How Competitive Are Crop Markets in Sub-Saharan Africa?

Brian Dillon and Chelsey Dambro

During the structural adjustment era of the 1980s and 1990s, governments across sub-Saharan Africa generally withdrew from crop markets to encourage entry by private traders and foster competition. Since that time, the degree of competition in crop markets has been a central concern of policymakers, donors, and researchers. We review the evidence on that topic by first developing a conceptual framework to guide our analysis, then discussing the findings from four categories of literature. We have two main findings. First, there is a paucity of empirical evidence on this question, which hinders our ability to draw strong conclusions. Second, that point notwithstanding, the evidence that does exist is broadly supportive of the notion that crop markets are competitive. The dominant themes in the literature are that trading profits are highly variable, trader entry and exit rates are high, and price co-movements between markets suggest relatively efficient levels of competitive arbitrage. It is possible that the high costs of entry foster non-competitive conditions at the level of large-scale, long-distance subnational trade, but we find no positive evidence to that effect, only the satisfaction of certain necessary conditions.

Key words: African agriculture, traders, barriers to entry, competition, crop markets, information interventions, marketing margins.

JEL codes: D43, O13, O55, Q13.

During the first two post-colonial decades in sub-Saharan Africa (SSA), governments actively participated in crop markets in various forms: establishing grades and standards, setting marketing periods, licensing, taxation, price controls, and direct market control through warehouses or marketing boards. In some settings private traders played a role, but government control was the rule, and market competition the exception (Bates 1981; Barrett 1997; Kherallah et al. 2002).

Beginning in the 1980s, structural adjustment opened many SSA crop markets to private competition. The hopes were that private traders would compete away rents and improve the operation of the price mechanism (Staatz, Dione, and Nango Dembele 1989). This would in turn allow farmers to respond to price signals from larger markets, leading to better resource allocation and higher productivity.

Since that time, understanding the degree of competition among traders has been a priority for both research and policy. A common belief is that markets are not fully competitive, and traders earn rents. This belief is usually based on anecdotes, or on a suspicion that farmers are exploited, not on evidence of non-competitive pricing (Sitko and Jayne 2014). Traders are convenient scapegoats, with politicians and others frequently perpetuating the view that traders collude to underpay farmers, resulting in ongoing distrust between the public and private sectors (Tschirley and Jayne 2010; Ellis and Manda 2012). Recently, concerns about market efficiency have motivated calls for cooperative marketing to improve farmers' bargaining power (Department for International Development 2004; Bernard et al. 2010), direct involvement in markets by the World

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Food Programme (WFP) through the Purchase for Progress program (WFP 2015), and a return to government marketing boards in some settings. Prominent examples of direct intervention in food crop markets include the substantial maize purchases by the Malawi Agricultural and Marketing Corporation (ADMARC) and the Food Reserve Agency (FRA) in Zambia (Jayne et al. 2009; Mason and Myers 2013).

What does the evidence say about the competitiveness of food crop markets in SSA? The goal of this article is to answer that question. We first develop a conceptual framework outlining the competitive and non-competitive forces that can increase marketing margins above expected levels. We then divide the empirical evidence into four groups, and review the findings. Our review focuses on studies of food crop markets, with exceptions for recent work on cash crops that is squarely on topic. The focus is on papers from the last twenty years, after most structural adjustment reforms were complete or well under way (for a summary of the papers in the review, see table 1). We prioritize studies from the first step in the value chain, in which farmers sell to traders, but also include relevant studies of wholesale markets where traders are both buyers and sellers.[1]

We have two main takeaways. The first is that the evidence on this topic is remarkably thin, given its importance. We review 26 papers covering 13 countries and twenty years, hardly a full representation of crop marketing on a large and diverse continent. However, that point notwithstanding, our second takeaway is that evidence consistent with competitive markets is commonplace, while evidence of non-competitive pricing is rare and subject to caveats. This is not to say that traders would not price non-competitively if given the opportunity. We remain sympathetic to the concern that some traders may earn non-competitive rents. But current evidence suggests that food crop markets are generally competitive.

