The Interaction of Contracting Frictions and Market Power in Agricultural Supply Chains *

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Abstract

Agricultural value chains in developing countries connect a large number of smallholders to a small set of downstream buyers under weak contract enforcement. This review examines how two important features of these markets – buyer power and relational contracting – jointly shape prices, production, investment, and farmer welfare. We organize recent empirical evidence around a common framework linking farmers, intermediaries, and downstream buyers. Three main conclusions emerge. First, buyer power depends not only on the number of buyers but also on their conduct and farmers' ability to switch across buyers and activities. Second, market power at different stages of the value chain can interact in ways that make the effects of policy difficult to predict. Intermediaries may exercise market power while also providing valuable services, so higher farm-gate prices do not necessarily imply higher farmer welfare. Third, market power and relational contracting are closely connected: competition improves outside options but can also reduce the rents needed to sustain informal agreements. We argue that future work should study market power and relational contracting jointly and evaluate agricultural policies beyond their effects on prices alone.

1 Introduction

Agricultural value chains in developing countries are marked by a fundamental asymmetry: a large mass of small, geographically dispersed farmers sells to a handful of intermediaries, processors, and exporters, who in turn link them to national and world markets. How the gains from this trade are distributed along the chain, and whether trade occurs at an efficient scale, bears directly

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on the incomes of the many households that depend on agriculture (World Bank, 2007), who are also increasingly exposed to the pressing challenges of climate change, and has therefore become a central concern for researchers and policymakers alike. Yet the evidence gives cause for concern. Recent studies have documented that farmers capture only a modest share of final value (Bergquist & Dinerstein, 2020; Zavala, 2026), and that trade liberalization and improved market access have often delivered smaller efficiency and distributional gains than anticipated (Ashraf et al., 2009; Barrett et al., 2022; De Janvry et al., 2015).

Alongside the well-documented imperfections in markets for credit, insurance, inputs, and information (Binswanger & Rosenzweig, 1986), a more recent literature has turned to two further sources of friction: (i) buyers' market power, and (ii) the weak formal contract enforcement. The first arises because agricultural production is fragmented and farmers face high transport costs, thin local markets, and limited outside options, so the intermediaries who buy their output can exercise monopsony or oligopsony power, depressing farm-gate prices and weakening the transmission of downstream price changes (Bergquist & Dinerstein, 2020; Mitra et al., 2018; Rubens, 2023; Zavala, 2026). The second concerns the difficulty of enforcing agreements in agricultural settings. Without reliable formal enforcement, it is hard to sustain forward sales, credit and input provision, and quality commitments on which efficient exchange depends. Together, these frictions help explain why governments intervene so heavily in agricultural chains through marketing boards, minimum prices, and restrictions on market structure, and why the record of market reforms has been so mixed. (Binswanger & Deininger, 1997; Ellis, 1992)).

This paper provides a (highly) selective review of a recent body of empirical work on market power and relational contracting in agricultural chains. Although these two frictions have often been studied in isolation, they are deeply interlinked, and their interaction is central to both how these markets function and how policy should be designed. The link runs in both directions. On the one hand, *relational contracts* – informal agreements sustained by the future value of the relationship – can mitigate market failures by supporting trade and investment where spot markets would collapse, but they are difficult to sustain under intense competition (i.e., existence of outside options). Thus, some degree of market power may be a prerequisite for successful relational agreements. On the other hand, these relationships might segment markets, deter entry, and maintain tacit or explicit collusion among parties. Hence, understanding agricultural markets requires moving beyond spot prices and market structure alone, towards an integrated view of contracts, enforcement, and strategic interaction across stages of the value chain.

Making progress on these questions requires tools that can separate market structure from conduct, recover markups and markdowns, model bargaining and vertical contracting between adjacent stages, and articulate the dynamic incentive constraints that underpin self-enforcing relationships. The studies we review draw heavily on modern empirical industrial organization. Much of their contribution is to connect observed patterns such as low pass-through, persistent price differences, presence of externalities as climate change, and low investment in quality to measures of efficiency and welfare that can be used to evaluate existing and proposed policies.

We organize this review around a simple conceptual framework that captures the structure common to agricultural value chains: a continuum of heterogeneous farmers who choose among a

handful of intermediaries, who in turn sell on to downstream buyers. This common set up lets us describe the studies we review in a shared language, treating each one's particular application or mechanism as an extension of the same underlying setting.

This review complements several broader surveys of agricultural value chains. Macchiavello et al. (2022) reviews the empirical industrial organization toolkit as applied to the transformation stages of food value chains, with particular attention to downstream retail. Barrett et al. (2022) provide an integrated empirical narrative of the transformation of agri-food value chains in low- and middle-income countries. On the contracting side, Macchiavello (2022) and Michler and Wu (2020b) review the literatures on relational contracting and contract choice respectively, and Bellemare and Bloem (2018) assess the welfare implications of contract farming. Relative to these, we focus specifically on the interface between buyer power and relational contracting at the farm-gate and in downstream, business-to-business transactions. We also draw on a wave of very recent structural and experimental studies, and tie them together through a single conceptual framework.

Section 2 introduces the conceptual framework used throughout the study. Section 3 examines evidence on buyer power and its effects on the distribution of surplus, productive efficiency, and the transmission of environmental policy. Section 4 examines how market power at one stage of the value chain affects other stages and shapes the effects of policy. Section 5 focuses on settings with market power at multiple stages, where prices and other terms are determined through bargaining and vertical contracts. Section 6 focuses on relational contracting, examining how repeated interactions support cooperation, how they interact with competition and market structure, and how relationships can encourage investment and sustainability. Section 7 concludes the review.

2 A General Framework for Agricultural Chains

We set out a framework for agricultural value chains characterized by a finite number of intermediaries with market power, who buy from atomistic farmers, and sell to a general downstream market. As part of our rigorous review, it allows for heterogeneity among farmers and intermediaries, different forms of intermediary conduct, regulated and unregulated prices, and repeated trade across seasons. We organize this set-up around five channels, which we use throughout the paper to understand the mechanisms and results of each study[1].

2.1 Environment

Figure 1 pictures the three tiers in a standard agricultural value chain. A continuum of farmers, $j \in [0, 1]$, supplies a good to a finite set of intermediaries – traders, mills, processors, or exporters – $i = 1, \ldots, N_r$, who transform it and sell to downstream buyers, $e = 1, \ldots, E$. Trade takes place in local markets, r, and in seasons, s. Intermediaries may operate in several markets at once, and market structure differs across them. This variation is the primary source of identification in much of the literature that we review.

Each season opens with the realisation of a state ζ_s, summarising shocks to downstream prices, yields, and costs. Some components of ζ_s are known before terms of trade are agreed, while others

[1]We add a sixth channel later to support the application relational contracts in agricultural settings

are realised only after commitments have been made. The season then proceeds in four steps: (i) intermediaries decide which markets to serve, (ii) each intermediary posts a farm-gate price p_{irs} and a bundle of non-price terms ξ_{is}, (iii) farmers choose an intermediary and produce, and (iv) intermediaries transform the good and sell it downstream at price P_{rs}. The enforceability of these terms is explored in an extension later.

Figure 1: A Standard Agricultural Supply Chain



2.2 Farmers

The value chain begins with a large number of heterogeneous and geographically dispersed farmers. Farmer j has productivity z_j, land area A_j, and cost function $c_j(\cdot)$, and produces $Q_j = Q(A_j, z_j)$. Farmers take prices as given, but differ in their production characteristics and in the value they place on different buyers. These differences determine which buyers they choose, whether they invest, and how aggregate supply responds to prices.

(C1) Discrete Choice Farmer Supply. After production, farmers decide where to sell their output. Because farmers typically sell their harvest to one buyer rather than splitting it across several buyers, we represent this decision as a discrete choice. Farmer j selling to intermediary i in market r and season s receives utility[2]

$$u_{ijrs} = \alpha_j p_{irs} + \xi_{is} + \mu_{ijrs} \tag{1}$$

where $\alpha_j > 0$ captures sensitivity to price, ξ_{is} captures non-price attributes offered by the intermediary – such as credit, inputs, collection services, and payment reliability – and μ_{ijrs} is an idiosyncratic preference for intermediary i.

Farmers can also choose not to sell to these buyers by switching crops, using their land differently, or leaving the market. These alternatives determine how easily they can respond to changes in prices. Aggregating equation (1) across farmers gives the supply faced by intermediary i and its elasticity:

$$S_{irs} = S_{irs}\big(p_{irs}, \xi_{is}; \mathbf{p}_{-irs}, \boldsymbol{\xi}_{-is}\big), \qquad \varepsilon_{irs} \equiv \frac{\partial \ln S_{irs}}{\partial \ln p_{irs}} > 0 \tag{2}$$

Discrete choice is one way to obtain this elasticity, but it is not essential for the analysis. What matters is that ε_{irs} depends on farmers' alternatives. More outside options, such as another nearby buyer or a viable alternative crop, make supply more elastic. When farmers can switch more easily across buyers than across activities, larger intermediaries tend to face less elastic supply.

(C2) Sunk Investment in Quality. Before selling, farmers may also make investments that affect the quality of their output. Let $a_j \in \{L, H\}$ denote standard or upgraded quality.

[2] Adapted from Leone et al. (2025).

Upgrading requires a sunk cost F_j and raises variable costs by a factor $(1+\gamma)$, where $\gamma > 0$. Unlike the selling decision above, this choice is made before the final price is known and cannot easily be reversed. Farmers therefore invest based on expected returns and become exposed to hold-up once the investment has been made.

