accessed on 3 December 2018).

[10]

Bakucs, Z., J. Fałkowski and I. Fertő (2014), "Does Market Structure Influence Price Transmission in the Agro-food Sector? A Meta-analysis Perspective", *Journal of Agricultural Economics*, Vol. 65/1, pp. 1-25, http://dx.doi.org/10.1111/1477-9552.12042.

[37]

Baltussen, W. et al. (2014), *Prijsvorming van voedsel; Ontwikkelingen van prijzen in acht Nederlandse ketens van versproducten*, https://library.wur.nl/WebQuery/wurpubs/480585 (accessed on 25 September 2019).

[31]

Barrett, C. et al. (2012), "Smallholder participation in contract farming: Comparative evidence from five countries", *World Development*, Vol. 40/4, pp. 715-730, http://dx.doi.org/10.1016/j.worlddev.2011.09.006.

[47]

Beghin, J., M. Maertens and J. Swinnen (2015), "Nontariff Measures and Standards in Trade and Global Value Chains", *Annual Review of Resource Economics*, Vol. 7/1, pp. 425-450, http://dx.doi.org/10.1146/annurev-resource-100814-124917.

[57]

Bellemare, M. and J. Bloem (2018), *Does contract farming improve welfare? A review*, Elsevier Ltd, http://dx.doi.org/10.1016/j.worlddev.2018.08.018.

[108]

Berry, S., M. Gaynor and F. Scott Morton (2019), "Do Increasing Markups Matter? Lessons from Empirical Industrial Organization", *Journal of Economic Perspectives*, Vol. 33/3, pp. 44-68, https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.33.3.44 (accessed on 16 October 2019).

[17]

Bijman, J. et al. (2012), *Support for Farmers' Cooperatives - Final Report*, https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2012/support-farmers-coop/fulltext_en.pdf (accessed on 13 December 2018).

[67]

Bokusheva, R. and L. Čechura (2017), "Evaluating dynamics, sources and drivers of productivity growth at the farm level", *OECD Food, Agriculture and Fisheries Papers*, No. 106, OECD Publishing, Paris, https://dx.doi.org/10.1787/5f2d0601-en.

[75]

Bokusheva, R. and S. Kimura (2016), "Cross-Country Comparison of Farm Size Distribution", *OECD Food, Agriculture and Fisheries Papers*, No. 94, OECD Publishing, Paris, https://dx.doi.org/10.1787/5jlv81sclr35-en.

[78]

Bonanno, A., C. Russo and L. Menapace (2018), "Market power and bargaining in agrifood markets: A review of emerging topics and tools", *Agribusiness*, Vol. 34/1, pp. 6-23, http://dx.doi.org/10.1002/agr.21542. [9]

Brester, G., J. Marsh and J. Atwood (2009), "Evaluating the Farmer's-Share-of-the-Retail-Dollar Statistic", *Journal of Agricultural and Resource Economics*, Vol. 34/2, pp. 213-236, http://www.waeaonline.org/jareonline/archives/34.2%20-%20August%202009/JARE,Aug2009,pp213,Brester.pdf (accessed on 4 December 2018). [32]

Cai, X., K. Stiegert and S. Koontz (2011), "Oligopsony Fed Cattle Pricing: Did Mandatory Price Reporting Increase Meatpacker Market Power?", *Applied Economic Perspectives and Policy*, Vol. 33/4, pp. 606-622, http://dx.doi.org/10.1093/aepp/ppr032. [91]

Cai, X., K. Stiegert and S. Koontz (2011), "Regime switching and oligopsony power: the case of U.S. beef processing", *Agricultural Economics*, Vol. 42/1, pp. 99-109, http://dx.doi.org/10.1111/j.1574-0862.2010.00503.x. [90]

Cechura, L., H. Hockmann and Z. Kroupova (2014), "Market Imperfections in the European Food Processing Industry", *COMPETE Working Paper*, No. 12, International Comparison of Product Supply Chains in the Agri-Food Sector (COMPETE), http://www.compete-project.eu/fileadmin/compete/files/working_paper/COMPETE_Working_Paper_12_Market_imperfection_in_FI.pdf (accessed on 16 October 2019). [24]