Among the many challenges to studying the degree of market competition, which we discuss below, two bear special mention. The first is that it is difficult to survey a representative sample of traders. Many operate seasonally, or combine trading with other activities. Others are wary of surveys, either for business reasons or because of past discrimination against traders in countries where the sector is dominated by ethnic minorities (Barrett 1994; Barrett 1997; Fafchamps and Gabre-Madhin 2006). The second challenge is that most tests cannot distinguish between non-competitive margins and unobserved trader costs. Advancing a claim of non-competitive pricing usually requires assumptions about costs that cannot be tested or relaxed.

For policymakers, our findings suggest that programs to fix ostensibly broken crop markets should be undertaken cautiously. Current research provides little support for the promotion of cooperatives or marketing boards, at least as forms of competition policy. In that light, improvements to public goods—especially transport and communications infrastructure—seem to be safer avenues to reduce price spreads between markets, with potential benefits for both producers and consumers.

A related takeaway for the development community is that promoting the idea of exploitative traders is neither helpful nor supported by current evidence. We would not suggest that anecdotal evidence of rent-seeking traders is always wrong. But we find little support for the idea that exploitation is widespread. Insufficient competition between traders seems to be the exception, rather than the rule.

Finally, encompassing this broad literature requires a suitably broad definition of "crop trader"; deciding who is a trader is not always straightforward. Traders may play multiple roles, making it difficult to distinguish them from farmers, retailers, processors, or transporters. For our purposes, a trader is anyone who buys crops in order to profit by selling them at another market or at a later date. This includes those that purchase crops at the farm-gate, at storefronts in the village square, at weekly markets, or at major wholesale markets. Some of the reviewed papers focus on small-scale traders who buy from nearby farmers and operate seasonally. Other papers deal with professional traders who work year-round, trade multiple crops, and manage warehouses, trucks, and large staffs.

Conceptual Framework

What is a fair value of trader margins or profits? There is no straightforward answer to

[1] We found papers by following citation threads, conducting keyword searches in AgEcon Search and Google Scholar, and contacting researchers working in this area. In table 1, we list the papers covered by this review. In the supplementary online appendix, we discuss some of the relevant papers that use data from other regions of the world.

Table 1. Summary of Papers in the Review

	Authors	Year	Country	Type of measurement
1	Barrett	1997	Madagascar	Inter-seasonal entry and exit
2	Badiane, Shively	1998	Ghana	Price co-movement between markets
3	Dessalegn, Jayne, Shaffer	1998	Ethiopia	Surveys of traders; Concentration ratio
4	Minten and Kyle	1999	DR Congo	Surveys of farmers
5	Abdulai	2000	Ghana	Price co-movement between markets
6	Gabre-Madhin	2001	Ethiopia	Surveys of traders
7	Fafchamps, Minten	2002	Madagascar	Marketing margins and social capital
8	Fafchamps, Gabre-Madhin, Minten	2005	Benin, Malawi, Madagascar	Surveys of traders
9	Osborne	2005	Ethiopia	Structural model of expected prices
10	Tostão, Brorsen	2005	Mozambique	Price co-movement between markets
11	Fafchamps, Gabre-Madhin	2006	Benin, Malawi	Surveys of traders
12	Van Campenhout	2007	Tanzania	Price co-movement between markets
13	Fafchamps, Hill	2008	Uganda	Inter-seasonal entry and exit
14	Moser, Barrett, Minten	2009	Madagascar	Price co-movement between markets
15	Muto, Yamano	2009	Uganda	Impact evaluation: farmer information
16	Svensson, Yanagizawa	2009	Uganda	Impact evaluation: farmer information
17	Aker	2010	Niger	Concentration ratio (CR4)
18	Chamberlin, Jayne	2013	Kenya	Surveys of farmers
19	Myers	2013	Malawi	Price co-movement between markets
20	Casaburi, Glennerster, Suri	2013	Sierra Leone	Price impacts of road-building program
21	Casaburi, Reed	2014	Sierra Leone	Impact evaluation: wholesale price premia
22	Courtois, Subervie	2014	Ghana	Impact evaluation: farmer information
23	Sitko, Jayne	2014	Kenya, Malawi, Mozambique, Zambia	Surveys of farmers and traders
24	Minten, Stifel, Tamru	2014	Ethiopia	Price co-movements between markets
25	Hildebrandt, Nyarko, Romagnoli, Soldani	2015	Ghana	Impact evaluation: farmer information
26	Minten, Tamru, Engida, Kuma	2015	Ethiopia	Surveys of farmers and traders