2.3 Intermediaries

Intermediaries connect farmers to downstream markets. They purchase agricultural output, may process or transform it, and then sell it to consumers, wholesalers, exporters, or other downstream buyers. Intermediary i has processing costs $C_i(q)$ and a fixed cost of operating in market r. Differences in these costs determine both how much intermediaries purchase and whether they enter a particular market.

(C3) Conduct. Once active in a market, intermediaries decide how much to purchase while taking into account the behavior of their competitors. Rather than imposing a specific form of competition, we summarize their conduct with $\omega \in [0,1]$. Let q_{irs} denote purchases by intermediary i and $Q_{rs} = \sum_i q_{irs}$ total purchases. The intermediary solves[3]

$$\max_{q_{irs}} \ \Pi_{irs} \ = \ P_{rs}(Q_{rs})\, q_{irs} \ - \ p_{irs}(q_{irs})\, q_{irs} \ - \ C_i(q_{irs}) \ + \ \omega \sum_{k \neq i} \Pi_{krs} \tag{3}$$

When $\omega = 0$, intermediaries behave independently, while $\omega = 1$ corresponds to full coordination. Intermediate values capture partial coordination. The first-order condition (FOC) gives the wedges between prices and marginal values on both sides of the intermediary [4]:

$$p_{irs} \ = \ \frac{MRP_{irs}}{\psi_{irs}}, \qquad \psi_{irs} \ = \ 1 + \frac{1+\omega(N_r-1)}{N_r\, \varepsilon_{irs}}, \qquad m_{irs} \ = \ \left[1 - \frac{1+\omega(N_r-1)}{N_r \left|\varepsilon^D_{rs}\right|}\right]^{-1} \tag{4}$$

Here, MRP_{irs} is the marginal revenue product, p_{irs} is the farm-gate price, $\psi_{irs} \geq 1$ is the farm-gate markdown, and $m_{irs} \geq 1$ is the downstream markup. The markdown depends on conduct and on how responsive farmers are to prices, while the markup depends on conduct and downstream demand. Thus, the number of intermediaries alone does not determine market power: the relevant elasticities and the way intermediaries compete also matter.

Equation (4) also explains why a low farmer share does not necessarily imply market power. Let $MRP_{irs} = \varphi_i P_{rs}$, where φ_i measures the contribution of the farm product to downstream value. Farmers receive the share φ_i/ψ_{irs} of the downstream price. A low share can therefore reflect either limited value added by the farm product or buyer market power. Distinguishing between them is a key challenge in the empirical literature.

(C4) Price Setting. The wedges that intermediaries can exercise also depend on who sets prices at each stage. Upstream, intermediaries typically post farm-gate prices and atomistic farmers choose among them. Downstream arrangements vary. Intermediaries may set their own prices, sell at an exogenous world price, or accept prices set by downstream buyers. These institutional

[3] Adapted from Bergquist and Dinerstein (2020).

[4] Adapted from Rubens (2023), Dominguez-Iino (2026), Zavala (2026), Weyl and Fabinger (2013).

differences determine whether market power operates upstream, downstream, or on both sides of the intermediary.

2.4 Demand

(C5) General Demand. The final tier is a representative consumer whose substitution behaviour generates the demand that intermediaries face. Let preferences be constant elasticity of substitution (CES) over differentiated varieties, so that demand in destination r for the output of intermediary i is[5]

$$Q_{irs} \;=\; \left(\frac{P_{irs}}{\mathcal{P}_{rs}}\right)^{-\rho} \frac{X_{rs}}{\mathcal{P}_{rs}}, \qquad \varepsilon^{D}_{rs} \;=\; -\rho \tag{5}$$

where $\mathcal{P}_{rs}$ is the price index, X_{rs} total expenditure, and $\rho > 1$ the elasticity of substitution. The specification is deliberately flexible. It can be nested to allow consumers to substitute across commodities, across source countries, and across producing regions within a country, which is what generates spatially heterogeneous demand elasticities; and it accommodates final consumers, domestic wholesalers, and international buyers alike. The limiting case $\rho \to \infty$ is a small open economy facing an exogenous world price, under which $|\varepsilon^{D}_{rs}| \to \infty$ and the markup in equation (4) collapses to $m_{irs} = 1$. What matters for the rest of the review is that ε^{D}_{rs} is not a free parameter but the product of consumer substitution, just as ε_{irs} is the product of farmer substitution.

Conditions in the final market therefore reach farmers only through MRP_{irs} in equation (4), so that a change in the downstream price is transmitted to the farm gate attenuated by the factor ψ_{irs}. Any applied policy at the downstream end of the chain is damped on its way upstream by market structure, and the magnitude of the damping is precisely what equation (4) measures. All this exercise holds within a season. However, the terms ξ_{is} in equation (1) include services that cannot be exchanged on the spot but must instead be promised, and they are sustained across seasons only by the value of repeated trade – which is composed of the very rents that equation (4) measures. Therefore, competition may raise the farm-gate price while simultaneously shrinking the set of terms that can credibly be offered, so its net effect on farmer welfare is ambiguous. Resolving that ambiguity requires the repeated version of this framework, which we develop later.

Table 1 summarises how each study discussed below relates to the framework, recording which channels it activates, how it specialises them, and the empirical method it uses to identify them.

Table 1: Channels and characterization in reviewed studies

Paper	Channels	Farmers	Intermediaries	Demand	Method
Bergquist and Dinerstein, 2020	C3, C4, C5	Not modelled	Oligopolistic traders	Flexible parametric	RCT + Structural
Zavala, 2026	C1, C4, C5	Choose between crops and exporters	Oligopsonistic exporters	Perfectly elastic	Structural
Rubens, 2023	C4, C5	Not modelled	Oligopsonistic manufacturers	Regulated state buyer	Structural + Reduced Form
Dominguez-Iino, 2026	C1, C4, C5	Choose between crops and land-use × crop	Oligopsonistic agribusinesses	CES demand	Structural

[5] Adapted from Dominguez-Iino (2026).

Table 1 continued

Paper	Channels	Farmers	Intermediaries	Demand	Method
Leone et al., 2025	C1, C4	Choose mills to sell	Oligopsonistic mills	Perfectly elastic	Structural + Reduced Form
Demirer and Rubens, 2025	C4	Not modelled	Monopolistic-Monosopnistic buyer/seller	No functional form	Structural
Macchiavello et al., 2026	C2, C4, C5	Invest in quality upgrade	Oligopsonistic exporters	Large buyer paying for quality	Structural + Reduced Form
Macchiavello and Morjaria, 2015	C6	Not modelled	Producers	Auction/spot markets	Reduced form
Macchiavello and Morjaria, 2021	C1, C6	Choice between mills	Oligopsonistic mills	Perfectly elastic	Reduced form

3 Monopsony Power in Agricultural Supply Chains

Agricultural markets frequently operate under substantial buyer power, particularly in settings where production is fragmented among small farmers and access to alternative buyers is limited (imperfect competition). Such buyer power depresses farm-gate prices and weakens the transmission of cost shocks, leading to a highly unequal distribution of surplus along the value chain. Beyond distributional concerns, buyer power can distort production decisions, dampen supply responses, and generate misallocation that reduces aggregate productivity – especially where spatial frictions, input constraints, and limited outside options constrain farmers' ability to respond. This section reviews recent empirical evidence linking monopsony power in agricultural input markets with these concerns.

3.1 Identifying Market Conduct and Surplus Allocation

A central puzzle in many developing-country agricultural markets is the coexistence of low farm revenues and high consumer prices, particularly following trade liberalization episodes that were expected to increase competition. Prices alone cannot settle whether this reflects collusion, since pass-through depends jointly on conduct and on the curvature of demand (Atkin & Donaldson, 2015; Weyl & Fabinger, 2013): weak pass-through is equally consistent with traders who coordinate and with competitive traders facing sharply curved demand, carrying opposite policy implications. Bergquist and Dinerstein, 2020 address this puzzle by providing a unified theoretical and experimental framework to measure the intensity of competition among traders and its implications for pass-through, entry, and welfare in Kenyan maize markets.

In terms of the general framework, their setting can be described by three main channels: intermediaries' conduct **(C3)**, price setting **(C4)**, and downstream demand **(C5)**. Conduct **(C3)** helps explain why markets with many traders may still deliver limited benefits to consumers, and this is the only study we review that estimates ω rather than imposing it. Price setting **(C4)** takes its simplest form here, since traders set the prices they charge consumers directly, so both wedges in the wedge equation are in principle available to them. Downstream demand **(C5)** is also important

because conduct cannot be identified from pass-through without knowing the shape of the demand curve faced by traders. Fixed costs of operating in a market matter as well, though not as a separate channel: a small number of traders may reflect thin markets rather than being the cause of high margins, and the entry experiment helps distinguish between these explanations. Finally, because traders are studied as sellers rather than buyers, the relevant wedge is the downstream markup m_{irs} rather than the farm-gate markdown ψ_{irs}.

The trader's problem is the intermediary's problem of the framework, with the same conduct parameter ω. In symmetric equilibrium their FOC is

$$P_{rs} \;=\; c_{rs} \;-\; \big(1+\omega(N_r-1)\big)\,\frac{\partial P_{rs}}{\partial Q_{rs}}\,\frac{Q_{rs}}{N_r} \tag{6}$$

where c_{rs} is the trader's marginal cost. Equilibrium markups therefore depend on the shape of demand and on two features of market structure and behaviour: the number of traders N_r, and whether they interact according to Cournot competition ($\omega = 0$) or joint profit maximisation ($\omega = 1$). Differentiating equation (6) with respect to marginal cost yields a pass-through equation

$$\rho_{rs} \;\equiv\; \frac{\partial P_{rs}}{\partial c_{rs}} \;=\; \left\{1 \;+\; \frac{1+E_{rs}}{N_r}\,\big(1+\omega(N_r-1)\big)\right\}^{-1} \tag{7}$$

where E_{rs} is the elasticity of the slope of inverse demand. Observed pass-through (ρ_{rs}) therefore reflects both the elasticity of the curvature of the demand (E_{rs}), the degree of competition (ω) and the number of traders (N_r).