Chavas, J. (2001), "Structural Change in Agricultural Production: Economics, Technology and Policy", in Gardner, B. and G. Rausser (eds.), *Handbook of Agricultural Economics*, Elsevier Science. [72]

Chen, H. et al. (2019), "A Historical Review of Changes in Farm Size in Canada", *Working Paper*, No. 19-03, Institute for the Advanced Study of Food and Agricultural Policy, Department of Food, Agriculture, and Resource Economics, University of Guelph, http://dx.doi.org/10.22004/AG.ECON.283563. [77]

Crespi, J. and T. Saitone (2018), "Are Cattle Markets the Last Frontier? Vertical Coordination in Animal-Based Procurement Markets", http://dx.doi.org/10.1146/annurev-resource. [60]

Crespi, J., T. Saitone and R. Sexton (2012), "Competition in U.S. Farm Product Markets: Do Long-Run Incentives Trump Short-Run Market Power?", *Applied Economic Perspectives and Policy*, Vol. 34/4, pp. 669-695, http://dx.doi.org/10.1093/aepp/pps045. [13]

Dai, J. and X. Wang (2014), "Is China's dairy processing industry oligopolistic and/or oligopsonistic?", *China Agricultural Economic Review*, Vol. 6/4, pp. 644-653, http://dx.doi.org/10.1108/CAER-01-2014-0004. [26]

DeBoe, G. (2020), "Impacts of agricultural policies on productivity and sustainability performance in agriculture: A literature review", *OECD Food, Agriculture and Fisheries Papers*, No. 141, OECD Publishing, Paris, https://dx.doi.org/10.1787/6bc916e7-en. [73]

Di Marcantonio, F., P. Ciaian and V. Castellanos (2018), "Unfair trading practices in the dairy farm sector: Evidence from selected EU regions", *JRC Technical Reports*, European Commission, http://dx.doi.org/10.2760/747043. [50]

Dillon, B. and C. Dambro (2017), "How Competitive Are Crop Markets in Sub-Saharan Africa?", *American Journal of Agricultural Economics*, Vol. 99/5, pp. 1344-1361, http://dx.doi.org/10.1093/ajae/aax044. [101]

European Commission (2014), *Tackling Unfair Trading Practices in the Business-to-Business Food Supply Chain, COM(2014) 472 Final*. [45]

European Commission (2014), *The economic impact of modern retail on choice and innovation in the EU food sector*, https://ec.europa.eu/competition/sectors/agriculture/retail_study_report_en.pdf (accessed on 15 October 2019). [14]

Falkowski, J. (2017), "The Economic Aspects of Unfair Trading Practices: Measurement and Indicators", in Di Marcantonio, F. and P. Ciaian (eds.), *Unfair Trading Practices in the Food Supply Chain: A Literature Review on Methodologies, Impacts and Regulatory Aspects*. [48]

Fischer, C. et al. (2009), "Factors influencing contractual choice and sustainable relationships in European agri-food supply chains", *European Review of Agricultural Economics*, Vol. 36/4, pp. 541-569, http://dx.doi.org/10.1093/erae/jbp041. [61]

Fulponi, L. (2006), "Private voluntary standards in the food system: The perspective of major food retailers in OECD countries", *Food Policy*, Vol. 31/1, pp. 1-13, http://dx.doi.org/10.1016/J.FOODPOL.2005.06.006. [64]

Gardner, B. (1975), "The Farm-Retail Price Spread in a Competitive Food Industry", *American Journal of Agricultural Economics*, Vol. 57/3, pp. 399-409, http://dx.doi.org/10.2307/1238402. [40]

Goodhue, R. (2011), "Food Quality: The Design of Incentive Contracts", *Annual Review of Resource Economics*, Vol. 3/1, pp. 119-140, http://dx.doi.org/10.1146/annurev-resource-040709-135037. [63]

Grau, A. and H. Hockmann (2018), "Market power in the German dairy value chain", *Agribusiness*, Vol. 34/1, pp. 93-111, http://dx.doi.org/10.1002/agr.21529. [87]

