Food and Agriculture Organization of the United Nations

Competition, market power, surplus creation and rent distribution in agri-food value chains

Background paper for The State of Agricultural Commodity Markets (SOCO) 2020

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The State of Agricultural Commodity Markets (SOCO) 2020

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Abstract

This paper reviews competition issues in agro-food value chains, including forms of governance and organization, concentration and market power and private standards implications. The paper discusses different value chains in food and agriculture and analyses how services and technologies are embedded in the final value and assesses the share of the different value chain segments. It analyses the nature of competition along the value chain and the interactions of participants; how market power can generate rents and alter welfare distribution along the chain; market structure considerations including examples of bargaining power, contractual arrangements and other manifestations of market power, including examples on the role of private standards and related welfare effects.

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CHAPTER 1

Introduction

1 Introduction

The growth of global value chains (GVCs), or "modern" agri-food chains more generally, has coincided with significant consolidation in agribusiness, food processing and especially, retailing. This has occurred in OECD countries but also increasingly in emerging and developing countries, as reflected in the so-called "supermarket revolution" (Reardon *et al,* 2003). While in the late twentieth century, discussions on problems of excessive concentration in food value chains were mostly about the dominant position of food processors, in the twenty-first century, this has shifted to implications of concentration in retail and input markets (Barrett *et al.*, 2019; Deconinck, 2020).

Market power and competition issues have emerged as important issues in food policy and sensitive items on the policy agenda. However, the evidence supporting market power abuse is less strong and the impact of concentration in local and global food chains on efficiency and rent distribution is more nuanced and complex than often claimed. There are several aspects that support being careful in drawing conclusions. First, there are significant data problems. Data that allow careful study of this issue are not generally available and, if available, are linked to specific (segments of) value chains, commodities and countries (Sexton, Zhang and Chalfant, 2005). Second, conceptually there are several reasons why the relationship between concentration and market power is complex. Third, empirical studies provide mixed evidence on this relationship. Several earlier studies have contributed to similar conclusions – see, for example, important contributions and reviews by Dillon and Dambro (2017), Lloyd (2017), Mérel and Sexton (2017), Sexton (2013), Sheldon (2017, 2018), Swinnen and Vandeplas (2010), and Wohlgenant (2013).

The report is organized as follows. The first section reviews some structural changes in agri-food value chains. The section afterwards reviews empirical studies on competition and rent distribution. In the next sections we provide potential explanations of why concentration in value chains may or may not lead to rent extraction and how it can affect the political economy of government policies. Then we present a framework to identify effective bargaining power in vertically coordinated (interlinked) markets; and how these issues may affect the governance of the value chains. The last section focuses on competition policy and recent policy initiatives to restrict business practices that may negatively affect farms, and that may not be captured by standard indicators (such as prices or price transmission). Two appendices add details on some of the sections.

CHAPTER 2

Structural changes in agricultural and food value chains

2 Structural changes in agricultural and food value chains

A declining share of agriculture in the value chain with economic development

Data to document the long run changes in the value chain are limited. We discuss here some key trends in the agri-food value chain using available indicators from OECD countries as illustration.

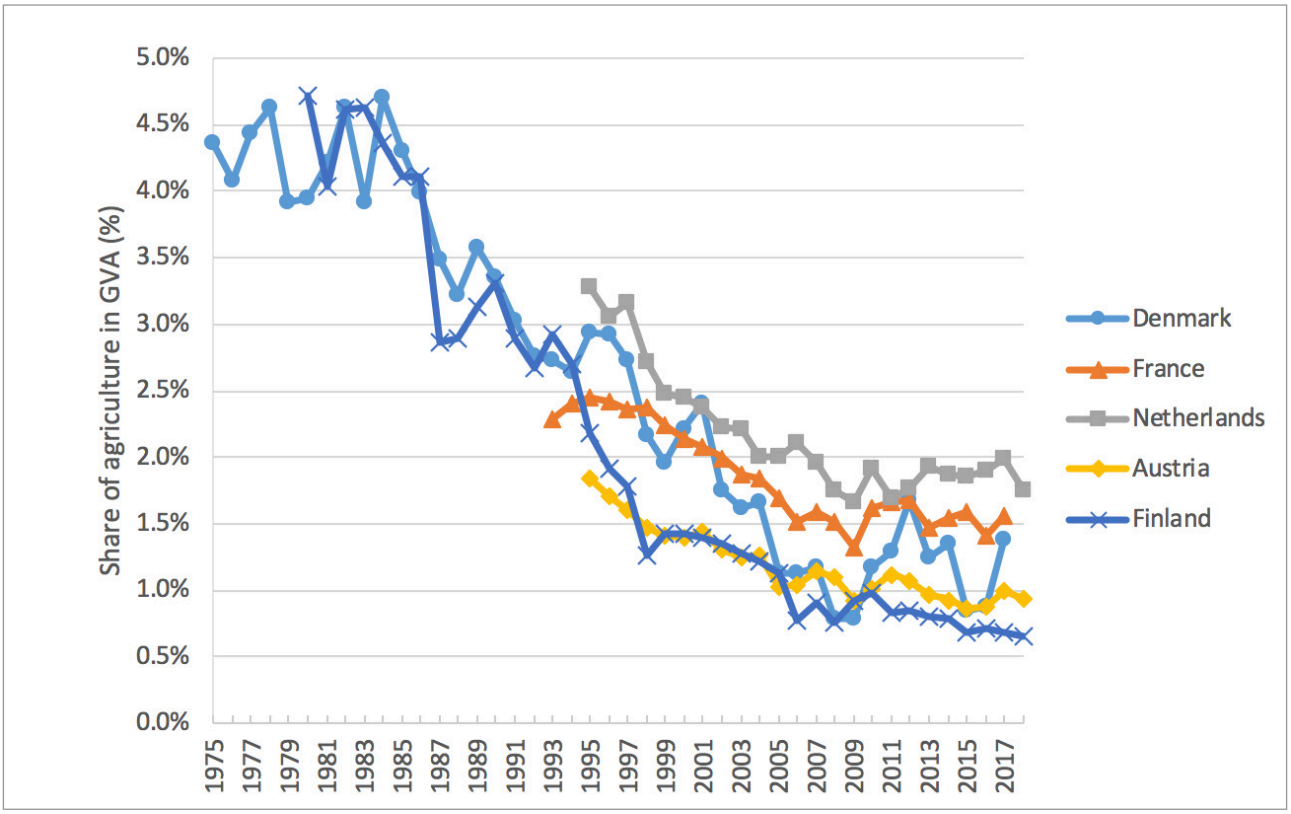
It is well known that the share of food in consumer expenditures declines with economic development. Moreover, the share of "consumer food expenditures" that goes to "agriculture" has declined even more with economic development. Processing, packaging, marketing and retailing of food are taking up a growing share; and health, quality, environmental and ethical attributes of food consumption have become increasingly important.

Today, the cost of agricultural ingredients is only a small share of the price of the final food products: more than a decade ago, in 2007, the European Commission estimated that it was around 5 percent of the cost of bread, and 20 percent for meat and livestock products – and this share has declined further since. Barrett *et al.* (2019) document how this has changed over a longer time period in the United States of America. In 1950, the share of agriculture in gross domestic product (GDP) was around 8 percent in the United States of America, similar to middle-income countries today such as China and Thailand (World Bank Group, 2019). Since then, it has fallen to below 1 percent. This is the familiar story of structural transformation in its mid-to-later stages. Over the same period, the farm share of total consumer food expenditures fell by an even larger magnitude. The gross farm share of consumer food expenditures was around 40 percent in the 1950s and has since declined to less than 15 percent. Hence, the share of other segments of the value chain has grown strongly with economic development.

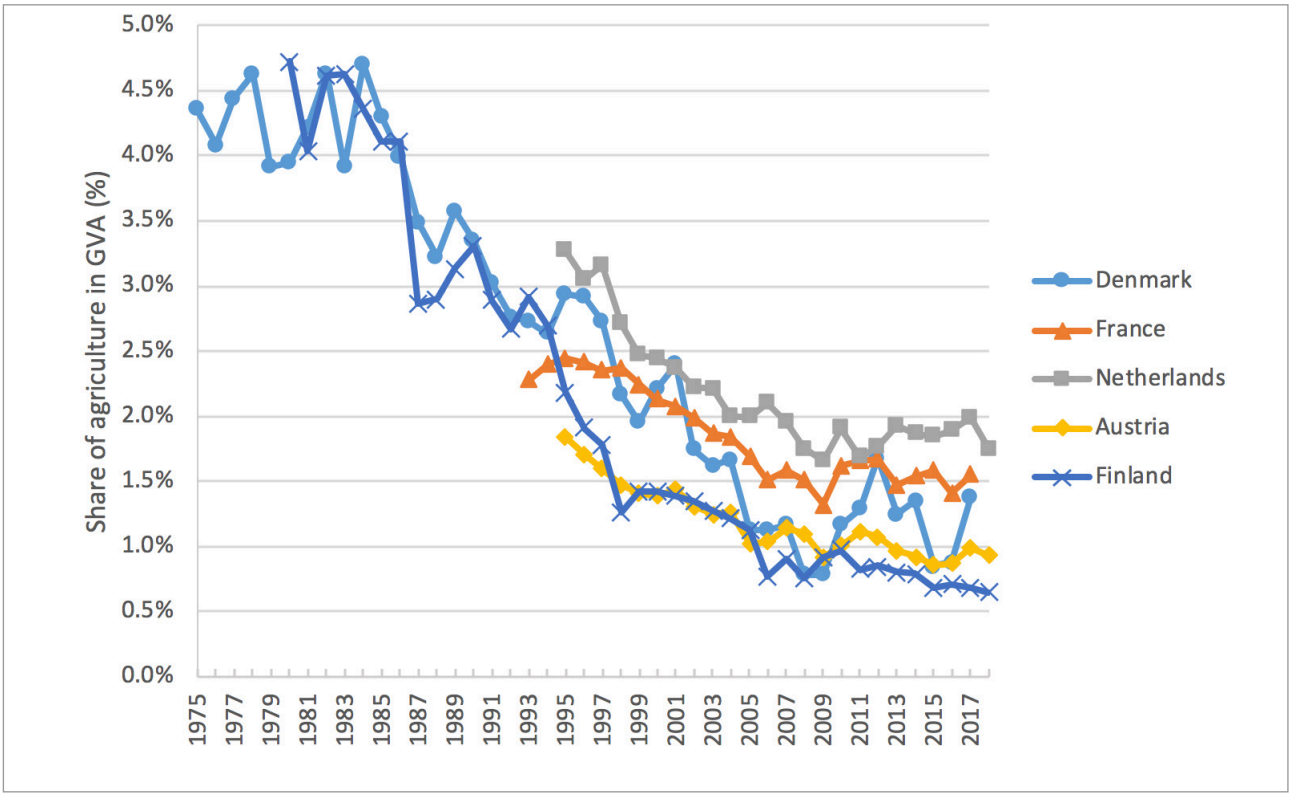
Also in other OECD countries, agriculture was a much more important share of the economy and the food value chain 50 years ago than it is today, while the changes in food manufacturing and retail have been much less. Agriculture's contribution to GDP in the richest countries is now below 1 percent. Figures 1–4 illustrate how the shares of food, agriculture, food processing and retailing have evolved over the past decades in European countries for which data are available. By the 1960s, the agricultural employment share varied between 5 percent in the United Kingdom of Great Britain and Northern Ireland and Belgium, around 10 percent in the Netherlands, Sweden and in Western Germany, and 20 percent in France. Data on food manufacturing and retail are only available for the more recent period. Employment and GDP shares of food manufacturing are in the 1.5 percent to 2.5 percent interval. This share has also been falling, albeit at slower rates than for agriculture. The retail sector is larger with around 4 percent of GDP and 8 percent of employment, but these numbers include also non-food retailing. The shares have been relatively stable over the past two decades.