To identify these parameters of equation (7), Bergquist and Dinerstein (2020) implement three randomized control trials across 60 markets in Kenya. In the first experiment, they provide temporary subsidies to all traders in a market, generating an exogenous reduction in marginal costs that allows estimation of pass-through ρ_{rs} at transaction level. In the second experiment, they offer randomized price discounts to consumers, inducing variation in prices and quantities that identifies demand curvature E_{rs} directly. In the third, they offer entry subsidies to study how changes in N_r affect prices.

The experiments' results indicate extremely low pass-through: only about 22% of cost reductions are passed on to consumers. Combined with estimates of demand curvature, this implies a level of conduct consistent with joint profit maximization among traders. Additional analysis allowing for cost heterogeneity, non-linear costs, and demand heterogeneity confirm this finding. The implied markups are large, and traders capture the majority of surplus, while consumers and upstream producers benefit little from cost reductions.

The entry experiment further shows that increasing the number of traders reduces prices, but only modestly. More important, the correcting effect of firms' entry depends on entrant characteristics: traders with existing relationships in the market integrate more easily and are less likely to disrupt incumbent behaviour. This highlights that legal openness to entry is not sufficient to guarantee competition when relational and informational frictions shape market participation.

These findings demonstrate that buyer power in agricultural markets can arise even in settings with homogeneous products and nominally free entry, and that surplus allocation depends critically

on market conduct rather than market structure alone.

Whereas Bergquist and Dinerstein (2020) generate their own variation, Zavala (2026) reaches a similar conclusion using administrative data on Ecuador's cash-crop export sector, and exploiting international price shocks as a source of variation. Linking farmers to exporters across the universe of exported crops, he documents that markets are highly concentrated and that farmers earn a smaller share of export revenue when their exporter dominates more of the crop market.

In terms of the general framework, the setting can be described by three main channels: discrete choice farmer supply **(C1)**, price setting **(C4)**, and downstream demand **(C5)**. Discrete choice farmer supply **(C1)** does the central work, since the alternatives available to farmers – which exporter to supply, and which crop to grow at all – determine the supply elasticity exporters face and thus explain why farmers receive low incomes. Price setting **(C4)** and downstream demand **(C5)** enter together in their simplest form: exporters sell at world prices and therefore face perfectly elastic demand, so the downstream markup in the wedge equation is $m_{irs} = 1$ and market power operates only on the upstream side of the exporter. Finally, conduct is assumed rather than estimated, allowing the paper to focus on identifying the supply side in greater detail.

A low farmer share is not by itself evidence of market power, since exporters also add value by processing and transporting the crop. Taking the FOC of the exporter's problem subject to the crop supply curve, the share of export revenue paid to farmers is [6]

$$\text{farmer share}_{irs} \;=\; \frac{p_{irs}\, q_{irs}}{P_{rs}\, x_{irs}} \;=\; \varphi_i \times \underbrace{\left(1 + \frac{1}{\varepsilon_{irs}}\right)^{-1}}_{\text{markdown}} \tag{8}$$

where x_{irs} is the volume the exporter sells downstream, φ_i is the output elasticity of the crop and ε_{irs} the elasticity of crop supply, the markdown term being the reciprocal of ψ_{irs} in the wedge equation. Under perfect competition, this share is equal to the output elasticity. When exporters have market power and face an upward-sloping crop supply, the share is lower. Both value added and market power can therefore reduce the observed share, making it difficult to distinguish between them using this measure alone.

The key difference comes from the choices available to each farmer. Farmers choose both which crop to grow and which exporter to sell to. These choices are related, as switching exporters for the same crop is easier than switching to a different crop. Under Cournot competition among exporters, the supply elasticity ε_{irs} has the closed form

$$\frac{1}{\varepsilon_{irs}} \;=\; \big(1 - \sigma_{irs}\big)\frac{1}{\eta} \;+\; \sigma_{irs}\,\frac{1}{\vartheta} \tag{9}$$

Thus, the elasticity depends on both: substitution across crops, ϑ, and across exporters, η, weighted by the exporter's share within a crop σ_{irs}. The harder it is for farmers to switch, the more exporters mark farm-gate prices down from the international prices they receive, and the more steeply those prices fall with exporter size – which is what the descriptive evidence shows.

By matching the pass-through of international price shocks to farm-gate prices, Zavala (2026)

[6] In this setting the exporters compete crop by crop, so r indexes crops.

estimates that both elasticities are small, implying high switching costs and substantial exporter power. Across products as diverse as bananas and shrimp, farmers receive only two thirds of their marginal revenue product. Yet a counterfactual analysis shows that certification schemes such as Fair Trade can raise farmer incomes by roughly 14% while avoiding the distortions an equivalently effective price floor would create.

Together with the evidence from Kenya, these results show that buyer power can arise in very different settings and can be identified using different approaches. More importantly, buyer power appears to depend on farmers' limited ability to switch between buyers, rather than simply on the number of buyers in the market.

3.2 Oligopsony Power and Allocative Efficiency

While Bergquist and Dinerstein (2020) and Zavala (2026) provide compelling evidence that buyer power depresses pass-through and redistributes surplus, their framework focuses on prices and margins, rather than production efficiency. It is however conceivable that buyer power also distorts the allocation of resources across producers and firms, thereby generating productivity losses in addition to distributional effects. Rubens (2023) tackles this question in an ingenious study of ownership consolidation in the Chinese tobacco industry. Like many other agricultural chains, the industry is characterised by atomistic farmers who sell to concentrated processors (who then, less typical but certainly not unique to this environment, sell to a state-owned downstream wholesaler). The study exploits a large-scale policy intervention as a "natural experiment" to identify how changes in buyer concentration affect allocative efficiency and income distribution. In 2002 the government introduced the Ownership Consolidation Policy, intended to foster scale economies through mergers of cigarette manufacturers and the exit of smaller, less efficient ones. The policy, however, had the unintended consequence of also sharply increasing concentration in upstream tobacco leaf markets.

In terms of the general framework, the setting can be described by two main channels: price setting **(C4)** and downstream demand **(C5)**. Price setting **(C4)** takes an unusual and analytically convenient form, since manufacturers occupy opposite positions on either side of their operation: they take downstream prices as given from the state-owned wholesaler, which sets factory-gate cigarette prices unilaterally, while retaining market power when buying leaf from farmers. Downstream demand **(C5)** is therefore pinned down institutionally rather than estimated, and this asymmetry is what allows the upstream and downstream wedges to be separated by design rather than by assumption. Local leaf markets are isolated by a prohibition on transporting leaf across them, and are highly concentrated but not monopsonised, so the relevant wedge is the oligopsony markdown ψ_{irs} rather than its monopsony limit. Market structure is not a channel here but the treatment: the consolidation policy reduces the number of manufacturers N_r from outside the industry, and the transport prohibition allows leaf markets to be partitioned into treated and control groups.

Rubens (2023) focuses on the markdown, which measures the gap between the marginal revenue product of tobacco leaf and the price paid to farmers. Under a monopsony scenario, this gap takes the form given in the wedge equation of the general framework: the markdown equals one plus

the inverse of the elasticity of input supply. If the manufacturer takes the leaf price as given, the markdown equals one and farmers are paid their marginal contribution to production. If instead buying more leaf raises its price, the manufacturer has an incentive to buy less and keep the price lower, and the markdown is greater than one. Its size therefore depends on how readily farmers can sell elsewhere.

The estimates indicate substantial oligopsony power even before the reform: farmers are paid merely half the marginal revenue product of leaf, a level the paper attributes to the spatial segmentation of leaf markets and the mobility frictions farmers face. Consolidation made the situation considerably worse. Rubens (2023) shows that manufacturers' markdowns increased by 37% (i.e. manufacturers exert great oligopsony power) post consolidation, while their productivity fell by 5%.

By jointly identifying buyer markdowns and productivity, Rubens (2023) complements earlier pass-through–based evidence by showing that buyer power in agricultural input markets affects not only prices and surplus allocation but also the efficiency of production. Consolidation leads to a reallocation of production towards lower-productivity firms, reducing aggregate productivity by 42% despite the policy's stated goal of efficiency gains. In other words, the modest gains from scale economies in manufacturing were not sufficient to compensate for the significant distortions arising from higher market power. At the regional level, output declines in more concentrated markets, indicating that buyer power distorts not only prices but also production decisions. Buyer power thus emerges as a source of both inefficiency and inequality in agricultural markets, generating substantial misallocation and amplifying welfare losses well beyond those captured by price distortions alone.

3.3 Market Power and the Environment

Buyers' market power can reshape the effects of policies aimed at curbing environmental externalities. Dominguez-Iino (2026) tackles this question in the context of South American agriculture, where production expansion is closely linked to deforestation and emissions, and where concentrated intermediaries mediate farmers' access to downstream markets. Emissions are generated at the atomistic end of the chain, by the millions of farmers who decide how much land to clear and what to grow on it, whereas environmental policy is far easier to implement and enforce at the concentrated end. A tax levied downstream must therefore travel upstream to reach the decisions it is meant to correct, and the question is how much of it survives the journey.