Greenville, J., K. Kawasaki and M. Jouanjean (2019), "Value Adding Pathways in Agriculture and Food Trade: The Role of GVCs and Services", *OECD Food, Agriculture and Fisheries Papers*, No. 123, OECD Publishing, Paris, https://dx.doi.org/10.1787/bb8bb93d-en. [102]

Hoffman, A. (1940), "Changing Organization of Agricultural Markets", *Journal of Farm Economics*, Vol. 22/1, https://www.jstor.org/stable/pdf/1232040.pdf (accessed on 12 December 2018). [58]

Howard, P. (2016), *Concentration and power in the food system : who controls what we eat?*, Bloomsbury, https://www.bloomsbury.com/us/concentration-and-power-in-the-food-system-9781472581143/ (accessed on 30 October 2017). [3]

IPES-Food (2017), *Too big to feed: Exploring the impacts of mega-mergers, consolidation and concentration of power in the agri-food sector*, http://www.ipes-food.org (accessed on 19 February 2020). [81]

Ji, I., C. Chung and J. Lee (2017), "Measuring Oligopsony Power in the U.S. Cattle Procurement Market: Packer Concentration, Cattle Cycle, and Seasonality", *Agribusiness*, Vol. 33/1, pp. 16-29, http://dx.doi.org/10.1002/agr.21490. [20]

Kaditi, E. (2012), "Market Dynamics in Food Supply Chains: The Impact of Globalization and Consolidation on Firms' Market Power", *Agribusiness*, Vol. 29/4, pp. n/a-n/a, http://dx.doi.org/10.1002/agr.21301.

[25]

Kelloway, C. and S. Miller (2019), *Food and Power: Addressing Monopolization in America's Food System*, Open Markets Institute.

[82]

Kinnucan, H. and D. Zhang (2015), "Notes on farm-retail price transmission and marketing margin behavior", *Agricultural Economics*, Vol. 46/6, pp. 729-737, http://dx.doi.org/10.1111/agec.12188.

[109]

Lan, H. and X. Wang (2019), "Estimating market power in the Chinese pork-packing industry: a structural approach", *China Agricultural Economic Review*, Vol. ahead-of-print/ahead-of-print, http://dx.doi.org/10.1108/CAER-03-2018-0046.

[27]

Lan, H. and X. Wang (2019), "Estimating market power in the Chinese pork-packing industry: a structural approach", *China Agricultural Economic Review*, Vol. ahead-of-print/ahead-of-print, http://dx.doi.org/10.1108/CAER-03-2018-0046.

[106]

Lianos, I. and A. Darr (2019), "Hunger Games: Connecting the Right to Food and Competition Law", *CLES Research Paper Series*, No. 2/2019, University College London - Centre for Law, Economics and Society (CLES), https://www.ucl.ac.uk/cles/research-papers (accessed on 19 February 2020).

[83]

Lloyd, T. (2017), "Forty Years of Price Transmission Research in the Food Industry: Insights, Challenges and Prospects", *Journal of Agricultural Economics*, Vol. 68/1, pp. 3-21, http://dx.doi.org/10.1111/1477-9552.12205.

[38]

Lloyd, T. et al. (2009), "Buyer Power in U.K. Food Retailing: A 'First-Pass' Test", *Journal of Agricultural & Food Industrial Organization*, Vol. 7/1, http://dx.doi.org/10.2202/1542-0485.1253.

[42]

MacDonald, J. (2017), "Consolidation, Concentration, and Competition in the Food System", *Federal Reserve Bank of Kansas City Economic Review*, https://www.kansascityfed.org/~/media/files/publicat/econrev/econrevarchive/2017/si17macdonald.pdf (accessed on 10 January 2018).

[5]

MacDonald, J. (2015), "Trends in Agricultural Contracts", *Choices*, Vol. 30/3, http://www.choicesmagazine.org/choices-magazine/theme-articles/current-issues-in-agricultural-contracts/trends-in-agricultural-contracts (accessed on 4 December 2018).

[59]

MacDonald, J. (2014), "Technology, Organization, and Financial Performance in U.S. Broiler Production", *Economic Information Bulletin*, No. 126, United States Department of Agriculture - Economic Research Service, http://www.ers.usda.gov (accessed on 25 August 2020).