Figure 1 Share of agriculture in gross value added (GVA) and employment in Selected European Countries (percent) 1975–2018

1.a Share of agriculture in GVA (percent)

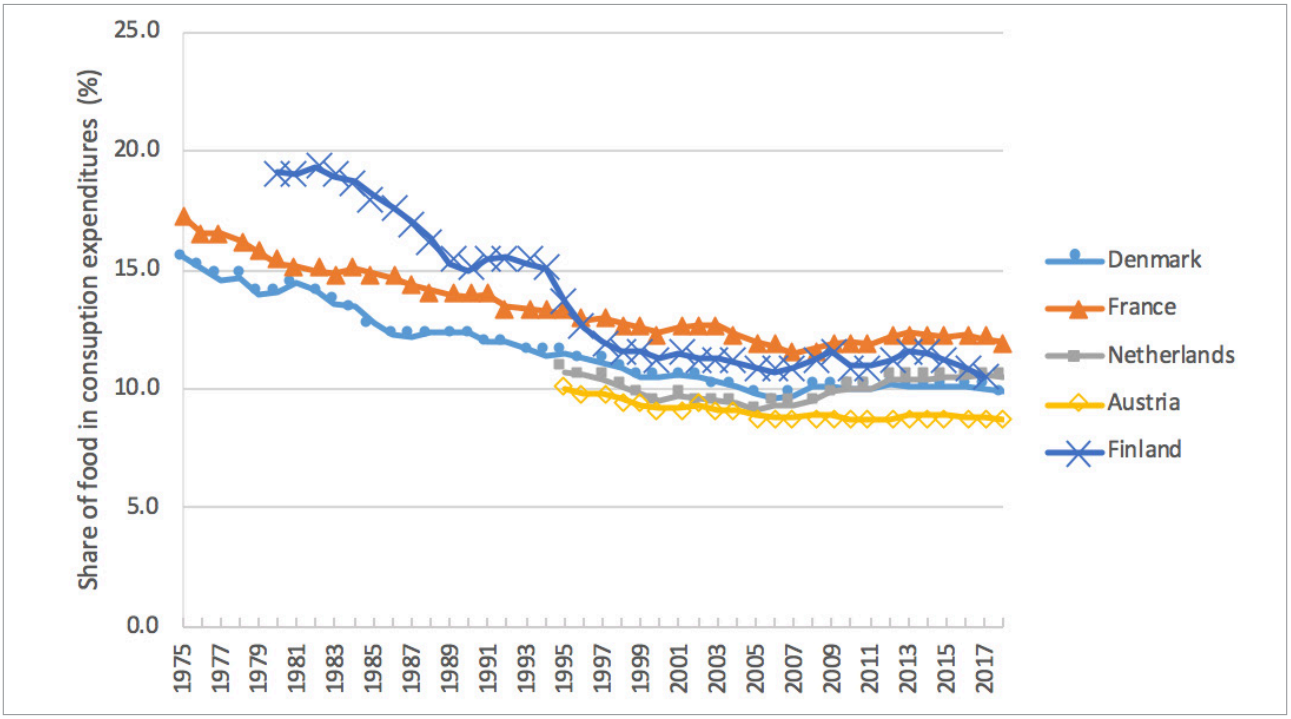


1.b Share of agriculture in employment (percent)



Source: Eurostat (2019)

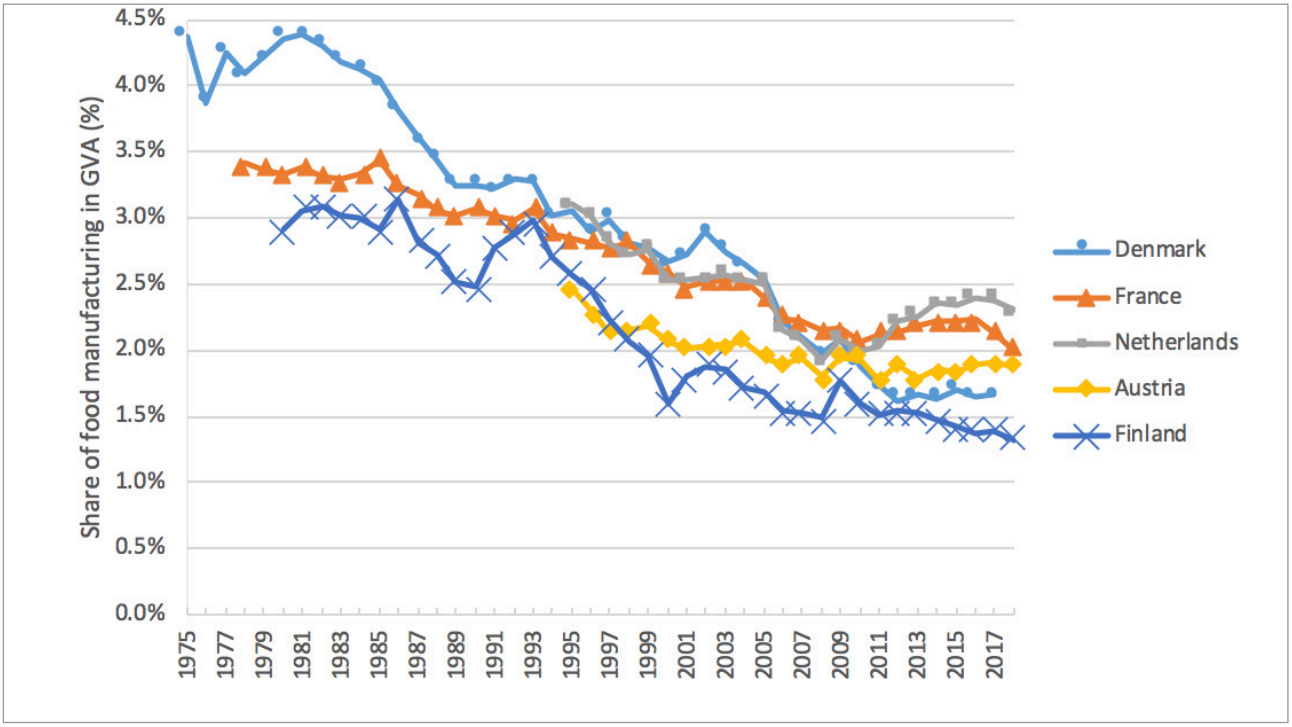
Figure 2 Share of food in consumption expenditures (percent) 1975–2018



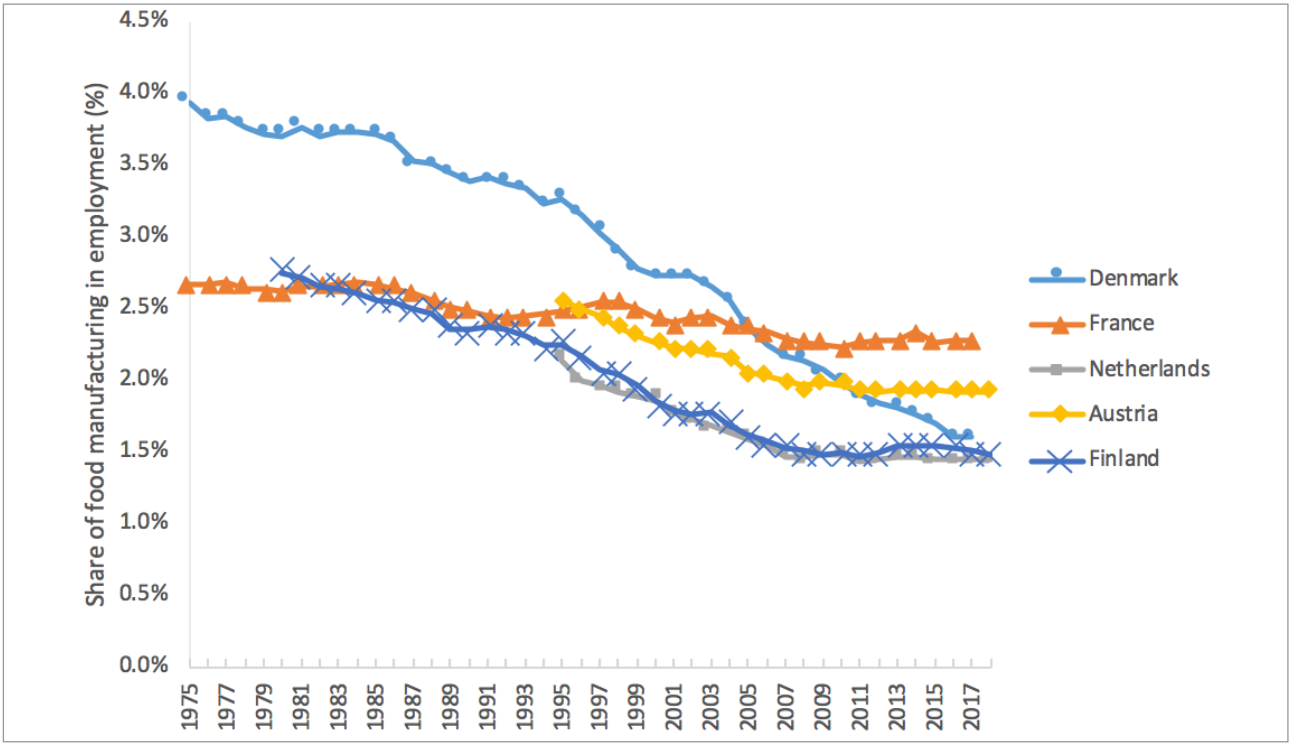
Source: Eurostat (2019)

Figure 3 Share of food manufacturing in gross value added (GVA) and employment in selected European countries (percent) 1975–2018

3.a *Share of food manufacturing in GVA (%)*



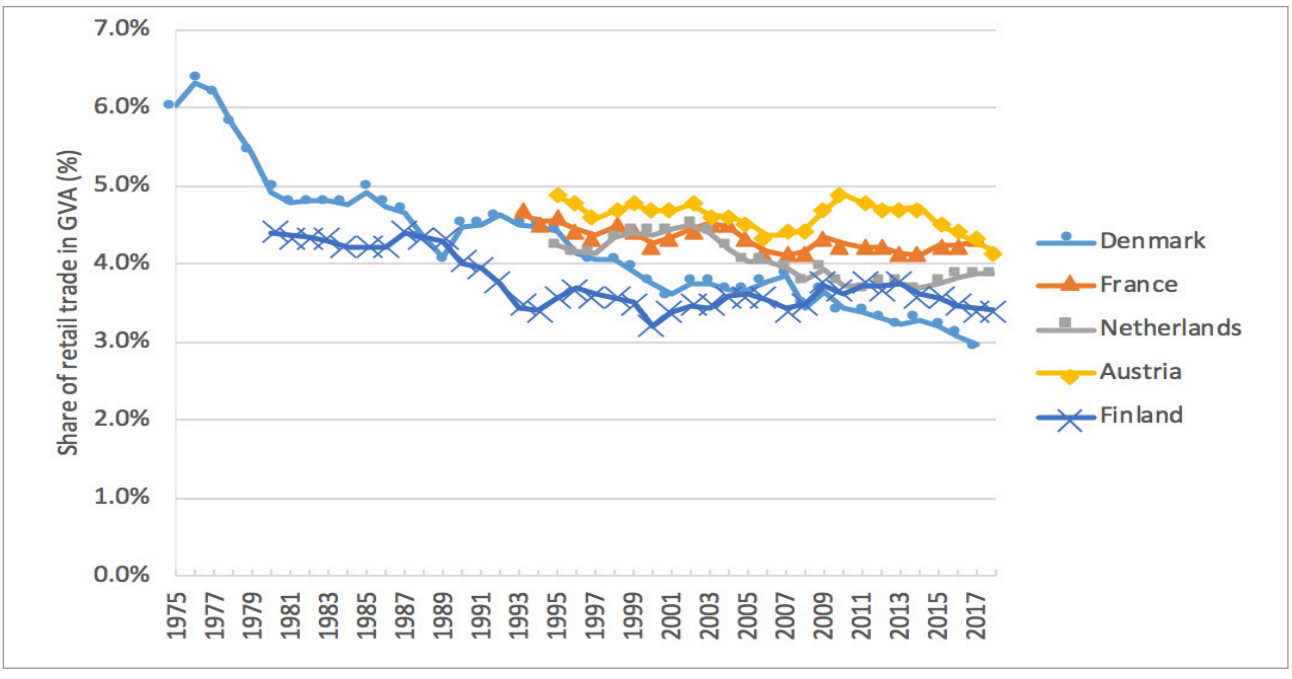
3.b Share of food manufacturing in employment (%)