that question. Competitive margins vary between crops and locations—even within the same country—because of variation in value-to-weight ratios, perishability, road conditions, and other factors. Traders who invest substantial time and capital are expected to earn more per unit than those who quickly turn around a small volume of crops with minimal overhead.

Standard price theory is helpful to fix ideas. A trader's gross marketing margin, before subtracting costs, is the difference between the price paid in purchase market i at time s, p_{is}, and the price received in sales market j at

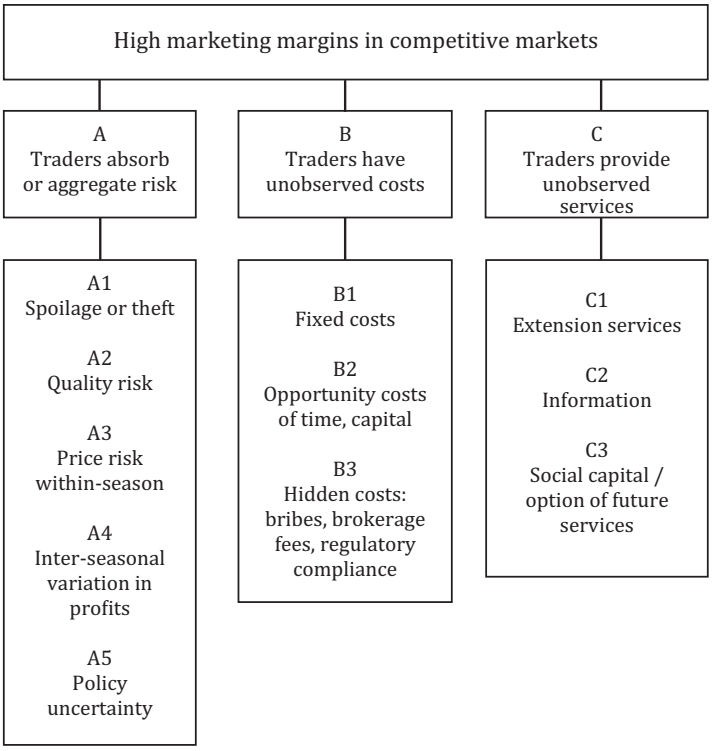

Figure 1. Factors that increase marketing margins in competitive markets

time t, p_{jt}. If the trader is engaged in purely intertemporal arbitrage within the same market, then $i=j$. Likewise, period t may occur very soon after period s if the trader stores crops for only a matter of hours or days. Let the full cost of transferring goods between markets be τ, including transport costs, compensation for the trader's investments of time, capital, and materials, financing costs, and any costs associated with the processing or transformation of raw goods. If the purchase and sales markets are competitive, the trader takes p_{is} and p_{jt} as given, and the marginal revenue on each unit is equal to the price paid by traders to all sellers (marginal revenue pricing). Traders who offer less than the market price cannot find sellers; those who pay more than the market price earn negative profits and eventually exit the sector. Under these conditions, the trader's profits are zero in expectation: $E[\pi] = E[(p_{jt} - p_{is}) - \tau] = 0$.