[71]

MacDonald, J., J. Cessna and R. Mosheim (2016), "Changing Structure, Financial Risks, and Government Policy for the U.S. Dairy Industry", *Economic Research Report*, No. 205, Economic Research Service, http://www.ers.usda.gov/publications/err-economic-research-report/err205 (accessed on 27 November 2018).

[80]

Macdonald, J., R. Hoppe and D. Newton (2018), "Three Decades of Consolidation in U.S. Agriculture", *Economic Information Bulletin*, No. 189, United States Department of Agriculture - Economic Research Service, http://www.ers.usda.gov (accessed on 19 February 2020).

[76]

MacDonald, J. and N. Key (2012), "Market Power in Poultry Production Contracting? Evidence from a Farm Survey", *Journal of Agricultural and Applied Economics*, Vol. 44/4, pp. 477-490, http://dx.doi.org/10.1017/s1074070800024056.

[93]

McCorriston, S. (2014), "Background Note", in OECD (ed.), *Competition Issues in the Food Chain Industry*, OECD Publishing, Paris.

[22]

McCorriston, S., C. Morgan and A. Rayner (1998), "Processing technology, market power and price transmission", *Journal of Agricultural Economics*, Vol. 49/2, pp. 185-201, http://dx.doi.org/10.1111/j.1477-9552.1998.tb01263.x.

[33]

Mccorriston, S., C. Morgan and A. Rayner (2001), "Price transmission: the interaction between market power and returns to scale", *European Review of Agricultural Economics*, Vol. 28/2, pp. 143-159.

[41]

Meemken, E. and M. Bellemare (2020), "Smallholder farmers and contract farming in developing countries", *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 117/1, pp. 259-264, http://dx.doi.org/10.1073/pnas.1909501116.

[107]

Menapace, L. and G. Moschini (2012), "Quality certification by geographical indications, trademarks and firm reputation", *European Review of Agricultural Economics*, Vol. 39/4, pp. 539-566, http://dx.doi.org/10.1093/erae/jbr053.

[66]

Ménard, C. (2017), "Summary and Conclusions: The Many Challenges of Unfair Trading Practices in Food Supply Chains", in Di Marcantonio, F. and P. Ciaian (eds.), *Unfair Trading Practices in the Food Supply Chain: A Literature Review on Methodologies, Impacts and Regulatory Aspects*.

[49]

Menard, C. and P. Klein (2004), "Organizational Issues in the Agrifood Sector: Toward a Comparative Approach", *American Journal of Agricultural Economics*, Vol. 86/3, pp. 750-755, http://dx.doi.org/10.1111/j.0002-9092.2004.00619.x.

[54]

Mérel, P. and R. Sexton (2017), "Buyer power with atomistic upstream entry: Can downstream consolidation increase production and welfare?", *International Journal of Industrial Organization*, Vol. 50, pp. 259-293, http://dx.doi.org/10.1016/J.IJINDORG.2016.11.002.

[15]

Meyer, J. and S. Cramon-Taubadel (2004), "Asymmetric Price Transmission: A Survey", *Journal of Agricultural Economics*, Vol. 55/3, pp. 581-611, http://dx.doi.org/10.1111/j.1477-9552.2004.tb00116.x.

[34]

Observatoire des Prix (2015), *Actualisation de l'étude sur la filière porcine - mai 2015 | SPF Economie*, Institut des comptes nationaux, https://economie.fgov.be/fr/publicaties/actualisation-de-letude-sur-la-0 (accessed on 25 September 2019).

[98]

OECD (2020), *Competition in Labour Markets*, OECD, Paris, http://www.oecd.org/daf/competition/competition-in-labour-markets-2020.pdf (accessed on 24 August 2020).

[110]

OECD (2018), *Concentration in Seed Markets: Potential Effects and Policy Responses*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264308367-en.