Source: Eurostat (2019)

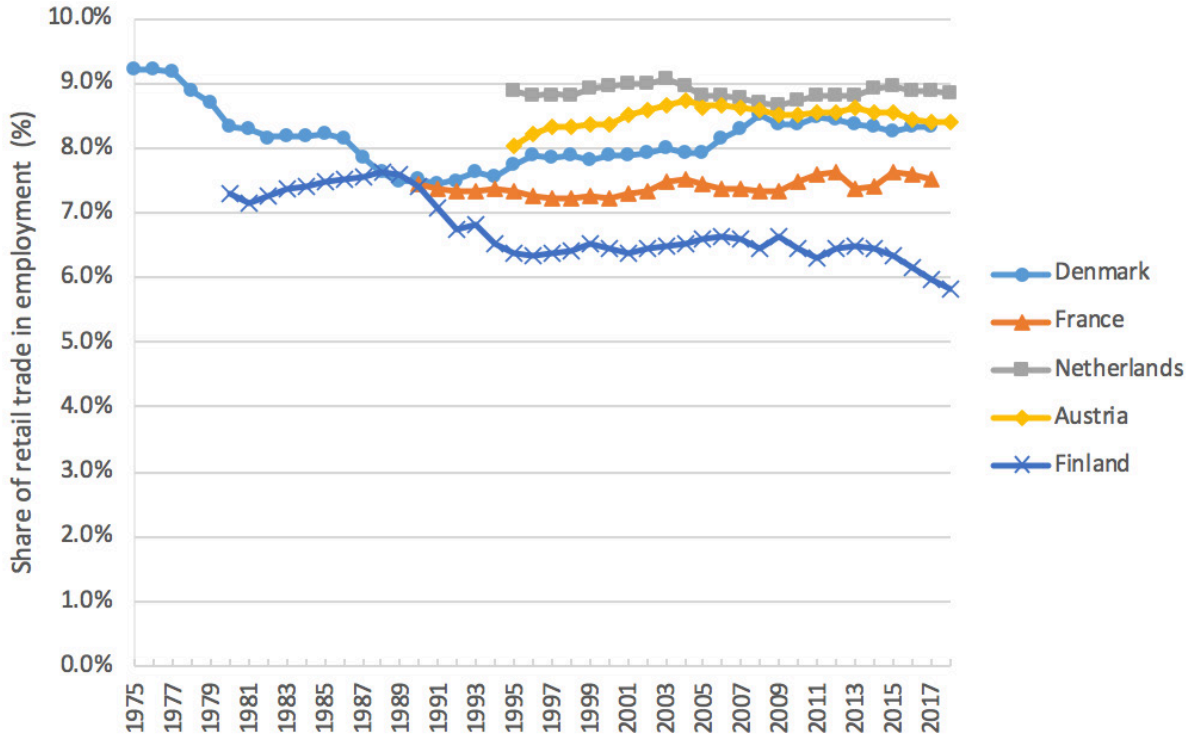
Figure 4 Share of retail in gross value added (GVA) and employment in selected European countries (%) 1975–2018

4.a Share of retail trade in GVA (%)



Source: Eurostat, 2019

4.b Share of retail trade in employment (%)



Value chains have also changed on the upstream (input) side of agriculture. With development, agricultural production typically becomes more capital intensive and more dependent on external inputs. With the growing importance of food processing and retailing on the downstream side of the value chain, the increased use of external inputs also reduced the share of agriculture in the total value chain.

James Thurlow and colleagues at IFPRI have been developing indicators of the agri-food value chain, which they refer to as AgGDP+ and AgEMPL+. AgGDP+ and measures the value added and AgEMPL+ employment of the entire agri-food chain. Besides, agriculture (farming) it includes the portion of upstream and downstream sectors that can be linked to agriculture and food, such as trade and transport, food services, agricultural inputs, etc. Their most recent dataset includes data from almost 100 countries, including many developing countries. They estimate that, on average, the share of off-farm contributions to the agri-food GDP and employment increases from around 25 percent (AgGDP+) and 5 percent (AgEMPL+) for the poorest countries to around 75 percent for both indicators in the richest part of the dataset. At USD 4000 per capita (national incomes) the shares are at approximately 50 percent (AgGDP+) and 30 percent (AgEMPL+), so the off-farm share of the food value chain grows rapidly with economic development.

Concentration on the up- and downstream ends of the value chain in OECD countries

Concentration has generally increased in the food supply chain. Consolidation in input agribusiness, food processing and retailing companies occurred through natural growth as well as through mergers and acquisitions (Berger, 2009; Deconinck, 2019, 2020; Dobson, Waterson and Davies, 2003).

The retail sector, in particular, has concentrated in recent years, more than the food manufacturing/processing sector. In fact, in reports from the 1980s, there was mostly concern about the high

concentration and monopoly power in the food manufacturing sector and the weak bargaining position of the small retail companies. Until the 1980s, food retailing was a largely fragmented sector. For example, the leading five firms controlled only 8–9 percent of national retail goods sales in the United Kingdom of Great Britain and Northern Ireland in 1961 and only 14.4 percent by 1982. The real wave of consolidation of the retail sector in the United States of America and the European Union largely took place in the 1990s. In the United States of America, the combined market share of the four largest grocery retailers increased from 14 percent in 1984, over 22 percent in 1994, to 55 percent in 2001 (Swinnen and Vandeplas, 2010).

Concentration has continued in the past decade. In some countries in Europe, the market share of the largest five food retailers (namely, the C-5 concentration ratios) is over 80 percent (European Commission, 2014). By 2004, the C-3 concentration in the grocery market were very high in Denmark (91.2 percent), Finland (79.6 percent), Iceland (81 percent), Norway (82 percent), Sweden (91.2 percent) (Einarsson, 2007).[1]

Changes in value chain consolidation in developing countries

Consolidation in the food and retailing industry has not only occurred in high-income countries, but also in emerging and developing economies. Large food and retail companies are also increasingly spreading globally, through foreign direct investments and local acquisitions. In this way, they contribute to concentration outside their home markets (Clarke, *et al.*, 2002). In developing countries, the "supermarket revolution" and recent foreign and domestic investments in food processing and agribusiness have triggered the development of "modern value chains".

Barrett *et al.* (2019) describe how the transformation of value chains occurs from traditional to modern markets and how this relates to concentration. They identify three stages of transition. First, traditional spot markets are typically competitive, with many agents competing on price, volume and observable quality terms. Fafchamps (2003) refers to this as a "flea market economy" so as to convey the uncoordinated, somewhat chaotic nature of small-scale traditional agricultural markets. Within very localized areas, competition typically reigns, although remoteness, financial liquidity constraints, and associated credibility and reputation issues can confer considerable market power in niches that require significant capital or are characterized by non-trivial economies of scale or scope, especially long-haul, large-scale trading (Casaburi and Rocco, 2019; Dillon and Dambro, 2017).

Second, as value chains transition to an intermediate stage, there is increased inter-firm competition in both upstream (commodity procurement) and downstream (for example, retailing) segments of the value chain, increasing the pressure on firms to reduce costs and to coordinate with suppliers to provide feed stocks and products with the differentiated traits more highly valued in the target market.

Third, as the value chain moves to the more modern stage, one commonly observes re-concentration downstream among a shrinking number of large firms in the more capital-intensive segments that have become ever more important in the value chain (Swinnen and Vandeplas, 2010). Re-concentration can emerge at the farm input supply level as well, if intellectual property rights confer market power, as is evident in the global seed industry today (Deconinck, 2020; OECD, 2018).

[1] In some of the Eastern European, often poorer, countries, concentration growth was slower. For a discussion of the so-called "retail revolution" in Central and Eastern Europe, see Dries, Reardon and Swinnen (2004).

An important consideration is that, as Zilberman, Lu and Reardon (2019) emphasize, investments by value chain innovators (such as food processors, seed companies or retailers) is often triggered by their strategy to create a local (temporary) monopoly in which they can collect excess profit. One should therefore expect the routine emergence of market power in particular locations since value chain transformation is driven by innovation that typically confers temporary market power. This can be associated with the introduction of specific private standards.

Increasing standards in food value chains and market power

In the past decade, food standards have spread rapidly, both in terms of numbers, geographically and in addressing new concerns. Production and trade are increasingly regulated through stringent public (and private) standards on quality, safety, nutritional, environmental, and ethical and social aspects. Both public and private standards play an increasingly important role (Swinnen, 2016; 2017).

The spread of private standards may be correlated with concentration in the value chain. This correlation may be caused by the modernization of the value chains with economic development and with the integration of poor countries in global (high-) value chains. However, it may also be that private standards are introduced to create excess profits due to (temporary) monopolies – similar to the value chain innovations introduced by entrepreneurs discussed above (as emphasized by Zilberman *et al.*, 2019).

Large companies with dominant market positions have introduced their own private standards, which, because of their size, have become de facto mandatory for many suppliers.[2] Moreover, suppliers have often been confronted with a limited number of buyers willing (or able) to reward high standards, for example, because standards (and the associated quality premiums) are company-specific (Henson, 2006; Smith, 2009). Perishability of high-standards commodities may reduce the supply elasticity and therefore reduce supplier bargaining power (Sexton and Zhang, 1996).

Standards and labels can thus have three effects on social welfare: (1) they can enhance efficiency by reducing asymmetric information; (2) they can reduce efficiency because of implementation costs; and (3) they can enhance or reduce efficiency through their impact on market power gain (Bonroy and Constantatos, 2015; Caswell and Mojduszka, 1996; Swinnen *et al.*, 2015).[3]

Conclusions on the aggregate effect are mixed. Zago and Pick (2004) show that depending on the competitiveness of the quality market, a label's introduction can increase or decrease social welfare. There is seemingly a paradox here, as labels are supposed to correct the market failure of information asymmetry, however, labels only reduce one type of market failure in the presence of two market failures: imperfect competition and imperfect information (Bonroy and Constantatos, 2015). For example, Fulton and Giannakas (2004) find that the introduction of a genetically modified (GM) label with certification costs has a negative impact on welfare,

[2] Meza and Sudhir (2010) find that private brands increase a retailer's bargaining power with respect to manufacturers, and retailers with their enhanced bargaining power "strategically set retail prices to favour and strengthen their private label".

[3] Labeling reduces price competition in the upstream market due to the product differentiation. In addition Bonroy and Lemarié (2012) identify reverse effect of labeling, when the more productive inputs do not align with consumers' preference such as genetically modified (GM) food. They show that the combined effect from differentiation and reverse ranking will have an impact on upstream market competition. On the other hand, a few papers argue that labeling may enhance competition resulting in lower profits for the suppliers. Bonroy and Constantatos (2008) show that when the labels reveal full-information, it may intensify competition resulting in lower share for producers despite the increase in total welfare. Roe and Sheldon (2007) find that the public labels push competition between firms driving suppliers' price down.

even for the welfare of producers. This contrasts with Zago and Pick (2004) who find welfare-increasing effects for producers in all cases of their analysis.[4]

Changes in value chain consolidation and government policies

The arguments above are mostly based on economic incentives to change structures in value chains. However, government regulations have played an important role. In particular heavy interventions of governments in agricultural and food markets in the second half of the twentieth century, not only affected prices, trade and markets but also the structure of production. In many countries of the world, agricultural prices were heavily distorted by government policies. Moreover, government controlled (either state-owned or parastatal) companies were often the main buyers and traders of agricultural commodities, as well as the key suppliers of agricultural inputs. They were, by government decree, monopolistic structures, sometimes allowing others in the market next to them, sometimes not. But even competing buyers or traders were often controlled by additional government regulations.