In terms of the general framework, his setting can be described by three channels: discrete choice farmer supply **(C1)**, price setting **(C4)**, and downstream demand **(C5)**. Farmers do not perceive intermediaries as differentiated buyers, and all firms in a county pay the same farm-gate price, so the choice is not over whom to sell to but over what to produce and whether to produce at all: a nested discrete choice problem in which farmers first decide whether to convert land from its natural state and then which commodity to grow on it (**(C1)**). The resulting supply elasticity is a market-level object rather than a firm-specific residual one, and it varies spatially, since producers near the forest frontier face higher adjustment costs and weaker input access. Price setting **(C4)** follows the same configuration as in Zavala (2026): intermediaries exercise oligopsony power upstream while

taking the downstream price as given. Downstream demand **(C5)** is the multilevel demand system of the framework: consumers substitute across commodities, across source countries, and across producing regions within a country, and it is this system that determines the price intermediaries receive and hence the marginal revenue product they pass back upstream.

The empirical results reveal a positive spatial correlation between buyer power and environmental externalities: regions with more concentrated intermediaries exhibit both lower supply elasticities and higher deforestation intensity. This interaction implies that standard downstream policies, such as uniform taxes, are poorly targeted when market power attenuates the transmission of incentives upstream. Counterfactual policy simulations illustrate a trade-off between enforceability and targeting: upstream instruments are more effective but costly to implement, while downstream tools scale more easily but lose precision in the presence of buyer power. These findings highlight that monopsony power not only redistributes surplus but also shapes how environmental policies propagate along the value chain, reinforcing the importance of understanding where power lies and how it is exercised.

A related interaction between market power and the environment operates through the response to environmental shocks themselves. Jayant (2026) studies the water-intensive Indian sugar industry, where recurrent droughts contract cane supply and, in doing so, reshape the market structure that farmers face. Using mill-level panel data on the universe of Indian sugar mills, Jayant (2026) documents that droughts raise market concentration persistently through the exit of least productive mills, and that their cane farmers reallocate to nearby survivors. Because cane is bulky and perishable, sourcing markets are spatially segmented, so this reallocation is a local phenomenon – a drought effectively hands surviving mills a larger, more concentrated catchment.

The environmental dimension lies in how this drought-induced consolidation is distributed along the chain. Surviving mills raise their productivity and improve cane management, allowing them to achieve higher sugar recovery. Yet farm-gate cane prices do not rise despite these productivity gains, consistent with the widening of oligopsony markdowns as local buyer concentration increases. A climate shock, mediated by buyer power, redistributes surplus away from farmers even as productivity improves. As in Dominguez-Iino (2026), this underscores that the welfare consequences of environmental shocks, like those of environmental policies, cannot be assessed independently of the market structure through which they propagate.

Taken together, the studies reviewed in this section provide robust evidence that agricultural markets are frequently characterized by substantial buyer power, and that this has significant implications for i) how surplus is distributed along the chain, ii) misallocation of agricultural inputs and distortions in production decisions, and iii) the effect of policies that are often designed directly targeting an externality, without much thought given to market structure. Methodologically, these studies also illustrate the benefits of deploying tools from modern empirical industrial organisation, ideally in combination with more reduced-form empirical techniques. These tools allow us to map empirical patterns in the data to theoretically micro-founded notions of efficiency and welfare, and also to evaluate existing or potential policies through the lens of counterfactual analysis.

4 Market Power Across Multiple Stages of Agricultural Chains

The previous section establishes buyer power as an important distortion at the farm gate, but largely abstracts from market power at other stages of the value chain. When market power is present across multiple stages, vertical interactions can either reinforce or reduce these distortions. As a result, policies targeting one stage may affect prices or efficiency elsewhere in the chain. For example, minimum farm-gate prices may raise farmer prices but also reduce buyer entry, while restrictions on buyer investments may limit upstream market power at the cost of operational efficiency or downstream rent-sharing.

Leone et al. (2025) develop a framework to study these forces together with a focus on the Costa Rican coffee chain. The setting consists of farmers, mills, and exporters, and its regulated structure allows the authors to study how regulation affects competition, bargaining, and farmer welfare. Coffee cherries must be delivered to a mill within hours of harvest, creating local sourcing markets in which farmers can sell only to a limited number of nearby mills. Mills process cherries into parchment coffee and sell it to exporters through spot or forward contracts. The sector is regulated by ICAFE (*Instituto del Café de Costa Rica*) through the *Sistema de Liquidación Final*, a revenue-sharing rule that links farmers' final payments to mills' realized downstream revenues and audited processing costs, limiting the share of value that mills can retain.

In terms of the general framework, the supply side is standard: farmers choose among differentiated mills **(C1)**, following the differentiated-product framework (Berry, 1994), with mill–district effects capturing the non-price terms that accompany the price. Price setting **(C4)** takes an administered form, since the revenue-sharing rule replaces the mill's FOC in determining what farmers finally receive. The main contribution, however, lies in two extensions that the framework does not contain. Mill sourcing is modelled as a two-stage entry game (Eizenberg, 2014), so that the number of mills serving a district is an outcome rather than a primitive; and prices between mills and exporters are bargained bilaterally rather than posted. Both are needed here because they address how a regulation propagates through a chain in which market structure and terms of trade adjust together.

Consider bargaining first. Each mill–exporter pair negotiates a forward price taking all other agreements as given, an arrangement known as Nash-in-Nash bargaining (Collard-Wexler et al., 2019; Horn & Wolinsky, 1988). Letting c_{is} for mill i's constant marginal cost of processing, P^w_{es} for the world price facing exporter e, Π for profits and Π^D for the profits each party earns if the pair fails to agree, the negotiated price solves

$$\max_{P_{ies} \in [c_{is},\, P^w_{es}]} \left(\Pi_{is} - \Pi^D_{is}\right)^{\lambda_{ies}} \left(\Pi_{es} - \Pi^D_{es}\right)^{1-\lambda_{ies}} \tag{10}$$

where $\lambda_{ies} \in [0, 1]$ is the mill's bargaining power, allowed to vary by pair and season. The spot market supplies a natural disagreement point on both sides. A mill that fails to agree sells the quantity on the spot market at zero expected profit, so its outside option retains only the profits

earned on its *other* forward relationships,

$$\Pi_{is}^{D} \;=\; \tau_s \sum_{e' \in \mathcal{E}_{is} \setminus \{e\}} \big(P_{ie's} - c_{is}\big) q_{ie's} \;-\; \sum_{r \in \mathcal{A}_{is}} K_{irs} \tag{11}$$

where $\mathcal{E}_{is}$ is the set of exporters mill i trades with, $\mathcal{A}_{is}$ the set of districts it sources from, K_{irs} the fixed cost of sourcing from district r, and τ_s the fraction of downstream value the revenue-sharing rule permits mills to retain. The mill's surplus from the marginal relationship is therefore $\tau_s(P_{ies} - c_{is})q_{ies}$, and the exporter's surplus is the margin over the world price net of its cost of bearing forward risk. Together, these two conditions connect the different stages of the value chain. Because each party has several trading relationships, a regulation that changes the terms of one contract also affects outside options in other relationships, and these changes then influence the prices ultimately received by farmers.

Finally, mills choose their sourcing districts before the season, and equilibrium requires that no mill wishes to add or drop one. A district the mill already serves must generate enough expected profit to cover K_{irs}, while a district it does not serve must not: comparing observed choices against these two conditions places an upper bound on the fixed cost of every district served and a lower bound on every district left out, following Eizenberg (2014). As a result, market structure is not fixed: a policy that reduces mill margins also changes the incentives to enter a district and, therefore, which districts are served.

Leone et al. (2025) find that bargaining power is substantial and highly dispersed, and private non-integrated mills negotiate better terms than cooperatives or integrated mills. Because bargaining power correlates with the mill–district effects that drive farmers' choices, downstream negotiating strength feeds back into upstream market shares and farmer surplus. Non-price factors are also important: farmers place substantial value on differences across mills and districts, sometimes even more than on higher prices.

Leone et al. (2025) evaluate two counterfactual policies to illustrate how market power and contracting interact across stages of the chain. First, tightening the revenue-sharing rule to pass more downstream value to farmers raises farm-gate prices and farmer welfare on average, but the gains are uneven. Moreover, in remote or thin markets, reduced mill profitability leads to less sourcing and weaker competition, leaving some farmers worse off precisely where their outside options are weak. Second, banning vertical integration raises farm-gate prices by fostering entry and competition among independent mills, but it reduces the non-price services, such as credit and advances, provided by integrated mills that many farmers value highly. As a result, most farmers experience welfare losses despite higher prices. Both results underscore that welfare in agricultural value chains depends on the full bundle of contractual terms, not on prices alone.

In the Costa Rica setting, contracts are bilateral: they link two actors in adjacent stages of the chain, so the mill–farmer contract is not strategically tied to the mill–exporter contract (and vice versa). This need not hold in practice: contracts between two stages could include provisions about terms, including prices, at different stages. We now review a recent study that illustrates this logic, its rationale and effects, taking a prominent buyer-driven quality upgrading program as an example

5 Contracting across Stages: Bilateral Market Power & Vertical Restraints

So far, we have studied market power using frameworks that often treat one side of the market as atomistic (e.g., many farmers facing a few buyers). While these approaches are essential for documenting buyer power at the farm-gate, many transactions in agricultural value chains are *business-to-business*: mills negotiate with exporters, exporters negotiate with multinational buyers, and terms often bundle prices with services, delivery commitments, quality requirements, and risk-sharing. In these environments, outcomes are shaped not only by market structure, but also by *vertical contracting*: who contracts with whom, what is negotiated, and what can credibly be promised when formal enforcement is weak.