[85]

OECD (2018), *Market Studies Guide for Competition Authorities*, OECD, Paris, https://www.oecd.org/daf/competition/market-studies-guide-for-competition-authorities.htm (accessed on 25 September 2019). [43]

OECD (2015), *Food Price Formation*. [35]

OECD (2014), *OECD Competition Policy Roundtables: Competition Issues in the Food Chain Industry*, https://www.oecd.org/daf/competition/CompetitionIssuesintheFoodChainIndustry.pdf (accessed on 21 September 2017). [2]

OECD (2005), *Competition and Regulation in Agriculture: Monopsony buying and joint selling*, http://www.oecd.org/competition (accessed on 14 November 2019). [1]

OECD/FAO (2019), *OECD-FAO Agricultural Outlook 2019-2028*, OECD Publishing, Paris/Food and Agriculture Organization of the United Nations, Rome, https://dx.doi.org/10.1787/agr_outlook-2019-en. [74]

OFPM (2019), *Rapport au Parlement 2019*, Observatoire de la formation des prix et des marges des produits alimentaires, https://observatoire-prixmarges.franceagrimer.fr/Lists/Liste%20Rapports%20au%20Parlement%20et%20Lettres/Attachments/28/version_site_internet.pdf (accessed on 16 October 2019). [30]

Oosterkamp, E. et al. (2013), *Food price monitoring and observatories: an exploration of costs and effects*, LEI - Wageningen University & Research, http://edepot.wur.nl/264471 (accessed on 25 September 2019). [97]

Otsuka, K., Y. Nakano and K. Takahashi (2016), "Contract Farming in Developed and Developing Countries", http://dx.doi.org/10.1146/annurev-resource-100815-095459. [62]

Panagiotou, D. and A. Stavrakoudis (2017), "A Stochastic Production Frontier Estimator of the Degree of Oligopsony Power in the U.S. Cattle Industry", *Journal of Industry, Competition and Trade*, Vol. 17/1, pp. 121-133, http://dx.doi.org/10.1007/s10842-016-0233-0. [104]

Panagiotou, D. and A. Stavrakoudis (2016), "A stochastic frontier estimator of the aggregate degree of market power exerted by the U.S. beef and pork packing industries". [105]

Perekhozhuk, O. et al. (2017), "Approaches and methods for the econometric analysis of market power: A survey and empirical comparison", *Journal of Economic Surveys*, Vol. 31/1, pp. 303-325, http://dx.doi.org/10.1111/joes.12141. [23]

Reardon, T. and C. Timmer (2012), "The Economics of the Food System Revolution", *Annual Review of Resource Economics*, Vol. 4/1, pp. 225-264, http://dx.doi.org/10.1146/annurev.resource.050708.144147. [55]

Rey, P. and T. Vergé (2005), "The Economics of Vertical Restraints", in Paolo Buccirossi (ed.), *Handbook of Antitrust Economics*, MIT Press, http://www.economics.soton.ac.uk/staff/Verge/Verticals.pdf (accessed on 17 November 2017). [39]

Rogers, R. and R. Sexton (1994), "Assessing the Importance of Oligopsony Power in Agricultural Markets", *American Journal of Agricultural Economics*, Vol. 76/5, p. 1143, http://dx.doi.org/10.2307/1243407. [12]

Rude, J., D. Harrison and J. Carlberg (2011), "Market Power in Canadian Beef Packing", *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, Vol. 59/3, pp. 321-336, http://dx.doi.org/10.1111/j.1744-7976.2010.01204.x. [96]

Russo (ed.), C. (2020), *Pass-through of unfair trading practices in EU food supply chains*, Publications Office of the European Union, Luxembourg, https://ec.europa.eu/jrc/en/publication/pass-through-unfair-trading-practices-eu-food-supply-chains (accessed on 3 July 2020). [51]

Saitone, T. and R. Sexton (2017), "Concentration and Consolidation in the U.S. Food Supply Chain: The Latest Evidence and Implications for Consumers, Farmers, and Policymakers", *Federal Reserve Bank of Kansas City Economic Review*, https://www.kansascityfed.org/~/media/files/publicat/econrev/econrevarchive/2017/si17saiton esexton.pdf (accessed on 21 November 2017). [6]