Much has changed in the policy environment and regulations of markets in the late twentieth century and early twenty-first century (Anderson, Rausser and Swinnen, 2013). In many countries, both rich and poor, production and trade of agricultural and food commodities have experienced some form of policy reform and de-regulation of value chains. The changes were most dramatic in the former Communist economies of Eastern Europe and Asia, but policy reforms were also important in the European Union and in many African and Latin American countries. Agricultural markets and food value chains in most developing and emerging countries are much less regulated today than they were 25 years ago and allow investments by the private sector to a much larger degree. Swinnen, Vandeplas and Maertens (2010) relate the performance of agriculture in these countries to policy reform-induced changes in the structures of the value chains. They also point at major differences between different types of commodities (low versus medium versus high value) in output growth and their value chain structures in response to the policy reforms. In general though, the liberalizations have contributed to a shift from (state-controlled) monopolistic structures of input suppliers and food processors and traders to more (private sector) competition.

[4] Most studies do not focus on the distribution of welfare between producers and consumers but rather on total welfare. Only a few explore the effect of labels on the distribution of surplus. Bonnet and Bouamra-Mechemache (2016) consider the effect of a label (in this case an organic label) on the share of the surplus created in the value chain between manufacturers and retailers with an explicit discussion of bargaining power.

CHAPTER 3

Empirical evidence on concentration and rent extraction

3 Empirical evidence on concentration and rent extraction

Empirical studies provide mixed evidence on the relationship between concentration in the value chain and rent distribution. Sheldon (2017, 2018) and Swinnen and Vandeplas (2010, 2015) review empirical studies and conclude that there is no clear evidence that growing concentration in retail has consistently hurt consumers or farmers (suppliers) – the evidence is mixed. Other reviews come to similar conclusions. For example, the reviews by Čechura, Hockmann and Kroupová (2014) and Perekhozhuk *et al.* (2017) also find that there is no strong evidence for buyer market power in agri-food value chains, and if any, only modest deviations from competition are observed.

Several studies based on the United States of America's meat industry found only small distortions in animal prices (Crespi, Saitone and Sexton, 2012; Wohlgenant 2013). Market power in these literatures is measured as the capacity to put and maintain prices (or quantities) above the expected levels under perfect competition. There are also a number of studies estimating (asymmetric) price transmission and relating this to market power in the value chain. They also test whether price transmission depends on whether prices go up or down because concentrated businesses in parts of the value chain can use differential effects extract rent. Studies include Chang and Griffith (1998); Goodwin and Holt (1999); McCorriston, Morgan and Rayner, (2001); Meyer and Cramon-Taubadel (2004); von Cramon-Taubadel (1998); and more recently by Bonnet and Réquillart (2012); Davidson *et al.* (2012); Holm, Loy and Steinhagen (2012); Lloyd (2017).5

These studies identify market power as one of several factors causing asymmetric price transmission. Other factors include adjustment costs, political intervention, inventory management, etc. However, in his conclusion of a recent edited volume on price transmission in agri-food markets, McCorriston (2015) concludes that the evidence regarding asymmetric price transmission from the studies in the volume is mixed and varies between sectors and periods, and that there is no strong evidence on the relationship with buyer concentration.

Some empirical studies in developing countries, although not specifically analysing the impact of concentration, do find that smallholder farms can benefit significantly from value chain integration even with monopoly exporters in food value chains (Maertens, Minten and Swinnen, 2012; Minten, Randrianarison and Swinnen, 2009).

Hence, despite obvious perceptions of competition problems, recent reviews of the academic literature have tended to conclude that there is little empirical evidence to support the hypothesis of widespread buyer power in agricultural product markets. There thus appears to be a gap between rising concentration and perceptions of buyer power in agricultural product markets on the one hand, and the absence of strong empirical evidence of buyer power on the other.

In the next sections we first provide potential explanations why concentration in value chains may not lead to rent extraction and how to identify effective bargaining power in vertically coordinated markets. Then we discuss a series of business practices which may negatively affect farms and which may not be captured by standard indicators (such as prices or price transmission).

[5] Swinnen and Vandeplas (2015) also point at mixed evidence from reviewing this literature. For example, Bonnet and Villas-Boas (2013) and Wang, Habtu and Tony (2006) show that with increasing returns to scale, price transmission in the presence of market power can be weaker than, identical to, or stronger than in the competitive markets case. In an empirical analysis of the German dairy sector, Holm, Loy and Steinhagen, (2012) find substantial asymmetric price transmission, but they do not find a correlation with the strength of a brand (a proxy for market power), and they find that the impact on profits is limited.

CHAPTER 4

Concentration, market power and bargaining power

4 Concentration, market power and bargaining power

Economic effects of concentration in value chains

The welfare effects of concentration in value chains are less obvious than often discussed. While concentration is a useful first indicator of possible market power, higher concentration does not necessarily translate into high market power. There are several possible reasons, including scale economies in production or R&D, reductions in transaction costs and countervailing power in value chains. More specifically, concentration may be welfare improving if, first, it leads to gains in efficiency with scale economies (Demsetz, 1973). Second, efficiency will increase if transaction costs are substantially lower as a result of high concentration (Shervani, Frazier and Challagalla, 2007) or if monopolistic structures contribute to reducing market failures through vertical coordination (Slade, 1998). Third, investments in R&D and innovation may require a certain degree of market power, to ensure that companies benefits from innovations (Pray, Oehmke and Naseem, 2005). Fourth, increasing consolidation of retailers can be social welfare improving if it allows them to exert "countervailing power" *vis-à-vis* large, often multinational, food companies (Chen, 2003; Dobson and Waterson, 1997). Fifth, if firms are heterogeneous, collusion will be more difficult. In an "asymmetric" market environment, where one large firm coexists with a few smaller firms, it is less likely that they will collude (Compte, Jenny and Rey, 2002; Kuhn, 2004).

The argument of countervailing power in food value chains has been emphasized in the 2000s as growing concentration in the retail sector have made it a more powerful sector in the value chain and can offset market power of food processors and traders. For example, Swinnen and Vandeplas (2010) document several cases of poor consumers (often pensioners) in Europe demonstrating in favour of providing licences to hard discount retailers (such as Lidl in Europe) in their localities since it would provide them access to cheaper food (and products in general).

Many complaints of market power problems have come from farmers (and smaller food processing companies). However, also in this case, the situation is more complex than it seems. First, the entrance of large retailers may enhance, rather than reduce, competition in traditional markets where trading is controlled by traditional middlemen. For example, Swinnen and Vandeplas (2010) also document cases of poor farmers in India demonstrating in favour of allowing foreign retailers to enter the Indian value chains because it provides them with alternative channels compared to the traditional situation where local middlemen have monopoly control over the markets.[6]

Relatedly, several studies, both theoretical and empirical, show that in situations with imperfect factor markets or significant search costs, farmers may be better off with concentrated downstream agents. In several recent papers Sexton and collaborators emphasize that, with search and information costs, vertical coordination, contract production and lock-in between farmers and downstream companies are essential characteristics of "modern" agricultural markets and value chains (Adjemian, Saitone and Sexton, 2016; Crespi, Saitone and Sexton, 2012; Mérel and Sexton 2017; Sexton, 2013). In these modern value chains, downstream companies have less incentives to use market power that reduces profitability of their suppliers.

[6] The Indian government has been going back and forward with imposing restrictions on foreign direct investment (FDI) in retailing, not allowing foreign retailers to invest in India, mostly under pressure of local traders and small shopkeepers afraid of competition.

Related to that, but focusing on developing and emerging countries, Swinnen and Vandeplas (2011) and Kuijpers and Swinnen (2016) explain that with resource-providing or interlinked contracts the *ex post* market power is different from the *ex-ante* market power as the hold-up potential of the farmer (that is, the farmer's option to extract rents by deviating from the contractual agreements) enhances his/her bargaining power. We will analyse this and explain the mechanism in greater detail in the next section (and refer to Appendix for a formal analysis).

What is crucial is that in all of these cases there is a trade-off with increased competition. Concentration and market power commonly refer to a firm's ability to set prices above marginal cost, in other words, its ability to put and maintain prices above (or quantities below) the expected levels under perfect competition. However, with search and contracting problems, increased competition may complicate coordination and contracting since hold-up opportunities and/or transaction costs increase. These arguments can apply both to developed and developing market conditions. In environments with multiple market failures, as typifies most developing countries' rural settings, market power can actually help resolve problems related to financing, contract enforcement, etc. and thus prove optimal in second-best contexts (Dillon and Barrett, 2017; Fafchamps, 2003). Macchiavello and Morjaria (2019) find support for this argument in Rwanda coffee markets: additional competition makes a farmer worse off because it increases default on contracts, thereby costing the grower relational contracts designed to resolve various market failures.

As Sexton (2013), Bonanno *et al.* (2018) therefore argue that "the traditional definition of market power may not fully capture the different facets of competition in modern agri-food markets". Especially in the context of increasingly coordinated vertical relationships in food value chain traditional tools and definitions to assess market power fall short, in spite of the many innovations (McCorriston, 2002; Saitone and Sexton, 2017; Sexton, 2000; 2013; Sexton and Lavoie, 2001; Sexton and Zhang, 2001). In this context Bonanno *et al.* (2018) argue that it is more useful to depart from traditional definitions of market power and examine effective bargaining power in modern agri-food markets. Compared to market power, 'bargaining power' is a more comprehensive concept (Bonanno *et al.*, 2018). 'Bargaining power' is defined by Kirkwood (2005, p33) as "the power to obtain a concession from another party by threatening to impose a cost, or withdraw a benefit, if the party does not grant the concession". Bargaining power can be compatible with the observed cooperative behaviours (for example, Kähkönen, 2014; Simatupang and Sridharan, 2002) as well as non-cooperative behaviours. And bargaining power not only involves actual surplus transfer but also a credible threat to do so.

In the next section we analyse this formally. However, before this, it is important to point out that there are also political (and policy) effects on changes in concentration. It not only affects (economic) market power but also political power.

Political effects of concentration in value chains

Growing concentration in different parts of the value chain may also affect producer and/or consumer interest in the policy arena. For example, for several food policy issues (such as agricultural subsidies or import tariffs) consumer and retailer interests are often aligned. Retail concentration may thus reinforce consumers' political clout. This issue has been largely ignored in political economy analyses which have typically used models of "consumers" and "producers" and "taxpayers" without disentangling the different economic agents within these groups (Swinnen, 2015).

However, in reality, many more groups lobby governments to introduce or remove certain policies. This includes landowners, seed and agro-chemical companies, banks, traders, food processors, retail companies, environmental groups, and food advocacy groups, among others). These groups have sometimes joined forces ("political coalitions") with farmers or with final consumers to influence policy makers in setting public policies. In other cases, they have opposed each other on policy issues. This depends on at what level of the value chain the policy impacts (for example, whether the policy is targeted to the [raw] agricultural commodity or to a processed commodity). For example, sugar processors and farmers may jointly lobby for sugar import tariffs or quota; or flour mills may join farmers or consumers in political lobbying depending on whether government regulations target grain prices or flour/bread prices (see Briones Alonso and Swinnen 2016). The rapid growth in agricultural protection in the European Union in the second half of the twentieth century, with high government supported prices for key products such as sugar and dairy products came with the rapid expansion of European food processing industry, part of which benefited significantly from these policies (Anderson, Rausser and Swinnen, 2013).

The growing concentration in retail and the emergence of preferred supplier systems have made the retail sector a more powerful actor in the value chain. This may benefit consumers because for many agricultural policy issues consumer and retailer interests are aligned, and their political coalitions may be reinforced by growing retail concentration.