5.1 Buyer and Seller Power in Vertical Relationships

A central challenge for policy is that "more buyer power" does not have a universal welfare interpretation. In some settings, stronger buyers can discipline upstream markups and reduce double marginalization. In others, stronger buyers can exacerbate distortions by depressing input prices and reducing output.[7] Demirer and Rubens (2025) provide a unified bargaining framework that makes this distinction sharp and offer an empirical approach to quantify the contribution of buyer and seller power to the welfare losses from market power.

They argue that the ambiguity is not a matter of taste in modelling but a genuine feature of the environment: where upstream marginal costs are increasing and downstream marginal revenue decreasing – the standard case in agricultural processing – an equilibrium exists under *both* forms of conduct. This contrasts with the two settings in which the literature usually works: the constant-marginal-cost case assumed in most empirical industrial organisation, where only seller-side distortions are possible, and the perfectly-elastic-demand case of most labour monopsony models, where only buyer-side distortions are.

In terms of the general framework, the paper is concerned exclusively with price setting **(C4)**: there is a single upstream seller and a single downstream buyer. The framework distinguishes three ways in which price-setting power may be allocated at a link, but takes as given that once a price is determined, one side of the market pins down the quantity traded. Demirer and Rubens (2025) treat that step as an object to be identified rather than assumed, and show what turns on it.

The two parties (i, e) bargain over a linear input price P_{ies}, taking all other agreements as given. Defining Π for profits, Π^D for the profits each party earns if the pair fails to agree, and $\lambda^e_{ies} \in [0, 1]$ for the downstream buyer's bargaining weight, the price solves

$$\max_{P_{ies}} \Big(\Pi_{es}\big(P_{ies}, q_{ies}\big) - \Pi^D_{es}\Big)^{\lambda^e_{ies}} \Big(\Pi_{is}\big(P_{ies}, q_{ies}\big) - \Pi^D_{is}\Big)^{1-\lambda^e_{ies}} \tag{12}$$

which is the same Nash-in-Nash bargaining framework used by Leone et al. (2025), now considered from the buyer's side. Buyer power depends on two separate elements: the buyer's bargaining

[7] We use the term "double marginalization" whenever we see at the same time a buyer with market power upstream setting an input price below marginal value, and the same buyer fixing a final price downstream.

weight, λ^e_{ies}, which is assumed to be policy-invariant, and the parties' disagreement payoffs, Π^D. Bargaining determines the price, while quantity depends on vertical conduct. Under *monopolistic* conduct, the negotiated price equals the buyer's marginal revenue and equilibrium lies on the input demand curve. Under *monopsonistic* conduct, it equals the seller's marginal cost and equilibrium lies on the input supply curve.

This distinction changes the welfare effect of buyer power. Under monopolistic conduct, greater buyer bargaining power increases output by reducing double marginalisation. Under monopsonistic conduct, it reduces output because the downstream firm both marks up its output price and marks down its input price. Similar observed outcomes can therefore arise from different forms of vertical conduct.

Demirer and Rubens (2025) show that there is a unique interior bargaining weight: the bilaterally-efficient weight λ^*, at which the pair attains joint-profit maximisation, and that whether observed conduct is monopolistic or monopsonistic depends on how λ^e_{ies} compares with it. Because λ^* is a function of the slopes of the upstream cost and downstream demand curves alone, the criterion requires neither estimating a bargaining model nor imposing functional forms: more elastic upstream costs widen the scope for monopsony distortions, while more inelastic downstream demand widens the scope for monopoly distortions.

Demirer and Rubens (2025) apply the framework to coal procurement by Texas power plants and decomposes observed inefficiencies into monopoly and monopsony components. They find substantial buyer bargaining power, but for most buyer-seller pairs, estimated buyer power remains below the "efficient" level implied by primitives, so vertical conduct is predominantly monopolistic. Buyer power mostly offsets seller power rather than amplifying distortions. Quantitatively, they estimate that the majority of welfare distortions in this setting are attributable to seller-side market power, with the remainder due to monopsony distortions. The policy implication is direct: the welfare consequences of changes in buyer power (e.g., through mergers) cannot be assessed without accounting for demand and cost elasticities that govern which vertical distortion is operative. Implementing this empirical framework in the context of agricultural chains would be extremely valuable.

An agricultural setting provides indirect evidence on the role of intermediaries. Emran et al. (2016) study Bangladesh's ban in 2011 on Delivery Order traders in the edible oils market, which replaced these traders with dealers appointed by downstream refiners. Using wheat as a comparison, they find that the reform increased domestic prices and marketing margins and reduced the pass-through of international prices. These results are inconsistent with intermediaries simply exercising market power without adding value. Instead, they suggest that intermediaries helped wholesalers overcome credit constraints. The main lesson is that intermediaries can either create additional market-power distortions or provide valuable services. Distinguishing between these roles is important because removing intermediaries can otherwise create unintended consequences.

5.2 Vertical Restraints: An Application to Quality Upgrading

Moving farmers into higher-quality markets is often seen as a way to raise rural incomes. This requires two conditions: quality must generate enough additional value to cover its cost, and

some of this value must reach farmers. Macchiavello et al. (2026) study these conditions in the Colombian coffee sector, where coffee moves from farmers and cooperatives to exporters and then to international buyers. Because quality contracts are difficult to enforce, farmers face a potential hold-up problem[8]. They must invest in quality before receiving a premium, while exporters may choose not to pay the promised premium after delivery. Anticipating this risk, farmers may choose not to invest in quality[9].

In terms of the general framework, the study can be described by sunk investment **(C2)**, price setting **(C4)**, and downstream demand **(C5)**. Sunk investment **(C2)** is the central channel: farmers must commit to quality before any premium is paid, so market power here determines not only how surplus is divided but whether it is created at all. Price setting **(C4)** enters at both links, since the international buyer can specify the terms the exporter must pass through to farmers rather than leaving that decision to the exporter. Downstream demand **(C5)** matters because the whole mechanism depends on a buyer whose willingness to pay for quality exceeds the rest of the market's. The farmer side is deliberately simple, with no choice among buyers, because the binding constraint is not where farmers sell but whether anyone can credibly commit to paying them for quality.

Let p^L be the standard farm-gate price, c^L the standard unit cost, and π the farm-gate quality premium, so that upgraded coffee earns $p^H = (1+\pi)p^L$ at extra variable cost γc^L. Farmer j with scale Q_j upgrades when

$$F_j \;\le\; \big(\pi p^L - \gamma c^L\big)Q_j \tag{13}$$

That is, farmers with lower fixed costs or larger production are more likely to adopt quality. Aggregating these decisions across farmers gives the total supply of high-quality coffee as a function of the premium. The exporter receives an export premium η^W and keeps a share $(1-\tau)$ of this value. It chooses the premium π paid to farmers to maximise profits. As a result, the premium paid to farmers is below the value that quality generates for the exporter, so the export premium is only partially passed through.

Without enforcement, even this partial pass-through may not be credible. Once the exporter has received the beans, it has an incentive not to pay the promised premium. The promise can be sustained only if the value of maintaining the trading relationship is greater than the short-term gain from not paying the premium:

$$\mathcal{V}\big(\eta^W, \pi\big) \;\ge\; \big(1-\tau\big)\pi\, p^L \tag{14}$$

where $\mathcal{V}$ is the per-unit value of continuing the relationship along the equilibrium path. Equation

[8]The importance of making quality verifiable also appears in staple markets. Miguel (2024) studies Ethiopian wheat markets and finds that prices reward observable quality attributes but not less observable ones. Less observable quality is rewarded only when other actors, such as millers or cooperatives, are present in the value chain. In contrast, observable quality receives higher rewards when farmers have access to more competing traders. Competition therefore helps reward observable quality, while less observable quality requires institutions that can support credible agreements.

[9]A large literature examines why such investments are not made focusing on constraint in credit, insurance and extension (Suri & Udry, 2022). Here the mechanism is different and complementary: even a farmer facing none of these restrictions does not invest if the premium cannot be credibly promised.

(14) captures how the agreement is sustained between the parties, an idea we develop later. For plausible parameter values, however, this condition does not hold. The exporter cannot credibly promise a premium large enough to induce farmers to upgrade in equation (13), and therefore no upgrading takes place.

Macchiavello et al. (2026)'s main contribution is to show how a third party can relax the constraint in equation (14). A buyer that values quality highly cannot solve the problem simply by paying the exporter a higher premium, since the exporter may not pass it on to farmers. Instead, the buyer can use a vertical restraint (Rey & Tirole, 1986) that jointly sets the export and farm-gate premiums, (η^R, π^R). This ensures that part of the premium reaches farmers and strengthens enforcement, since an exporter that reneges risks losing both future farmer supply and the buyer's premium. This can make quality upgrading possible.

Evidence from two Colombian exporters supports this mechanism. The first operates in the conventional market, where margins increase with quality but farmers receive no additional payment above the minimum exportable grade. The downstream quality premium is therefore not passed on to farmers, giving them little incentive to invest in quality even when the additional cost is below the international premium. This is consistent with the hold-up problem described above.

The second exporter participated in a programme with a large international buyer that provided training and inputs, required quality-management practices, and paid a premium for top-grade parchment. Using the programme's rollout across two southern regions, Macchiavello et al. (2026) combine exporter records with administrative data on Colombian farms in a difference-in-differences design. They find that farmers received the premium, supplied more top-grade parchment, and increased long-term quality investments. These effects were stronger among larger and better-managed farms, as predicted by equation (13).

A calibrated dynamic discrete-choice model reproduces these patterns and shows the importance of the vertical restraint. Under prevailing market conditions, exporters could not have credibly offered these premiums without it. Overall, the programme increased surplus along the value chain by 8–18%, with farmers receiving 36–62% of these gains.