Saitone, T. and R. Sexton (2017), "Concentration and consolidation in the US food supply chain: The latest evidence and implications for consumers, farmers, and policymakers", *Federal Reserve Bank of Kansas City Economic Review*, https://www.kansascityfed.org/~/media/files/publicat/econrev/econrevarchive/2017/si17saiton esexton.pdf (accessed on 15 October 2019). [100]

Salhofer, K., C. Tribl and F. Sinabell (2012), "Market power in Austrian food retailing: The case of milk products", *Empirica*, Vol. 39/1, pp. 109-122, http://dx.doi.org/10.1007/s10663-011-9166-3. [88]

Scalco, P. and M. Braga (2014), "Measuring the Degree of Oligoposony Power in the Brazilian Raw Milk Market", *International Food and Agribusiness Management Review*, Vol. 17/2. [94]

Scalco, P., R. Lopez and X. He (2017), "Buyer and/or seller power? An application to the Brazilian milk market", *Applied Economics Letters*, Vol. 24/16, pp. 1173-1176, http://dx.doi.org/10.1080/13504851.2016.1262515. [95]

Sckokai, P., C. Soregaroli and D. Moro (2013), "Estimating Market Power by Retailers in a Dynamic Framework: the Italian PDO Cheese Market", *Journal of Agricultural Economics*, Vol. 64/1, pp. 33-53, http://dx.doi.org/10.1111/j.1477-9552.2012.00368.x. [89]

Sexton, R. (2017), "Unfair Trade Practices in the Food Supply Chain: Defining the Problem and the Policy Issues", in Di Marcantonio, F. and P. Ciaian (eds.), *Unfair Trading Practices in the Food Supply Chain: A Literature Review on Methodologies, Impacts and Regulatory Aspects*. [44]

Sexton, R. (2013), "Market Power, Misconceptions, and Modern Agricultural Markets", *American Journal of Agricultural Economics*, Vol. 95/2, pp. 209-219, http://dx.doi.org/10.1093/ajae/aas102. [11]

Sexton, R. and T. Xia (2018), "Increasing Concentration in the Agricultural Supply Chain: Implications for Market Power and Sector Performance", *Annual Review of Resource Economics*, Vol. 10/1, http://dx.doi.org/10.1146/annurev-resource-100517-023312. [16]

Sexton, R., M. Zhang and J. Chalfant (2003), "Grocery Retailer Behavior in the Procurement and Sale of Perishable Fresh Produce", *Contractor and Cooperator Report*, No. 2, United States Department of Agriculture, https://naldc.nal.usda.gov/download/32806/PDF (accessed on 16 October 2019). [28]

Sexton, R., M. Zhang and J. Chalfant (2003), "Grocery Retailer Behavior in the Procurement and Sale of Perishable Fresh Produce", *Contractor and Cooperator Report*, No. 2, United States Department of Agriculture, https://naldc.nal.usda.gov/download/32806/PDF (accessed on 16 October 2019). [103]

Sheldon, I. (2017), "The competitiveness of agricultural product and input markets: a review and synthesis of recent research", *Journal of Agricultural and Applied Economics*, Vol. 49/01, pp. 1-44, http://dx.doi.org/10.1017/aae.2016.29. [7]

SPF Economie (2019), *Etude de la composition du prix de la viande bovine - juillet 2018 | SPF Economie*, SPF Economie, P.M.E, Classes moyennes et Energie, https://economie.fgov.be/fr/publications/etude-de-la-composition-du (accessed on 25 September 2019). [99]

Swinnen, J. (ed.) (2007), *Global supply chains, standards and the poor*, CABI, Wallingford, http://dx.doi.org/10.1079/9781845931858.0000. [69]

Swinnen, J. et al. (2015), *Quality standards, value chains, and international development: Economic and political theory*, http://dx.doi.org/10.1017/CBO9781139198912. [46]

Swinnen, J. and R. Kuijpers (2019), "Value chain innovations for technology transfer in developing and emerging economies: Conceptual issues, typology, and policy implications", *Food Policy*, Vol. 83, pp. 298-309, http://dx.doi.org/10.1016/j.foodpol.2017.07.013. [70]