These coalitions are not static. Political power structures within value chains may change with some (sub)sectors growing and others declining with economic development, new technologies may bring new players into the value chains, new policy instruments may be introduced (or considered), etc. For example, technological advances, such as biotechnology and genetically manipulated (GM) crops, have created new vested interests. Biofuels have emerged as an important factor in agricultural markets and food policies due to rising oil prices and the search for renewable energy sources. In the United States of America, crop insurance companies have become an increasingly important interest group in agricultural policy discussions as crop insurance programmes have become the largest expenditure item on recent Farm Bills. Recent European Union regulations on 'unfair trading practices' in food value chains (UTP – see last section of this report) only passed the political decision-making when the European food industry switched sides in the political lobbying. Initially they (and the retail sector) opposed the regulation. When they decided that the UTP regulation was mostly in their benefit (with most European Union food companies being small small- and medium-sized enterprises (SMEs)) and joint forces with farmers against retail industry opposition, the legislation passed (Swinnen, Olper and Vandevelde 2020).

CHAPTER 5

A conceptual framework of competition and rent distribution with vertical coordination

5 A conceptual framework of competition and rent distribution with vertical coordination[7]

Two key characteristics of rural areas in developing and emerging countries are factor market constraints and weak institutions for formal contract enforcement. These conditions have major implications for the distribution of rents in value chains and the impact of competition. We will illustrate this with a simple conceptual framework (refer to Appendix for a more formal theoretical model).

Globally, vertical coordination has emerged in value chains as a business response to farmers' factor (input) market constraints limiting their ability to produce high-quality products. Empirical studies show that, local suppliers in developing and transition countries are engaging in complex contracting with companies selling into high-income markets – either domestically or internationally. These contracts not only specify conditions for delivery and production processes but also include the provision of inputs, credit, technology, management advice, and so forth (Swinnen, 2007; World Bank, 2005). The latter are particularly important for local suppliers who face important local factor market imperfections. In particular, imperfections in credit and technology markets are typically large, which implies major constraints for investments required for quality upgrading, especially for farmers who cannot source from international capital markets.[8]

Market power and competition in food processing and retailing companies can affect both rent creation (efficiency) and rent distribution (equity) in these chains. As explained above, competition would prevent companies from exercising monopoly power in the setting of the contract conditions, but there may be a problem of sustainability of the contracts with competition. For example, with pre-financed feed by dairy companies, or pre-financed seed and fertilizer by crop processing companies, farms can sell their output to competing processors who can offer higher prices since they do not have to incorporate the costs of the assistance programmes. This may cause the collapse of the contracts, in particular in the presence of weak contract enforcement institutions.

Basic Framework

Consider a farmer who produces a low-quality product that can be sold in the local market. The farmer's alternative is to produce a higher quality product that can be sold through a "buyer"

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[7] Based on Swinnen et al. (2015); Swinnen and Kuijpers (2019); Swinnen and Vandeplas (2011).

[8] There is much evidence of processors and traders providing finance and technology to farmers (for example, Gulati, Delgado and Bora, 2005; Sadler, 2006). Bellemare (2012) finds that processing companies in Madagascar (for example, cotton, vegetables, rice and barley) provide farmers with improved seeds, pesticides, and fertilizer. Dries, Germenji and Noev (2009) document how East European dairy processors develop programmes to stimulate farm-level technology investments by offering credit programmes, investment loans, and bank loan guarantees to their suppliers, stimulating dairy-specific investments such as improved livestock and cooling equipment. In addition to the provision of technological inputs and finance, studies document that buyers stimulate adoption of new technologies by farmers in less tangible ways, for instance through training (for example, Minten, Randrianarison and Swinnen, 2009; Negash and Swinnen, 2013; World Bank, 2005). Recent studies indicate the potential for vertical coordination to stimulate technology adoption indirectly through, for example,, agricultural insurance. Casaburi and Willis (2015) using a randomized control trial among Kenyan dairy farmers, show that the take up of agricultural insurance as part of an interlinked contract (whereby the insurance premium is deducted from the payment at product delivery) is significantly higher than the take up of a stand-alone insurance which requires an upfront payment of the premium. A broad survey from Ghana, Mozambique, Kenya and Viet Nam by Farole and Winkler (2014) show that all interviewed foreign-owned agricultural investors provide some type of technologies to local farmers (including assistance around quality and health, safety and environmental issues). Studies find that technology transfer is higher in high standard value chains. Schipmann and Qaim (2011) find that technology provision by traders in the Thai sweet pepper sector is more common for farmers participating in the modern retail sector, than for farmers selling on the traditional market. Rao, Brümmer and Qaim (2012) show that Kenyan vegetable farmers supplying to the supermarket channel tend to use more fertilizer, seeds and manure per acre.

(possibly after processing) to urban consumers. To produce such high-quality product, the farm therefore needs to apply specific inputs, using more advanced technology. It is costly for the farm to buy such inputs/technology. The farmer will only decide to adopt the technology if his net surplus from producing high quality products is positive.

Many farmers in developing and emerging countries face technology, input and credit market imperfections, making it difficult and expensive for them to buy the technology (Croppenstedt, Demeke and Meschi, 2003; Feder, Just and Zilberman, 1985; Morris, *et al.*, 2007; Rozelle and Swinnen, 2004). The buyer may have better access to the modern technology than the farmer when the buyer has less credit and liquidity constraints; or lower transaction costs due to economies of scale; or lower information asymmetries if the buyer has better knowledge of consumer preferences. The buyer can then offer the farmer a contract, which includes the transfer of technology and conditions for purchasing the product (time, amount and price).

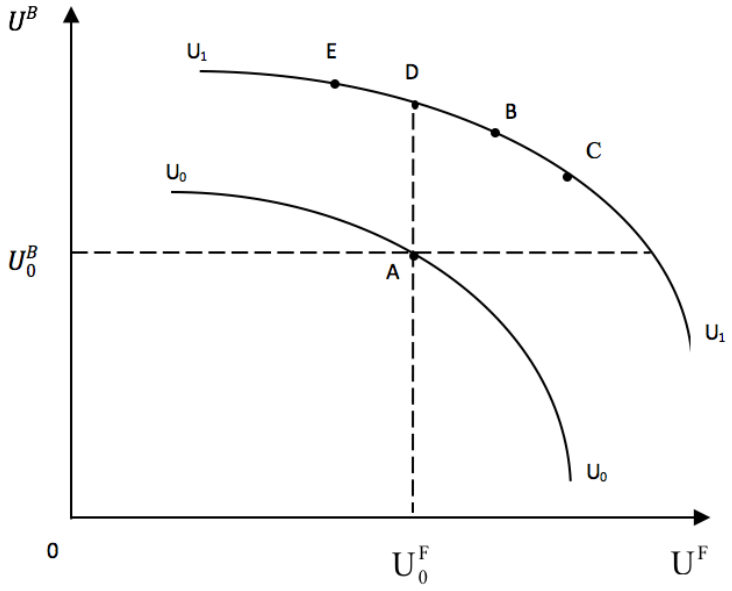
Key questions are whether these contracts create an aggregate surplus and who benefits from the contract. Figure 5 illustrates pre- and post-contracting welfare. Without an interlinking contract, the utility possibility frontier is U_0U_0. Assume that pre-contract utility is at (U^F_0, U^B_0), represented by point A. Through the contract, farms can access technologies that were previously unavailable and companies can have access to higher quality supplies. Total welfare increases and the utility possibility frontier shifts to U_1U_1.

Who benefits from the welfare increase? In other words, will the new equilibrium be at point B, D, or E? At point B, both parties share in the gains from the contract, and everybody is better off. At point C everybody benefits as well, but the gains for farmers are larger. At point D, the buyer extracts all the rents of the innovation.

What determines at which point one arrives? There are several models in the development economics literature which show one can arrive at point D. Braverman and Stiglitz (1982) for example shows that if buyer B sets the conditions of the contract, the farm will accept the contract as long as it represents an improvement of its expected utility. Hence, at the margin, it will be optimal for B to present the farmer with contract conditions equal to U^F_0, the farm's reservation utility. This is the case represented by point D.[9] Bardhan (1989) and Bell (1988) argue that the outcome can be worse if the interlinking of transactions bestows additional market power upon the buyer. If personalized and interlinked transactions weaken the bargaining strengths of farmers *vis-à-vis* buyers, they may end up at something like point E, where farmers' utility is lower after the contract, despite the fact that total welfare has improved.

[9] Braverman and Stiglitz (1982) show how in output-credit market interlinkages (trader-farmer) C typically does this by subsidizing credits (lower interest rates) and taxing outputs (lower output prices).

Figure 5 Equity and efficiency effects of interlinking markets



Source: Based on Swinnen and Vandeplas (2010)

However, all these arguments presume a very low bargaining position of farmers to start and, arguably even more important, assume perfect contract enforcement. In developing and emerging countries, contracts such as the one described here may be formal or informal but, in either case, contract enforcement is nontrivial.[10]

Contract breach can take many forms. In the setting considered here, we can distinguish three potential types of holdup that might occur in case of imperfect contract enforcement. First, the farmer could decide to divert the technology provided by the buyer by selling it or using it for different purposes. Second, the farmer could default on the contract by selling the product to an alternative buyer, after applying the transferred technology. Such"side-selling"can be profitable, as the alternative buyer does not have to account for the cost of the provided technology. [11] Finally, the buyer could hold up the farmer by renegotiating the contract upon delivery if the product produced with the advanced technology is worth more to him than to any other buyer. Instead of paying the agreed contract price, the buyer can pay the farmer the value of his best alternative at that point.

[10] Imperfect contract enforcement and holdup problems are widespread in agri-food value chains in developing and emerging countries (for example, Barrett et al., 2012, 2019; Cungu et al., 2008; Saenger, Torero and Qaim, 2014). Studies on the transition processes in the 1990s document extensive value chain breakdown following holdup problems in agri-food chains, as contract enforcement was difficult in these circumstances (Gow and Swinnen, 1998, 2001; Swinnen and Rozelle, 2006). Upton and Lentz (2017) find almost 30 percent of farmer default by side-selling on procurement contracts with the World Food Programme in Ethiopia, Kenya, and the United Republic of Tanzania. Narayanan (2012) reports 44 percent of farmers in contract farming schemes in southern India defaulting on a contract. Minten et al., (2009) document extensive investments by buyers in monitoring systems to counter opportunistic behaviour of farmers who received technological inputs and technical assistance. Schipmann and Qaim (2011) report that 23 percent of the farm contracts in their case study in Thailand include agreements about side-selling.

[11] Upton and Lentz (2017) find that the median rate of farmer default on procurement contracts with the World Food Programme in Ethiopia, Kenya, and the United Republic of Tanzania was 28 percent, with default fully explained econometrically by side-selling in moments of spot market prices exceeding the contract price. Narayanan (2012) reports that 44 percent of farmers in one of several different contract farming schemes in southern India acknowledged defaulting on a contract. So the indirect evidence on competition is consistent with the idea of vigorous competition in at least the transitional stage of agri-food value chains (Barrett et al. 2019).

Contract breach involves costs and benefits, for both parties. In case the farmer decides to divert the technology, the farms' benefit of doing this, equals the cost of the technology for the buyer, but at the same time the farmer suffers a reputation cost – and possibly punitive action later. In case there is no external contract enforcement (beyond reputation costs) the partners can try to design the contract to be "self-enforcing" to avoid a breach of contract and make the technology transfer work. (In technical terms (see appendix), for this to work, the technology transfer contract should satisfy the incentive compatibility constraints and participation constraints of both parties).

Finally, an important implication of this analysis is that a simple look at the market structure may give a biased indication of the potential distribution of the benefits of technology transfer through value chains. In a context of imperfect contract enforcement, the farmer might be able to capture a significant share of the surplus of the technology transfer contract if the farmer's holdup opportunities create incentives for the buyer to pay him an extra payment – what we have defined an "efficiency premium" as part of the contract (Swinnen *et al.*, 2015).

The effect of competition on bargaining power and rent distribution

How does competition (concentration) affect the outcome? First, the most obvious effect is that increased demand for high quality farm products, which could be triggered by more competition among buyers, would increase the incentives for processors to provide farm contracts and better contract terms.