Two conclusions follow, and they sit uneasily together. Quality upgrading can indeed raise farmer incomes substantially, so the practitioners' premise is not wrong. But the evidence from the first exporter suggests it is unlikely to happen under ordinary market conditions, absent either enforceable quality contracts or a large buyer willing to pay for reliable quality and able to restrain the exporter.

Vertical restraints are not the only response to unverifiable input quality. Firms can instead integrate their suppliers. Hansman et al. (2020) study this response among Peruvian fish meal manufacturers. Fish meal has high- and low-quality grades, and the price premium for quality varies for reasons outside Peru. Using fishing quotas in other producing countries to instrument for this premium, the authors find that manufacturers are more likely to integrate suppliers when the value of quality rises, especially when they have greater potential to upgrade. After integration, suppliers change their behaviour to preserve quality, but only when supplying their owner, suggesting that the effect comes from integration rather than knowledge transfer. Shocks that increase a firm's reliance on integrated suppliers also raise its production of high-quality fish meal.

Along with Macchiavello et al. (2026), the study shows two solutions to the same contracting problem. In Colombia, vertical restraints make quality premiums credible, while in Peru, firms integrate suppliers. Repeated relationships with independent suppliers support reliable supply but not higher quality, suggesting that relational contracting and vertical integration solve different problems: the former supports supply, while the latter supports quality.

6 Relational Contracting in Agricultural Value Chains

Contracting problems are common in agricultural value chains. Transactions between small farmers and buyers are often informal and too small to justify the costs of formal enforcement. Similar problems arise downstream, where intermediaries trade with larger buyers under imperfect information and limited enforcement. These constraints are particularly important in developing countries, where formal institutions are weaker and relationships often substitute for missing credit and insurance markets.

As a result, relational contracts and other forms of vertical coordination play an important role in agricultural markets. These relationships can support trade and investment, but they can also limit competition and affect market structure. This section extends our framework to include limited enforcement and then reviews evidence on the value of relationships and their effects on trade. Then we examine how relational contracts interact with formal contracts and market structure, and how these relationships can be built. Finally, we review how these contracts relate to goals for sustainability.

6.1 Conceptual Framework of Relationships and Relational Contracting

Our framework deliberately left one feature of the environment unspecified. Currently, it is a stage game played each season, and the terms ξ_{is} that intermediaries offer farmers in the farmer's choice problem include services – advances repaid at harvest, input loans settled after delivery, second payments made once the crop is sold on – that are not exchanged at the moment of sale. Whether such terms can be offered at all depends on whether the promises embedded in them are honoured, which the stage game alone cannot determine. We now close the framework by adding that channel.

(C6) Enforcement. Suppose no promise is enforceable by a third party. A relational contract between intermediary i and farmer j is then a plan mapping histories into terms, sustained by the parties' reversion to their outside options after any deviation. Let V_{ijs} be the present value of the surplus the relationship generates over and above those outside options, and Δ_{ijs} the one-off gain from reneging on the promise – side-selling the crop, withholding a second payment, declining to pay a premium agreed before the investment was made.[10] With the effective discount factor $\delta = \beta\chi$, the plan is sustainable only if

$$\frac{\delta}{1-\delta} V_{ijs} \quad \geq \quad \Delta_{ijs} \tag{15}$$

Equation (15) is the dynamic incentive compatibility constraint (DICC). Models of relational

[10] We suppress the market index r throughout this section, since each farmer belongs to a single market.

contracting differ in their information structure, payoffs, and equilibrium concept, but some version of it underpins essentially all of them: cooperation survives only where the future value of the relationship outweighs the immediate gain from abandoning it. It applies at any link in the chain, between a farmer and an intermediary or between an intermediary and its downstream buyer, and to either party.

What makes the DICC more than a restatement of a familiar condition is that neither of its sides is a free parameter: both are outputs of the stage game already specified. The temptation Δ_{ijs} is governed by the best alternative available to whoever contemplates deviating, and that alternative is exactly what the discrete choice in the farmer's choice problem and the supply elasticity determine, so that a farmer with more accessible buyers, or a better spot market, gains more from reneging. The value V_{ijs} is governed by the rents the pair jointly earns in excess of those alternatives, which is what the wedge ψ_{irs} determines. Explicitly,

$$V_{ijs} = V\big(\psi_{irs},\, \varepsilon_{irs},\, N_r\big), \qquad \Delta_{ijs} = \Delta\big(\varepsilon_{irs},\, N_r,\, p_{irs},\, \xi_{is},\, \zeta_s\big) \tag{16}$$

Two implications organise the rest of this section. The first is that the framework now closes as a fixed point rather than a sequence. The set of terms an intermediary can credibly offer,

$$\Xi_{is} \;=\; \big\{\, \xi_{is} \;:\; \text{DICC} \;\; \text{holds for all } j \text{ served by } i \,\big\} \tag{17}$$

depends on rents, yet ξ_{is} itself enters farmer utility in the farmer's choice problem, hence market shares and the supply elasticity, hence those same rents. Market power and enforcement are jointly determined, and the interlinked transactions characteristic of these chains are precisely the ξ_{is} that a one-shot market cannot support.

The second implication is that competition acts on the DICC through two effects of the same sign. Improving farmers' alternatives raises Δ_{ijs} directly, and compresses the wedge and hence lowers V_{ijs} indirectly. Both tighten the constraint, so Ξ_{is} shrinks. Combined with the static result that competition raises the farm-gate price, the welfare effect on farmers is ambiguous: they value price and services alike, and the two move in opposite directions.

Taking the DICC to data poses two difficulties beyond the standard problems of contract data (Andre & Salanie, 2003). Relational contracts are informal and context-specific, so records are scarce. More fundamentally, observed data describe behaviour on the equilibrium path, whereas Δ_{ijs} and the punishment that supports V_{ijs} are off-path objects, and it is those that determine whether the constraint binds. The next studies make progress by finding settings in which the outside option is observable, so that the temptation can be measured and the value of the relationship inferred from the constraint itself.

6.2 The Value of Relationships

A central difficulty in taking the DICC to the data is that neither the temptation to deviate nor the value of continuing the relationship is directly observed. The former depends on off-equilibrium payoffs from default, while the latter depends on discounting and beliefs about future behavior (Macchiavello, 2022). The empirical challenge is therefore to find settings where observable outside

options can proxy for the temptation to deviate and use the DICC to bound relationship value.

Macchiavello and Morjaria (2015) provide such a setting using Kenyan rose exports during 2004–2008, a period of socio-political turbulence and weak contract enforcement. Producers sell either directly to foreign buyers through relational contracts or through auctions in the Netherlands. In terms of our framework, the setting can be described by enforcement **(C6)**, operating at the intermediary–buyer link rather than at the farm gate. What makes it informative is that the auction provides an observable outside option: when auction prices rise, producers have a stronger incentive to divert roses away from their regular buyers. If deliveries continue nonetheless, the self-enforcement condition implies that the relationship must be worth at least the foregone gain – so the temptation to renege, which is ordinarily an off-path object and therefore unobservable, becomes measurable, and the value of the relationship can be bounded from below.

Both parties must prefer to maintain the relationship. Let W_{es} and W_{is} denote the buyer's and seller's continuation values, W^O their respective outside options, P_s the relational price, $\bar{P}_s$ the auction price, and $\underline{q_s}$ the committed quantity. Their enforcement constraints are

$$\delta\big(W_{e,s+1} - W^O_{e,s+1}\big) \geq P_s \underline{q_s}, \qquad \delta\big(W_{i,s+1} - W^O_{i,s+1}\big) \geq (\bar{P}_s - P_s)\underline{q_s} \tag{18}$$

Adding the two constraints eliminates the relational price and gives

$$\delta S^R_{s+1} \geq \bar{P}_s \underline{q_s} \tag{19}$$

where S^R_{s+1} is the total continuation value of the relationship net of outside options, corresponding to V_{ijs} in equation (16). Because the auction price and committed quantity are observed, equation (19) provides a lower bound on relationship value.

The study also shows that relationship value changes with age as buyers learn about sellers' reliability. Older relationships can therefore support larger volumes and more demanding terms. Consistent with the model, enforcement becomes particularly important when outside options are attractive, such as before Valentine's Day, when auction prices are high. During the post-election violence, deliveries follow an inverted-U pattern with relationship age: young relationships have little reputation to protect, while very old relationships have little new information to gain from another successful delivery. Intermediate-age relationships therefore make the greatest effort to maintain trade.

Two lessons follow. First, relational contracts can sustain substantial trade when formal enforcement is limited, and observable outside options can be used to bound their value. Second, limited enforcement affects not only the distribution of surplus but also the volume of trade, since weak relationships may prevent otherwise profitable transactions.

Similarly, Antras and Foley (2015) study how financing terms support trade when enforcement is weak. Using transaction data from a U.S. poultry processor exporting to many destinations, they compare cash-in-advance versus open-account terms. The processor is more likely to require cash-in-advance in weaker institutional environments, but relationship duration relaxes this constraint: as the relationship ages, the processor becomes more willing to ship on open-account terms. During crises, financing terms shape trade contractions: buyers transacting under cash-in-advance

reduce purchases the most. The main lesson is that relationships can substitute for weak formal enforcement by expanding the feasible set of contract terms.

Contractual defaults are typically not directly observed in the data. Using the rose example: if a seller does not deliver roses to a regular buyer, is it a default or is it that parties agreed to cancel the order? And, if it is a default, was it caused by force majeure, or was it strategic, in the sense that the seller deliberately decided to default even when contractual performance was feasible? Empirically distinguishing these scenarios is potentially important but challenging. Rewards from such a test potentially include quantifying departures from the theoretical implication that parties stick to on-the-equilibrium path behavior, ability to design better risk assessment tools, and a more nuanced understanding of welfare implications. The main challenges are that defaults are rarely observed in the data and, when they are, their underlying motives are difficult to tease out. Blouin and Macchiavello (2019) build on the DICC empirical framework to test for, and quantitatively assess the importance of, strategic default. The intuition builds upon a key insight in the theoretical literature on contracts: strategic default occurs when market conditions change sufficiently to place a business relationship outside its self-enforcing range (see Klein (1996); Hart (2009)). This suggests that large, unanticipated shocks to market conditions can be used to test for strategic default.