Swinnen, J. and S. Vandevelde (2017), "Regulating UTPs: Diversity versus Harmonisation of Member State Rules", in Di Marcantonio, F. and P. Ciaian (eds.), *Unfair Trading Practices in the Food Supply Chain: A Literature Review on Methodologies, Impacts and Regulatory Aspects*. [53]

Swinnen, J. and S. Vandevelde (2017), "Unfair trading practices - the way forward", in Di Marcantonio, F. and P. Ciaian (eds.), *Unfair Trading Practices in the Food Supply Chain: A Literature Review on Methodologies, Impacts and Regulatory Aspects*. [52]

US Department of Justice (2012), *Competition and Agriculture: Voices from the Workshops on Agriculture and Antitrust Enforcement in our 21st Century Economy and Thoughts on the Way Forward*, http://www.justice.gov/ag/speeches/2010/ag-speech-100312.html. (accessed on 29 November 2018). [18]

Van Berkum, S. (2007), "Vertical coordination in the dairy sector: a comparative analysis of Romania and Slovakia", in Swinnen, J. (ed.), *Global Supply Chains, Standards and the Poor: How the Globalization of Food Systems and Standards Affects Rural Development and Poverty*, CABI International, Wallingford, UK. [68]

van der Meulen, H. (2018), *Voedsel-Economisch Bericht: Schaalgrootte en inkomen melkveehouderij*, Agrimatie.nl, https://www.agrimatie.nl/PublicatiePage.aspx?subpubID=2525&sectorID=2245&themaID=7458&indicatorID=7452 (accessed on 11 December 2018). [79]

Vavra, P. (2009), "Role, Usage and Motivation for Contracting in Agriculture", *OECD Food, Agriculture and Fisheries Papers*, No. 16, OECD, https://www.oecd-ilibrary.org/agriculture-and-food/role-usage-and-motivation-for-contracting-in-agriculture_225036745705 (accessed on 4 December 2018). [56]

Vavra, P. and B. Goodwin (2005), "Analysis of Price Transmission Along the Food Chain", *OECD Food, Agriculture and Fisheries Papers*, No. 3, OECD, Paris, https://www.oecd-ilibrary.org/agriculture-and-food/analysis-of-price-transmission-along-the-food-chain_752335872456 (accessed on 4 December 2018). [36]

Verriest, A., A. Gaeremynck and D. Thornton (2013), "The Impact of Corporate Governance on IFRS Adoption Choices", *European Accounting Review*, Vol. 22/1, pp. 39-77, http://dx.doi.org/10.1080/09638180.2011.644699. [29]

Vinson & Elkins (2020), *Plaintiffs Struggle To Prove Meat And Potatoes Of Antitrust Case As COVID-19 Throws Market Into Further Disarray*, JDSupra.com, https://www.jdsupra.com/legalnews/plaintiffs-struggle-to-prove-meat-and-78289/ (accessed on 28 September 2020). [21]

Wesseler, J. et al. (2015), *Overview of the agricultural inputs sector in the EU*, European Parliament, Committee on Agriculture and Rural Development, http://www.europarl.europa.eu/RegData/etudes/STUD/2015/563385/IPOL_STU(2015)563385_EN.pdf (accessed on 19 September 2017). [4]

Winfree, J. and J. McCluskey (2005), "Collective Reputation and Quality", *American Journal of Agricultural Economics*, Vol. 87/1, pp. 206-213, http://dx.doi.org/10.1111/j.0002-9092.2005.00712.x. [65]

Wohlgenant, M. (2013), "Competition in the US Meatpacking Industry", *Annual Review of Resource Economics*, Vol. 5/1, pp. 1-12, http://dx.doi.org/10.1146/annurev-resource-091912-151807. [19]

Zheng, X. and T. Vukina (2009), "Do Alternative Marketing Arrangements Increase Pork Packers' Market Power?", *American Journal of Agricultural Economics*, Vol. 91/1, pp. 250-263, http://dx.doi.org/10.1111/j.1467-8276.2008.01185.x. [92]

Zilberman, D., L. Lu and T. Reardon (2019), "Innovation-induced food supply chain design", *Food Policy*, Vol. 83, pp. 289-297, http://dx.doi.org/10.1016/j.foodpol.2017.03.010. [86]