Second, however competition will also affect both the enforcement of the contracts and the effective bargaining power of the farms. Swinnen and Vandeplas (2010) identify five different sub-effects of changes in competition on the resulting rent distribution and surplus creation.

- First, as long as contracts do not break down, competition will induce an increase in farm surplus from production because of the traditional argument that competition between buyers increases demand and increases the farm price.
- Second, competition will induce more efficient and more innovative company management. This may lead to cost reductions (and thus lower prices) but also to new markets and increased demand, increasing the overall surplus.
- Third, competition affects the importance of supplier reputation. Competition between buyers will reduce the supplier's reputation cost from breach of contract. One reason is that when the number of companies increases, the penalty for contract breach may decline. This is because the threat of cut-off from future contract arrangements is less stringent, as there are other contract partners available (Hoff and Stiglitz, 1998). This argument is in line with Eswaran and Kotwal (1985), who state that reputation is an effective weapon against moral hazard only for suppliers "of those factors that are in excess supply". In other words, a higher demand for the supplier's produce lowers his reputation cost from breaching a contract. Another reason why the penalty for breaching a contract is lower with more competition, is that reputation effects are less prevalent in a competitive market, where agents are less likely to coordinate and share information (Zanardi, 2004). This will make it easier for an opportunistic supplier to find an alternative buyer. Local information networks work less well when the number of agents expands, as it costs more in terms of effort, money, and/or time to let information spread among a larger group of agents. Note that, this

effect makes a contract breach by the supplier (farm) more likely and, thus, the sustainability of contracts less likely. As long as contracts do not break down, increased competition among agents and reduced reputation effects benefit the farms.

- Fourth, competition will also increase the supplier's *ex post* outside option and thus increase his share of the contract value through a higher number of buyers. The reason is that with more buyers, it will be harder to behave monopsonistically, or to coordinate or collude among buyers. Moreover, more buyers may bring a wider diversity of buyers, including buyers who potentially have a higher valuation of the high quality good.
- Fifth, all these effects only hold to the extent that the contracts are provided. However, with (increased) competition between buyers, input provision may be unsustainable, and contracting may break down even if it would be socially efficient.

In summary, in this model, competition will definitely increase the supplier's benefits, conditional upon contract enforcement. However, contracts may break down (or not be offered) as contract enforcement is more difficult with increasing competition, although the result is not unambiguous and depends on the relative importance of various sub-effects of competition.

CHAPTER 6

Endogenous governance of value chains (VCs)

6 Endogenous governance of value chains (VCs)

Different forms of value chain governance have emerged, partly in response to the coordination problems that have been identified above. Some value chains are based on spot market transactions within the value chains, others by complete vertical integration, and others by various forms of contracting, or "vertical coordination" more generally. Contracting, or vertical coordination, is an institutional solution for technology/input access in value chains in the presence of imperfect factor markets, and is typically categorized as a "hybrid" form of governance on a spectrum between spot markets and vertical integration (Williamson, 1991).

However, within the hybrid governance form, there can be much variation. The specific design of the contract can help to avoid holdup and align incentives by re-distributing the contract surplus, depending on the extent of external enforcement, the type of technology/inputs and the nature of the market imperfections. The macro-institutional environment, the nature of the contract, and the value in the chain, all influence contract enforcement problems. This implies that there is no one-size-fits-all optimal value chain governance model, but instead one can expect a wide variety in contractual designs to emerge – which is what we observe in practice. Here we briefly summarize a few types (see Swinnen and Kuijpers (2019) for more details and examples).

Contracting between farms and processors/trader/retailers/input companies

The standard case is where a processor or trader that buys the farm's product (be it a processing, a retailing, or trading company) finances the technology as part of a contract. The contract typically specifies an obligation to comply with buyer standards and includes a transfer of technology, or of credit, for the technology investment linked to a purchasing agreement. Payment for these financial and technological services is generally accounted for at the time of product delivery. The technology that is provided can be rather simple such as specific seeds, fertilizer or animal feed. However, much more complex forms of technology transfer are also observed, especially in areas where product quality becomes more important and long-term investments are required. More advanced forms of contract-farming can include the provision of technological improvements through extension services, technical and managerial assistance, quality control, and specialized transport and storage services. Sometimes contracts also include loans and assistance for medium-term investments but these are more common in contracts that also involve other companies in the value chain (see further).

Input supply companies can also be initiators of contracts. Like food processing companies, technology companies also benefit if farms purchase the appropriate technology. To assist farms in purchasing the technology (and ensure payments), technology suppliers have engaged in a variety of contracting schemes. Institutional innovations have focused on reducing financial constraints of farms by introducing credit schemes, by assisting farms in selling their products to improve their cash flow and liquidity, and through leasing arrangements. For longer term technology investments, such as machinery, technology companies introduced different types of contracting, such as leasing. In essence it is an in-kind loan, whereby the equipment forms the collateral (since the lessor keeps ownership). Leasing is often used by suppliers of lumpy technological solutions, such as machinery, to "sell" technology to farms that have no access to credit, or cannot come up with the necessary collateral for loans.

Contracting with multiple agents

Processors and technology companies are often reluctant to provide loans to farms for significant technology investments. The reasons are obvious: while "simple" technology contracts are risky with contract enforcement problems, the risks are higher with longer term and more expensive technologies. They require substantial amounts of finance and, with the increase in the size of the outstanding loans, the risk of delayed re-payment or default increases too. Companies have therefore tried to share risk, finance, and monitoring by collaborating with other companies in the value chain in contracting farmers. Swinnen and Kuijpers (2019) provide several empirical examples of such institutional innovations. An example of a "triangular contract structure" is when dairy processors team up with rural financial institutions (banks) to create contracts in which banks provide loans to farms for dairy cooling equipment investments, whereby the loans are (partly) guaranteed by the dairy processors (only for loans to farms with a delivery contract) – effectively sharing risk and finance requirements between the processor and the financial institution.

Vertical integration

In some cases, companies have gone as far as taking over the farming activities by "vertically integrating" the supply of raw materials in their company. Vertical integration removes the problems of contract enforcement and provides the company full control over implementation (including, for example, application of pesticides with strict pesticide residue requirements). However, it has drawbacks in terms of inefficiencies of labour management in large integrated farms Large farms face transaction costs because of principal agent problems and monitoring costs in labour contracting, which are typically large in agriculture (Pollak, 1985). The importance of these efficiency losses depends on farm specialization and technology, with losses larger for labour intensive activities and where monitoring is more costly (Allen and Lueck, 1998; Feder, 1985).

In summary, in reality one can observe many different forms of value chain governance and with variations in concentration. These different governance models obviously have implications for the impact of concentration on rent distribution through the chain, as the vertical interactions between different agents in the value chains will be affected by the extent of vertical coordination (from zero in spot markets to 100 percent in vertically integrated firms and something in between for contracts).

CHAPTER 7

Competition policies and unfair trading practice regulations

7 Competition policies and unfair trading practice regulations

Despite nuanced conclusions from the literature on the relationship between concentration and market power abuse, there are many cases of farmers complaining of how large processors and retailers abuse their market power *vis-à-vis* their suppliers. These concerns have grown as agricultural markets have been globally liberalized over the past decades, with important reforms of policies that regulated prices, markets and trade (Anderson, Rausser and Swinnen, 2013).

Increased concentration in agri-food chains has coincided with important price and trade policy changes. During the second half of the twentieth century (in particular the 1950s through the 1980s) governments fixed prices for farmers in a large part of the world – not affected by market power of processors or retailers. In Europe, this was the case both in the west, with minimum prices set by the government under the European Union's Common Agricultural Policy (CAP) for key commodities, and in the east under the state regulated price systems in Communist countries. In such an environment of price regulations, concentration in value chain was less an issue. This is no longer the case, as many countries liberalized agricultural policies (and prices) after 1990. These liberalizations have also reduced the role of government-controlled institutions and companies in value chains, leaving more for the private sector (Swinnen, Vandeplas and Maertens, 2010).

In the liberalized policy environment, the standard approach to regulating market power is through competition regulations. There are several well-known cases when governments have prevented mergers and acquisitions (M&As) to ensure sufficient competition in food markets – as in any other market. Recent examples from the food sector include the 2017 merger of AB InBev and SAB Miller (at the time the third largest corporate take-over in history) where the United States of America's government required the merged company to divest some of their joint activities (Swinnen and Briski, 2017). In 2019 the United Kingdom of Great Britain and Northern Ireland regulators also blocked the merger of two major retailers, ASDA and Sainsbury's, arguing that it would lead to an increase in prices and a reduction of consumer choice.

Yet, farmers have not always been satisfied with competition regulations or standards and have pushed for more interventions. An intriguing and innovative case of regulations of market power and presumed abuse in agri-food value chains has recently developed in the European Union with the regulations of "Unfair Trading Practices" (UTPs). A reason why empirical studies may find little conclusive evidence about the impact of concentration on rent distribution (market power and prices) is because market power may be used in ways other than manipulating prices to enhance rents for concentrated industries.[12] This has been the subject of farms' and small business' complaints in the European Union about "unfair" business practices by large food processors and retailers (Fałkowski *et al.*, 2017).

The European Commission (2013) defined Unfair Trading Practices (UTP) 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". UTPs are a collection of various types of practices and which are associated with abuse of market power – see Appendix for details on the types of UTPs.

[12] Exclusively focusing on prices can risk fully capturing the potential benefits from more concentration or vertical relationships, such as enhanced access to inputs, price stabilization, etc. – some of which have been discussed explicitly above.

Complaints by farmers and small businesses of abuse of market power in agri-food value chains has led to regulatory interventions in the European Union, under the so-called "Unfair Trading Practices" (UTPs) regulations, approved in March 2019. The regulations were triggered by a series of policy shocks and market volatilities (including the effects of the Russian bans and food price fluctuations over the past decade) which caused heavy political pressure on the European Union governments to intervene and which then lead to the regulation of unfair trading practices (UTPs). The UTP directive outlaws a list of 16 UTPs, 10 so-called 'black' practices (which are prohibited regardless of the circumstances) and 6 'grey' practices (which are only allowed if buyer and supplier agree on them in a clear and unambiguous manner) (European Union, 2019; Russo, 2020).

This new regulatory approach is not only interesting in itself. One could imagine that this regulation (which is now applied only to business transactions within the European Union and between European Union companies and companies in third countries) could provide a model for similar regulations globally in the future.

APPENDIX

Appendix 1 Unfair trading practices (UTPs)[13]

The European Commission (2013) defined unfair trading practices (UTP) 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". UTPs are a collection of various types of practices that are associated with abuse of market power. They can be classified in four categories: (i) the retroactive misuse of unspecified, ambiguous or incomplete contract terms, (ii) the excessive and unpredictable transfer of costs or risks of a trading partner to its counterparty, (iii) the misuse of confidential information and (iv) the unfair termination or disruption of a commercial relationship.

Retroactive misuse of unspecified, ambiguous or incomplete contract terms

The existence of these types of practices are, in part, a consequence of the high degree of uncertainty inherent to agricultural production. The dependence on natural conditions creates indescribable contingencies of the agricultural contract and some dimensions of performance are often necessarily omitted in the contract, because specifying all possible contingencies are costly to design (Salas, 2016).[14]

Excessive and unpredictable transfer of costs or risks of a trading partner to its counterparty

This category contains many different individual practices such as the transfer of specific investments, delayed payments, reverse margin practices (RMP), short-notice cancellations of perishable agri-food products and payments not related to a specific transaction. These practices relate to, for example, the use of off-invoice fees, namely, payment for promotion, marketing or advertising; slotting fees; the return of unsold products, etc. There are several studies which have analysed the effects of the transfer of specific investments, transfer of risk and delayed payments, all of which have been associated to concentration, but which can also be caused by other factors.