The context is forward sales contracts in the international coffee market, in which exporters promise to deliver certain volumes of coffee several months in advance. In these arrangements, parties face a trade-off between price risk and counterparty risk. Parties could fix the price in advance: This provides price stability, but should market conditions change between the signing and the delivery date, either party on the deal would potentially gain from a default. Parties could instead sign a price-indexed contract in which the final price tracks market conditions. Blouin and Macchiavello (2019) construct a contract-specific measure of price surprise and show that positive price surprises are associated with a higher likelihood of default. Their estimates reveal that around half of the observed defaults in the data are strategic. A structural exercise based on the DICC suggests that the possibility of strategic default imposes large costs on weaker business relationships and causes sizeable distortions in the market. [11]

Extending this logic to a different setting, Rubens and Silveira (2026) show how observed payment wedges can reflect both market power and dynamic incentives. Studying U.S. public accounting firms, they find that junior workers are paid below their contemporaneous marginal revenue product in exchange for higher future compensation. The arrangement is sustained by the value of future rents, since shirking risks forfeiting this backloaded premium.

The same logic applies to agricultural value chains. A wedge between what a farmer is paid and what they contribute does not necessarily measure buyer power; it may partly reflect the intertemporal structure of a relational contract. For example, farmers may accept lower current prices in exchange for future credit, inputs, reliable purchasing, or deferred payments. Rubens and Silveira (2026) provide an empirical approach for distinguishing these mechanisms by comparing the discounted stream of payments with the discounted stream of marginal contributions. Applied to agricultural markets, this approach could help separate genuine buyer power from wedges that

[11] Macchiavello and Miquel-Florensa (2018) apply the same test in the Costa Rica coffee market and argue that the possibility of strategic default is a driver of vertical integration because long-term relationships are constrained in the amounts of coffee they can trade forward without risking a strategic default.

support relational agreements.

Taking the DICC to the data provides a powerful lens to identify the nature of, and quantify the distortions associated with, contracting failures in specific contexts. Although the exact implementation ought to be rooted in the context under study, a few general lessons emerge: (a) measuring, or at least proxying for, temptations to deviate is crucial, (b) information on defaults and parties' expectations is also important, and (c) different types of shocks are useful to uncover different properties of the relationships.

The four papers reviewed above exploit administrative records of transactions between large, formal, firms. These data are becoming increasingly common, and we anticipate a flourishing literature. Empirical tests based on the DICC, however, can be applied borrowing from different methodological approaches. Observational studies that rely on administrative data have the advantage of drawing lessons from transactions that occur despite underlying contracting problems. They are less suitable to understand transactions that do not happen due to contracting problems. Yet knowing about such marginal transactions can be important to understand the likely impact of policies that could remove or attenuate contracting problems. This is an area in which randomized controlled trials (RCTs) can be particularly powerful.

For example, RCTs could evaluate the impact of subsidies that expand the set of existing trades [12]. Bubb et al. (2018) provide a vivid illustration of the approach by experimentally testing for limited enforcement in water transactions between neighbouring farmers in rural India. The authors implement subsidies to water transactions between neighbours, randomly varying the identity of the party that received the subsidy. In the absence of contracting problems, parties should be able to bargain over the surplus generated by the subsidy and the identity of the receiving party should not matter for whether or not the transaction takes place. In contrast, the authors find that subsidizing the seller leads to much more trade than subsidizing the buyer. Lack of contract enforcement causes significant output losses, despite the fact that neighboring farmers have plenty of opportunities to interact repeatedly and assuage, if not totally overcome, contracting problems.

Casaburi and Macchiavello (2019) provide another example in the context of Kenyan dairy farmers. Through a set of experimental designs conducted in partnership with a local dairy cooperative, they document that, owing to saving constraints, farmers have a significant demand for deferred, lumpy payments. Deferred lumpy payments require that farmers trust that buyers will not default on deferred promised payments for past deliveries. Through experiments, the study establishes that small, itinerant traders indeed lack the credibility to offer such delayed payments. As a result, farmers are paid significantly lower prices from the only buyer who can credibly offer the deferred payments (the local cooperative). The study illustrates how limited contract enforcement might create an entry barrier in the deferred payment market. Deploying structural techniques to estimate dynamic contracting problems and integrating them into counterfactual analysis for policy evaluation is a promising area for future work (see, e.g., Brugués, 2026 for a notable example).

[12] A further advantage is that the field surveys can be used to directly elicit expectations and contractual defaults.

6.3 Relational Contracting, Formal Contracts, and Markets

Relational contracts are especially present in markets that are geographically fragmented, small, and costly to serve, and where formal enforcement is weak. In such contexts, relationships can sustain trade by disciplining opportunism through repeated interaction. Yet the same mechanism implies that market structure matters: competition changes outside options, which can either strengthen or undermine relational enforcement. This subsection reviews evidence on how competition, formal contracting, and relational governance interact, and highlights implications for market power and welfare.

Macchiavello and Morjaria (2021) study how competition affects outcomes when formal contracts are hard to enforce and parties rely on relational contracts. The context is Rwanda's coffee chain, where farmers sell cherries to washing mills. These transactions involve more than spot exchange: mills may provide inputs or loans pre-harvest, farmers may sell on credit during harvest with a promise of a second payment, and mills must then honor post-harvest payments. Therefore, relationship is determinant for the success of trade. Weak enforcement creates two central deviations: farmers may side-sell at harvest, and mills may renege on post-harvest payments.

In terms of the general framework, the study can be described by discrete choice farmer supply **(C1)** and enforcement **(C6)**. Their pairing is what the question requires: to ask whether competition erodes relational contracts, one needs a setting in which the number of accessible buyers varies, farmers' outside options are measurable, and the relational terms ξ_{is} are observed rather than inferred. All three hold here. Farmers choose among nearby mills and can also process at home, mill placement generates variation in the number of buyers within reach, and the services that accompany the price – input provision and post-harvest payments – are recorded directly in a purpose-built survey rather than inferred from prices.

The model makes the dependence in equation (16) explicit. A farmer's outside option is to sell elsewhere or process at home, giving a per-unit value $u(P^h, \mathcal{C}_j)$ that is increasing in the price of home-processed coffee P^h and in $\mathcal{C}_j$, the number of competing mills within farmer j's reach. Substituting the optimal payment schedule into the two incentive constraints yields a single condition for a self-enforcing relational contract:

$$\frac{\delta}{1-\delta}\Big[\big(P_s - c_{is}\big)\big(1 + I_{is}\,\theta\big)q \;-\; \kappa I_{is}\Big] \;\geq\; u\big(P^h, \mathcal{C}_j\big)\, q\big(1 + (1-\delta)\,\theta I_{is}\big) \tag{20}$$

where $P_s - c_{is}$ is the mill's per-unit margin, q the quantity delivered, I_{is} an indicator for whether the mill provides inputs at cost κ, and θ the resulting productivity gain. Equation (20) is the DICC written for this setting: the left-hand side is the present value of the rents the relationship generates, the right-hand side the aggregate temptation to deviate.

The comparative static follows immediately and is the paper's central theoretical result. Because $u(P^h, \mathcal{C}_j)$ increases in $\mathcal{C}_j$, the minimum discount factor at which equation (20) holds is increasing in a farmer's exposure to competition. This is the direct effect identified in equation (16). An indirect effect compounds it: competition also reduces the volumes a mill processes and hence the rents on the left-hand side, so relationships may fail even with farmers who cannot themselves reach a competing mill. The predictions are therefore sharp: where competition rises, relational

practices should decline together, mills should process less at higher unit cost and lower quality, and the effect on farm-gate prices at harvest is ambiguous, since prices may rise even as the services accompanying them disappear.

Testing this requires variation in competition that is not itself a response to mill performance. The authors combine a survey measuring relational practices directly with an instrument built from an engineering model of where mills would optimally be sited given topography and hydrology. The results match the predictions. Relational practices decline where competition intensifies, mills process lower volumes, become less efficient and produce lower quality, and farmers do not gain: prices need not rise, and profits and welfare proxies fall after entry.

The implication runs against the usual reading of entry. Where enforcement is weak, competition can reduce welfare not by failing to discipline market power but by dismantling the relationships that made trade valuable in the first place, so that entry may be socially excessive even when it is privately profitable. It also shows why farm-gate prices are an unreliable welfare measure in these settings: the terms that disappear are precisely those that never appeared in the price.

In the same line, Bulte et al. (2024) study Ethiopian wheat markets and show that traders with market power may sustain relational contracts by providing inputs that improve quality (an "efficiency premium"). As competition intensifies, traders reduce input provision, quality falls, and relationships unravel as farmers shift toward spot markets.

In contrast, Ghani and Reed (2022) show that relationships can adapt rather than disappear. In Sierra Leone's ice market, increased competition changes which service is exchanged relationally: relationships move from assuring supply in scarcity toward providing trade credit, leveraging information within the relationship to sustain trade even as market conditions change.