Misuse of confidential information

Trade-secret protection is desirable when the informed party can undertake relation-specific investments to increase their gains from trade. Tan, Wong and Chung (2016) find that proprietary information and explicit knowledge leakages have significant adverse effect on firm's performances.

Unfair termination or disruption of a commercial relationship

Termination or disruption of commercial relationships is a key threat in agri-food value chains. Agri-food value chains, which typically require multiple suppliers to satisfy orders and are thus confronted with supplier selection problems (Scott *et al.*, 2015), are more susceptible to this

[13] For more details: see Russo (2020).

[14] There is an incentive to renegotiate an incomplete (or costly-to-enforce) contract if: i) new information is discovered or ii) at least one of the parties takes an irreversible decision at some point (Dewatripont and Maskin, 1990). For example, over time a buyer can discover the exact cost structure of a supplier and use this information to renegotiate a price reduction (Hart and Tirole, 1988). Once the supplier invests a sizable amount of money in building the production capacity that is required by the buyer, he/she depends on future orders to recover the cost of the specific asset and cannot refuse new contract terms (the hold-up problem in Williamson, 1985; Schmitz, 2001). In such an instance, the buyer can decide to behave 'opportunistically', defined as 'self-interest seeking with guile' (Williamson, 1985). Unilateral renegotiation is not necessarily efficient and, if allowed, can lead to underinvestment and inefficient allocation because the weak party can refuse to trade in fear of future unfavourable developments (see Bolton, 1990).

practice. Further, agri-food firms with high asset specificity (such as farmers) are particularly vulnerable to it. A party with a credible threat of termination can obtain sizable concessions, especially if the counterparty is locked-in the transaction.

The United States of America's legislation aims to protect growers and to provide them with some bargaining power in the event they are involved in contract disputes with large food processors. A few studies examining the effect of legislation against termination or disruption of commercial relationship find different results related to the producers' welfare. Some find rent redistribution from processors to producers (Lee, Wu and Fan, 2008; Wu, 2010), while others find harmful effect on producers (Lewin-Solomons, 2000). Wu (2010) shows that the legislation can protect growers at the expense of decreases in efficiency, or decrease their welfare with the increase in efficiency, depending on whether growers find it difficult to collect damages under the existing law.

Appendix 2 A model of competition and rent distribution with vertical coordination[15]

Two key characteristics of rural areas in developing and emerging countries are factor market constraints and weak institutions for formal contract enforcement. These conditions have major implications for the distribution of rents in value chains and the impact of competition.

Basic model

Consider a farmer with a fixed allocation of labour and land who uses "basic technology/inputs" to produce a quantity q_L of a low-quality product that can be sold in the local market for a price q_L. The farmer's alternative is to sell to a trader, processor, or retailer (who we refer to as "the buyer"). They sell the product (possibly after processing) to urban consumers for a price p_H as summarized. To keep the model simple, we assume processing or marketing costs are zero.

The buyer requires specific standards or minimum amounts of supply from the farm. To comply with the standard or to increase his productivity, the farm therefore needs to apply a more advanced technology. To start, we keep the definition of "technology/inputs" general. Later we will consider different types of technologies. The farm can buy the technology/inputs itself for a price τ^f.

We assume this technology allows the farmer to comply with the buyer's private standard and/or that it increases the farmer's productivity, reflected in a higher quantity produced q_H (with $q_H \geq q_L$) and/or a higher consumer price ($p_H \geq p_L$, given fixed land and labour inputs. The total value generated by applying the advanced technology is defined as $V = p_H q_H$. Defining $l = p_L q_L$ as the farmer's opportunity cost, the net surplus created by adopting the technology is $S = V - l - \tau^f$. This is the total surplus in the value chain from technology adoption. The farmer's net surplus is $S^f = V^f - l - \tau^f$ with $V^f = \theta p_H q_H = \theta V$ and θ representing the farmer's share of the consumer price for the high value product. The farmer will decide to adopt the technology if his net surplus θ is positive, i.e. if:

(1) $$V \geq \frac{(\tau^f + l)}{\theta}$$

This result is illustrated in panel (a) of figure 6.

This general condition captures both the quantity and quality effects of technology adoption. All else equal, technology adoption is more likely if its quantity effect on productivity ($q_H - q_L$ is larger, if the quality effect ($p_H - p_L$) is stronger, if the farmer's share of the consumer price θ is larger, if the price of technology τ^f is lower, and if the opportunity costs of the farmer l are lower.

Many farmers in developing and emerging countries face technology, input and credit market imperfections, making it difficult and expensive for them to buy the technology (Croppenstedt *et al.*, 2003; Feder *et al.*, 1985; Morris *et al.*, 2007; Rozelle and Swinnen, 2004). The buyer may have better access to the modern technology than the farmer when the buyer has less credit and liquidity constraints; or lower transaction costs due

[15] Based on Swinnen et al. (2015); Swinnen and Kuijpers (2019); Swinnen and Vandeplas (2011).

to economies of scale; or lower information asymmetries if the buyer has better knowledge of consumer preferences. The buyer can then offer the farmer a contract, which includes the transfer of technology and conditions for purchasing the product (time, amount and price). We refer to the buyer's opportunity cost of the technology transfer as $\tau < \tau^f$. This opportunity cost will depend on the cost of transfer, as well as on the buyer's potential return to alternative investments (including alternative sourcing contracts). This means that in the absence of a contract, the buyer's "disagreement payoff" is equal to τ. For simplicity, we assume the farmer's "disagreement payoff" is equal to $l = p_L q_L$. The buyer's and farmer's participation constraints are then defined as $\Pi^B \geq \tau$ and $\Pi^f \geq l$, with Π^B and Π^f denoting the buyer's and farmer's contract payoff, respectively. The total (net) surplus created by the contract is $= V - l - \tau$.

A key question, to which we will return, is who benefits from the contract. To start, we assume that the share of the surplus that accrues to the farmer is β (with $0 \leq \beta \leq 1$ with β is determined through ex-ante bargaining. Later we explain how the division of surplus depends on contract enforcement and holdup opportunities.

Consider first, as a benchmark, the case that contracts are always perfectly enforced. In this case, given the disagreement payoffs of both parties, the contract payoffs are

(2) $$\Pi^{f^*} = l + \beta S = l + \beta(V - l - \tau)$$

(3) $$\Pi^{B^*} = \tau + (1 - \beta)S = \tau + (1 - \beta)(V - l - \tau)$$

where superscript * denotes the payoffs with perfect enforcement. Under these assumptions, the technology transfer will take place if the net surplus is positive, i.e. if

(4) $$V \geq \tau + l$$

The value created (V) should be larger than the opportunity costs of labour (l)and of transferring the technology (τ). This result is illustrated in panel (b) of figure 6. Technology transfer is more likely if the effect on the value of the farmer's product ($p_H - p_L$) or on the production efficiency ($q_H - q_L$) is higher, if the buyer's opportunity cost of transferring the technology τ is lower, and if the opportunity costs of labour l are lower.

Contract enforcement

In developing and emerging countries, contracts such as the one described here may be formal or informal but, in either case, contract enforcement is nontrivial. Contract breach can take many forms. In the setting considered here, we can distinguish three potential types of holdup that might occur in case of imperfect contract enforcement. First, the farmer could decide to divert the technology provided by the buyer by selling it or using it for different purposes. Second, the farmer could default on the contract by selling the product to an alternative buyer, after applying the transferred technology. Such "side-selling" can be profitable, as the alternative buyer does not have to account for the cost of the provided technology. Finally, the buyer could hold up the farmer by renegotiating the contract upon delivery if the product produced with the advanced technology is worth more to him than to any other buyer. Instead of paying the agreed contract price, the buyer can pay the farmer the value of his best alternative at that point.

Farmer holdup

Consider a case when the farmer considers diverting the inputs. Assume that the benefit of this equals the cost of the technology for the buyer τ. In addition, the farmer can still realize his opportunity cost of labour l. By violating his contract, the farmer suffers a reputation cost $\phi \geq 0$. Hence, with technology diversion, the farmer's payoff is $\Pi_d^f = l + \tau - \phi$ and the buyer's payoff is $\Pi_d^B = 0$.

In case there is no external contract enforcement (beyond what is captured in the reputation costs) the partners can try to design the contract to be "self-enforcing" to avoid holdups and make the technology transfer work. For the contract to be self-enforcing, the farmer's contract payoff must at least equal his holdup payoff Π_d^f, while the buyer's payoff must at least equal his disagreement payoff τ. In other words, the technology transfer contract should satisfy the farmer's incentive compatibility constraint ($\Pi_d^f = l + \tau - \phi$) and the buyer's participation constraint ($\Pi^B \geq \tau$). Combining these, the value generated by the transfer should satisfy the following condition for the contract to be feasible:

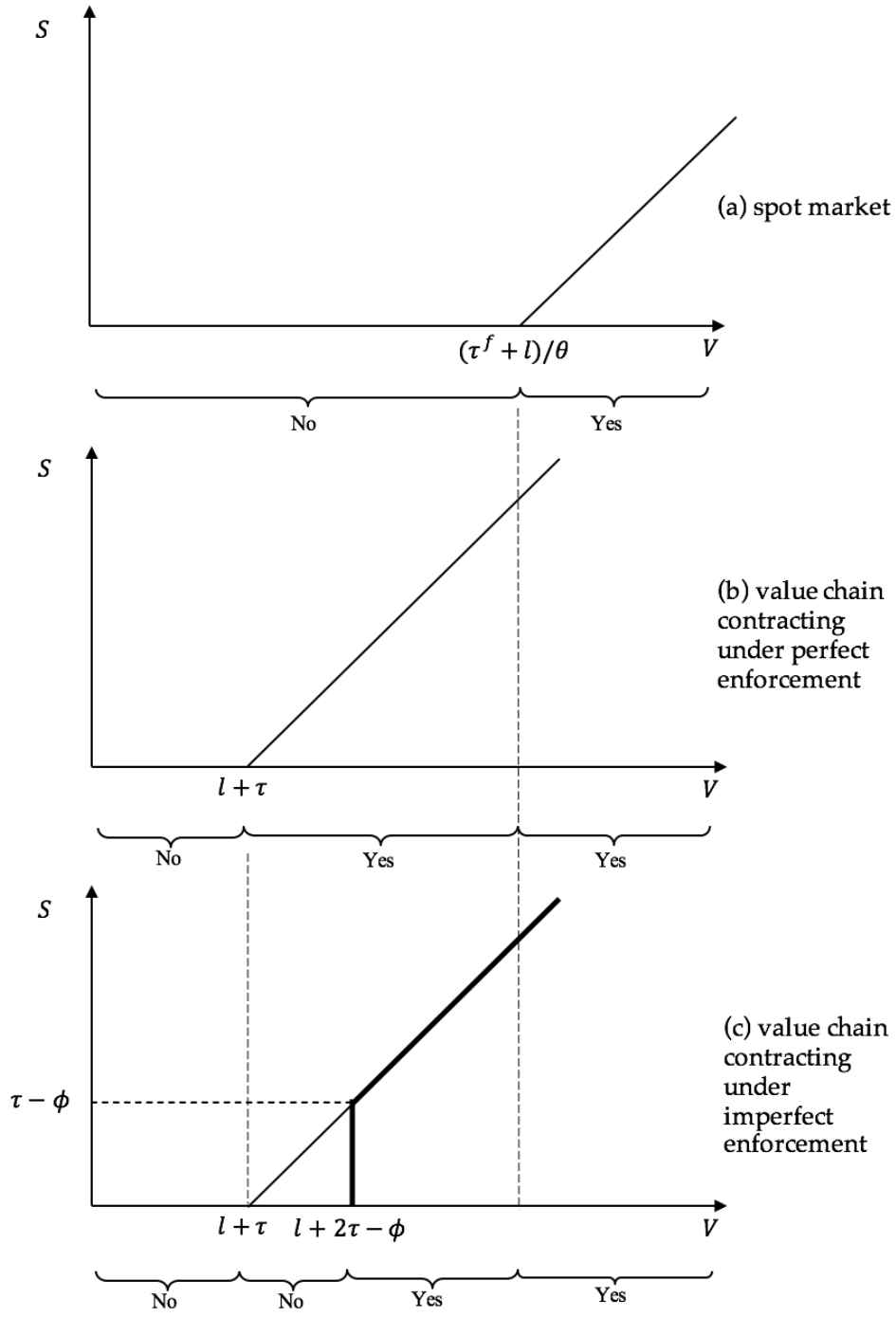
(5) $$V \geq l + 2\tau - \phi$$

in addition to the condition $V \geq l + \tau$, determined earlier (equation 4). This implies that technology transfer in value chains is possible when

(6) $$V \geq V^{min} = \max\{l + \tau;\ l + 2\tau - \phi\}$$

If V is sufficiently high, it is possible to adjust the contract terms to satisfy the farmer's incentive compatibility constraint without violating the buyer's participation constraint, making the contract, in principle, feasible. A low V, however, might be insufficient to pay the farmer at least his holdup payoff and prevent contract breach. In this case, a self-enforcing contract will not be possible. Obviously, holdup is only profitable for the farmer if the benefit of diverting the technology is bigger than his reputation cost, i.e. if $\tau > \phi$. If $\tau \leq \phi$, the farmer has no incentive to hold up the buyer and the "efficiency" condition (equation 4) remains binding. These results are illustrated in panel (c) of figure 6.

Figure 6 VC Surplus Creation under Three Scenarios: (a) spot markets, (b) value chain contracting under perfect enforcement and (c) value chain contracting under imperfect enforcement



Buyer holdup

The buyer may refuse to pay the farmer the agreed share of the value at product delivery and, instead, offer to pay only as much as the farmer's best alternative at that moment V_s (for example, the value of the produce when sold on the local market). Doing this will result in a reputation cost $\omega \geq 0$ for the buyer. In this case, the contract payoffs become $\Pi_r^B = V - V_s - \omega$ for the buyer and $\Pi_r^f = V_s$ for the farmer.For a self-enforcing contract to be feasible, it should satisfy both the farmer's participation constraint $\Pi^f \geq l$ and the buyer's incentive compatibility constraint

($\Pi^B \geq \Pi_r^B = V - V_s - \omega$). Combining these implies the following condition for which technology transfer remains feasible under the threat of buyer holdup:

(7) $\quad l \leq V_s + \omega$

in addition to the condition $V \geq l + \tau$, determined earlier. This result implies that the effect of buyer holdup on the feasibility of the transfer does not necessarily depend on the value generated by the technology V It does depend on the reputation costs of the buyer (ω) and the alternatives for the farmer (V_s). The latter may be a function of the value v or not, depending on the high value market structure and local demand (see Section 5).

Since the buyer's reputation cost ω is non-negative, $V_s \geq l$ is a sufficient condition for the farmer to agree with this contract. This is the case when the farmer is able to sell the "high-quality" product for at least the value of the "low-quality" equivalent to others than the buyer (e.g. on the local spot-market). In summary, technology transfer through value chain contracting is more likely when the value generated by the technology (V), the farmer's best alternative to the buyer's offer (V_s), and reputation costs (ϕ and ω) are higher, and when the farmer's and buyer's opportunity costs(l and τ) are lower.

Effective bargaining power and contract enforcement

So far we have referred to β as the sharing rule, which identifies the distribution of the surplus created by technology adoption between buyer and farmer, and which we assumed is the outcome of a (not modeled) bargaining game between buyer and farmer. But the share rule β is only a correct indicator of how the surplus created by the technology transfer will be distributed between the buyer and the farmer under perfect contract enforcement. Under imperfect enforcement, each party can gain "bargaining power" (that is, claim a larger part of the surplus), if it can make a legitimate threat to hold up the other party. Under imperfect contract enforcement, one can define β as the "*effective sharing rule with imperfect enforcement*" where

(8) $\quad \hat{\beta} = \frac{\pi^f - l}{S}$

with π^f the effective contract pay-off for the farmer and l his opportunity costs.

Figure 7 illustrates how the distribution of the technology adoption surplus changes with the value of the technology and the holdup opportunities when farmer holdup occurs at relatively low values of the transferred technology V and when buyer holdup occurs at relatively high values of V (a situation which is consistent with the analysis in the previous section). The upper panel of figure 7 shows the actual distribution of the surplus with S the total surplus, βS the farmer's surplus under perfect contract enforcement, and $\hat{\beta} S$ the farmer's surplus under imperfect enforcement. The buyer's surplus is the vertical distance between the lines representing the total surplus and the farmer's surplus. The lower panel illustrates how β is constant for all levels of V , while $\hat{\beta}$ changes with V.

If we move from left to right in the graph, increasing the value V, we pass through several "value regions". In domain A, the value of the technology is too low to overcome the buyer and farmer's combined opportunity costs and it is thus socially not efficient to adopt. In domain B, the value V is large enough for technology transfer to be socially efficient but is insufficient to make the contract self-enforcing and avoid farmer holdup. As demonstrated in the previous section, technology transfer is infeasible if $V < l + 2\tau - \phi$. Beyond this level of V (domain C),

the efficiency gain of transferring the technology is large enough to make the contract self-enforcing. In this case, the buyer is willing to offer – what Swinnen and Vandeplas (2011) have termed – an "efficiency premium" to the farmer on top of the perfect enforcement payoff to avoid technology diversion.

At the point where $V = l + 2\tau - \phi$ the entire surplus S is needed to compensate the farmer not to divert the technology. Hence, at this point the entire surplus goes to the farmer ($\pi^f - l = S$) to make the contract self-enforcing. The holdup possibility of the farmer increases his effective bargaining power to the maximum level $(\hat{\beta} = 1)$. This theoretical result can explain, sometimes significant, benefits for smallholder farmers from participating in these value chains despite strong concentration at the buyer level.

As V increases beyond that point, more surplus is created and more surplus is left for the buyer. The farmer's surplus $(\hat{\beta}S)$ remains constant, since it is determined by the (fixed) level of holdup opportunities. Hence, β declines with increasing V but $\hat{\beta} > \beta$. More specifically, in domain C farmer holdup remains binding, with $\hat{\beta} = \frac{\tau - \varphi}{V - l - \tau} > \beta$ In domain D neither farmer nor buyer holdup is opportune, such that the perfect enforcement outcome prevails and $\hat{\beta} = \beta$.

In domain E, the value of technology adoption is highest and there will be buyer holdup unless the contract compensates the buyer sufficiently. With buyer holdup binding, $\hat{\beta} = \frac{V_s + \omega - l}{V - l - \tau} < \beta$ The benefits of technology adoption for the farmer, $\hat{\beta}S$, do not further increase with increasing V in domain E, as is illustrated in figure 7. Buyer holdup potentials impose a maximum surplus for the farmer.

Figure 7 Effective bargaining power and rent distribution with VC contracting

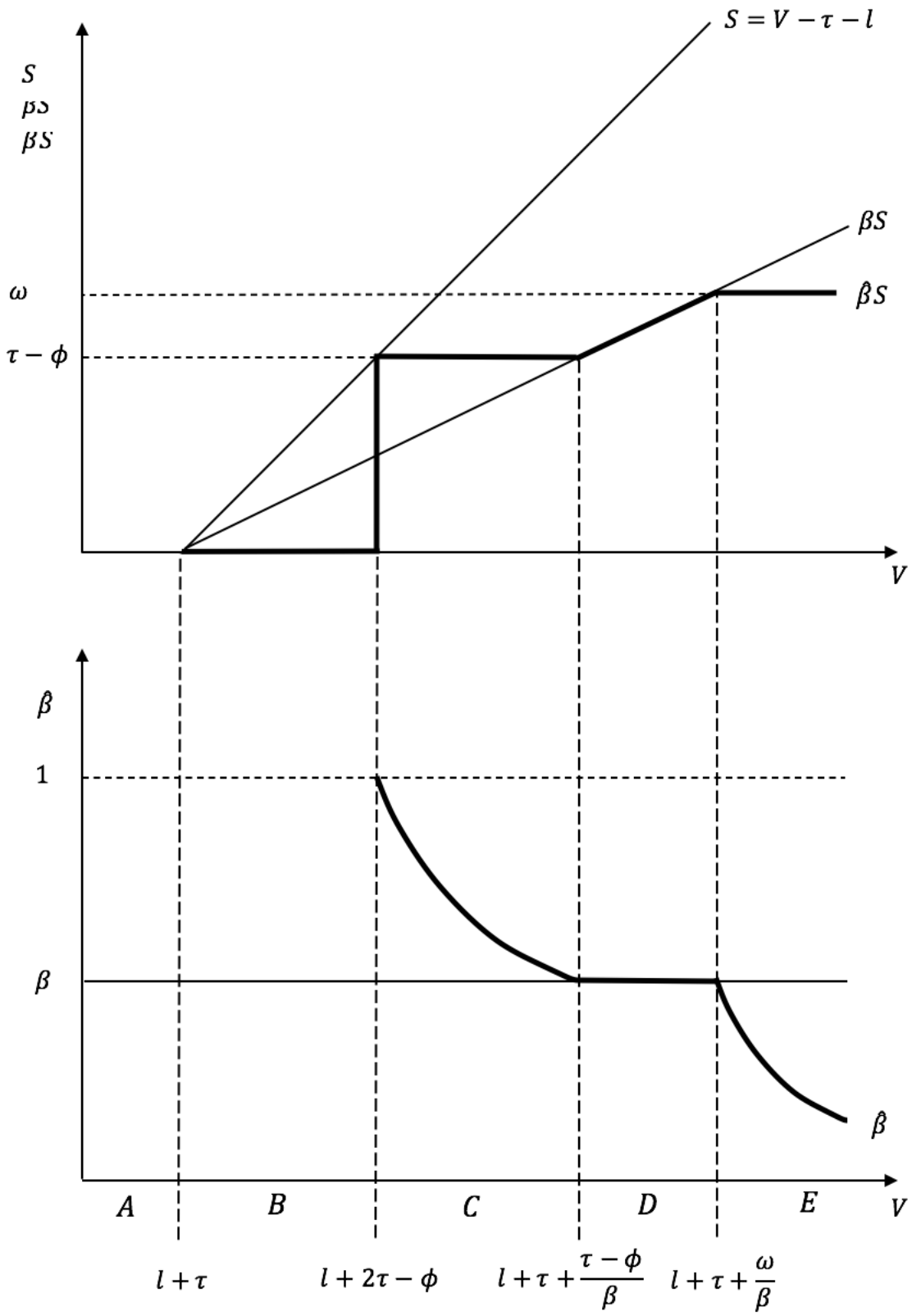


Figure 7 further illustrates when buyer holdup becomes binding for the case that $V_s = 1$. Combining the definitions of S and Π_r^B, it follows that the net benefits of the holdup for the buyer are

(9) $$\Pi_r^B - \tau = S - \omega$$

A value V_r the net benefits of buyer holdup (represented by the $S - \omega$ line) equal the buyer's share of the surplus $(1-\beta)S$. This occurs at the surplus level S_r for which $S_r - \omega = (1-\beta)S$, which implies that $S_r = \frac{\omega}{\beta}$ and $V_r = 1 + \tau + \frac{\omega}{\beta}$. It also implies that the maximum net surplus for the farmer $\hat{\beta}S$ equals ω (and $\hat{\beta} = \frac{\omega}{S}$ over domain E. Hence, the buyer's reputation costs not only affect when holdup will occur, but also the benefits for the farmer from a self-enforcing technology contract.

Finally, an important implication of this analysis is that a simple look at the market structure may give a biased indication of the potential distribution of the benefits of technology transfer through value chains. Our results imply that in a context of imperfect contract enforcement, if the farmer has little market power (represented by a low β, he or she might still be able to capture a significant share of the surplus of the technology transfer if the farmer's holdup opportunities create incentives for the buyer to pay him an efficiency premium as part of the contract (represented by $\hat{\beta} > \beta$ in domain C).

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