Song and Ma (2024) find that relational contracts are more likely to form in thicker markets, pointing to a complementarity between informal contracts and the spot market. Their context is a wholesale cabbage market in Northern China that operates close to a competitive benchmark with many buyers and sellers, a homogeneous product, and on-the-spot payment. Yet relationships arise, and thickness is what makes them valuable. When more buyers compete for a given supply, the risk of being rationed rises, so a buyer facing a higher buyer-to-seller ratio is significantly more likely to enter a relational contract. These relationships carry a 2–3% premium over the spot price, which buffers relational traders against its volatility.

Casaburi and Reed (2020) experimentally subsidize traders in Sierra Leone's cocoa chain and find limited pass-through on prices but larger pass-through on credit provision. Emran et al. (2021) formalize this insight: when intermediaries provide both goods and credit, standard pass-through predictions can fail, and policy changes that alter market structure (e.g. bans on intermediaries) can have unintuitive price effects. These studies emphasize that competition and policy operate on multiple margins, not prices alone.

Finally, Michler and Wu (2020a) study groundwater irrigation contracts in Bangladesh, exploiting variation in village-level third-party enforcement. They find that when verifiable performance measures are available and violations are severe, relational and formal contracts act as substitutes. In weaker enforcement environments, however, formal contracts can complement relational agreements by providing a fallback position, illustrating that the relationship between contract forms

depends on what is verifiable and enforceable.

We conclude this section highlighting three important points. First, relational contracts are a powerful response to limited enforcement. The DICC provides a unifying lens: cooperation is sustained when the value of the relationship exceeds the temptation to deviate. Empirically, this logic can be made operational by looking at observable outside options (e.g. auction or world prices), predictable fluctuations, and shocks that shift temptations and reveal strategic default.

Second, relational contracts are not frictionless substitutes for formal contracting. They can be binding and costly: they constrain quantities, exclude marginal transactions, and may generate distortions when the DICC limits trade. At the same time, they can enable valuable services (credit, deferred payments, or input provision) and sustain quality upgrading where spot markets fail.

Third, relational contracting interacts tightly with market structure and can reshape the welfare interpretation of competition. When enforcement is weak, increased competition may undermine relational enforcement by strengthening outside options, reducing input provision, and lowering efficiency and quality—even if posted prices do not fall. In other settings, relationships adapt, reallocating relational capital toward different services such as trade credit, or acting as buyers' insurance when supply shocks ration products' supply. These findings imply that market power and relational contracting are inseparable: relationships can mitigate market power by sustaining investment and trade, but they can also segment markets, create entry barriers, and generate persistent surplus wedges.

6.4 Building Relational Contracts for Sustainability

Firms face growing pressure to improve traceability and environmental compliance, driven by regulations such as the EU Deforestation Regulation and the Carbon Border Adjustment Mechanism. These pressures bind hardest in chains that rely on smallholders, where adoption of sustainable practices is low and visibility along the chain limited. The evidence reviewed above implies that such initiatives depend on relational contracts, since traceability and costly investment both require farmers to trust commitments that no court will enforce, and that those relationships are fragile, threatened by competition and by the cost of reaching thousands of dispersed farmers. Abouaziza et al. (2026) partner with the largest coffee exporter in East Africa to ask whether relationships can be deliberately built, rather than merely observed where they happen to exist.

The study intervenes on **(C6)** directly. Unlike other studies in this section, here farmers' beliefs about whether the firm will honour its commitments are themselves the treatment, with market structure held fixed. In terms of equation (17), the intervention aims to expand the set of credible terms Ξ_{is} at unchanged ε_{irs} and N_r – acting on the enforcement margin directly, rather than on the market conditions that determine it.

The design has two stages. A "relationship building" module was embedded in the firm's routine agronomic training, with randomised variation in how farmers were invited to attend – by telephone call or by text message only – serving as an instrument for actual attendance. More than a year later, farmers were offered randomised contracts to adopt tree stumping, a costly investment that rejuvenates yield potential and helps trees adapt to changing weather, but which forgoes harvest for two seasons and is therefore rarely adopted without subsidy. One contract paid on verified

stumping immediately, as is standard in the industry; the other paid at harvest, when the income loss is actually felt, conditional on both stumping and delivery to the firm. The second is better targeted and cheaper per tree, but only works if farmers believe the firm will pay. The contrast between them therefore measures precisely what the DICC governs: adoption under the deferred contract requires the farmer to believe the promise, and the gap in take-up between the two schemes is a direct reading of how far the constraint binds.

The results are striking on that margin. The relationship-building session raised traceability – willingness to deliver to the firm, to communicate with it, and to take part in its activities – and improved farmers' assessment of the relationship on several measures. Most importantly, it closed the adoption gap between the deferred and immediate contracts entirely, so that the cheaper, better-targeted scheme performed as well as the standard one, raising cost-effectiveness per tree stumped.

The relationship also proved durable under strain. The training's effects on the firm's formal performance-tier system were large initially but faded within a couple of years amid payment delays and managerial turnover. Trained farmers responded to this underdelivery not by withdrawing but by complaining more, choosing voice over exit, which suggests the relationship survived the firm's lapses. Effects did not vary by gender, farm size or distance to the collection station, and no spillovers to untrained neighbours appear, consistent with clarity being established through direct individual communication rather than diffusing through social networks.

The findings also connect to a broader literature on the formation and consequences of business relationships. In a related setting, Nigam and Tan (2026) measure firm reliability – whether transactions are completed on time – using data covering formal firms in Rwanda. More reliable firms have larger interfirm sales, export more, trade more with exporters and multinationals, and are less affected by supply-chain disruptions. Importantly, firms become more reliable after they first trade with a multinational, and this improvement extends to transactions with other buyers. The results suggest that reliability, a component of ξ_{is}, can be measured directly and improved through relationships with demanding buyers. Alongside Abouaziza et al. (2026), they indicate that relationships do more than sustain individual transactions: they can change behaviour in ways that persist across trading partners.

At the same time, the fragility of such arrangements is worth emphasising. Ashraf et al. (2009) evaluate DrumNet, a Kenyan programme that combined credit, agronomic training, and a guaranteed marketing channel to help smallholders adopt export crops. The programme increased adoption and raised incomes substantially. However, the arrangement collapsed when the exporter purchasing the crop failed to meet European certification requirements and stopped buying. Farmers switched to other buyers and defaulted on their DrumNet loans. In terms of the DICC, the value sustaining the relationship depended on a single downstream buyer. When that buyer exited, the continuation value of the relationship collapsed, along with the obligations it supported. The episode illustrates that relational contracts can be powerful but also vulnerable, especially when they depend on a small number of critical links in the value chain.

The contribution is methodological as much as substantive: this is among the first randomised experiments designed to build relational contracts in a supply chain, rather than to document

them. Where the empirical literature has concentrated on what makes relational arrangements credible, this study shows that clarity about the arrangement is itself a lever, and a cheap one. It also speaks to the literature on agricultural extension, which has focused on relaxing information constraints about agronomic practice with mixed results, by showing that information about the relationship can raise take-up of sustainability programmes where information about the practice does not. More broadly, it demonstrates that the enforcement channel is not merely a constraint to be measured but one that firms and policy can act upon.

7 Conclusion

This paper reviews how market power and relational contracting jointly shape outcomes in agricultural value chains. Across the whole review, a consistent picture emerges: prices, quantities, quality and welfare in agriculture are not determined by market structure alone, but by the interaction of buyer power, bargaining, and the governance of trade through relational (informal) contracts.

Three main conclusions emerge. First, buyer power cannot be inferred from the number of buyers alone. The markdown wedge depends on intermediary conduct and farmers' supply elasticity. Evidence from Kenyan maize markets shows that traders can behave cooperatively even when many buyers are present, so additional entry may have little effect. Evidence from Ecuador instead shows that buyer power can arise because farmers have limited ability to switch across crops or buyers. Moreover, buyer power affects more than the distribution of surplus. Evidence from the Chinese tobacco industry shows that it can distort the allocation of production, while evidence from South America shows that it can weaken the transmission of environmental policy. Buyer power therefore affects both who produces and how the gains from production are distributed.

Second, policies targeting one stage of the value chain can have unintended effects elsewhere. In Costa Rica, stricter revenue sharing can raise farm-gate prices but also cause mills to leave smaller markets, reducing farmers' selling options. Restrictions on vertical integration can remove services such as credit and reliable purchasing that farmers value. Similarly, evidence from Bangladesh shows that removing intermediaries can increase rather than reduce prices as they help relax credit constraints. These examples show that intermediaries can both exercise market power and provide valuable services. Farm-gate prices alone are therefore not sufficient to measure farmer welfare.

Third, market power and relational contracting are directly connected through enforcement. We show that cooperation depends on the value of continuing a relationship relative to the gains from breaking it. Competition can improve farmers' outside options, but it can also reduce the rents that sustain credible promises. Evidence from Rwanda shows that stronger competition can weaken relational practices, with negative effects on processing and quality. At the same time, enforcement constraints can be relaxed. In Colombia, a downstream buyer uses a vertical restraint to make quality premiums credible, and in Rwanda, clearer communication strengthens relationships and increases the adoption of deferred-payment contracts. Relationships can therefore be fragile, but they can also be deliberately strengthened.

These findings suggest two directions for future work. First, market power and relational contracting should be studied jointly. Studies of market power that hold contracting arrangements

fixed may overstate the benefits of competition when intermediaries also provide valuable non-price services. Conversely, studies of relational contracts that take market structure as given cannot determine how much of the relationship's value depends on market power.

Second, the interaction between competition and relationships is ultimately an empirical question. Some market power may generate the rents needed to sustain relational contracts, while those same relationships may reduce competition by segmenting markets or discouraging entry. Which force dominates will determine whether policy should promote competition, strengthen formal enforcement, or support the relationships that substitute for it. Understanding this trade-off, rather than focusing only on farm-gate prices, should be a central goal of future research.

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