We do not attempt to describe the full set of supply and demand factors that determine the market prices of crops at various points in the value chain. Rather, we focus on the hypothetical (yet common) situation in which an observer believes that trader margins are suspiciously high in a particular market. The framework we develop below is intended to describe the competitive and non-competitive forces that could increase marketing margins *above* the expected level. In order to maintain this narrow emphasis, we will pass over numerous issues that are nonetheless relevant for price determination, such as the returns to crop processing enjoyed by some traders, or the role of regulation and government intervention in influencing equilibrium prices in competitive markets. Government influence will still factor into the conceptual framework at certain points because regulation can create barriers to entry that impede competition, and policy uncertainty can exacerbate the risks that traders face.

Category 1: Competitive Markets

Assume first that crop markets are competitive. There are numerous reasons that a trader might earn what appear to be non-competitive rents despite a fully competitive market. We group these into three categories, shown in figure 1. First, traders might be absorbing substantial risk (category A). Second,

traders might have costs that are unobserved by the researcher (category B). And third, traders may provide services at zero marginal cost that are unobserved by the researcher (category C). Category A is in essence a case of misspecification—the observer has not fully understood the problem being solved by agents on the ground. Category B and C cases are instances of measurement error with respect to the costs incurred by traders or the benefits received by farmers, respectively.

Risk

Consider first the risks to trading within a single season. Short-term price fluctuations introduce significant risk. Most private traders pay farmers in cash and hold crops for days, weeks, or months. During that period the trader is exposed to any price changes, which can be substantial and unpredictable. The greater the downside price risk, the greater the average margin needed to induce traders into the market. Uncertain crop quality represents another source of risk. If traders cannot easily observe quality, they bear the risk of any markdowns for high moisture content, broken grains, or other quality concerns. Traders also bear the risk of spoilage, infestation, or theft between purchase and resale.

A second class of risk stems from variation in margins across markets. Many traders operate over multiple years, drawing from a distribution of profits across space and time. High margins in one market or crop year compensate for other markets or crop years with thin or negative margins. Observers who are keen to detect exploitation naturally focus on margins that appear to be egregiously large. Yet, trading may be profitable only because marketing margins for some crops are higher than average. Further, traders may serve some markets at a loss in order to maintain contacts with producers for future years.

Finally, a third class of risks stems from uncertainty about possible government intervention in the short or medium term. Ad hoc policy responses to emerging food crises, such as price controls, are often implemented without clear warning and in the absence of pre-determined rules (Jayne 2012). Even during the earliest phases of structural transformation it was understood that sudden policy changes could radically alter trader profits in the short term (Berg 1989). This is especially detrimental to traders who have significant capital tied up in storage facilities, rented vehicles, or crop stores.

Unobserved Trader Costs

Fixed costs of trading are a key potentially unobserved trader cost. Traders may purchase and maintain trucks, carts, storage facilities, and tools such as scales and bags. Many of these capital goods are difficult to observe and value appropriately, as they depreciate at unknown rates or support multiple activities. Matters are complicated further if fixed costs are recoverable. Furthermore, when some costs are fixed, the margin consistent with perfect competition is a function of the volume of trade undertaken. If the volume of trade is difficult to predict, a cautious trader might assume a low volume at the start of the season and offer a lower initial price to farmers to ensure the recovery of fixed costs.

There are numerous other trader costs that are difficult to observe and value. First is the opportunity cost of the trader's time and capital. It is costly to tie up capital in food crops whose value may fluctuate. Second, the higher the prices of inputs to trading, such as credit and information, the higher the equilibrium marketing margin. Third, there may be market inter-linkages that involve traders advancing credit to farmers during planting, then recovering the principal plus interest at harvest. While these inter-linkages are less common for food crops than cash crops, they remain potentially important. A high marketing margin may reflect debt repayment folded into the transaction price. Fourth, traders may incur costs that they are hesitant to reveal, such as bribes to traffic police, customs officials, or village officials. These costs may be hidden from observers, but they are nonetheless relevant to the marketing margin earned by traders. Finally, there are miscellaneous additional costs that only the most careful survey will detect, such as brokerage fees, service on debt, processing costs, and maintenance. Some of these costs may not be salient during interviews, and thus subject to under-reporting.

Unobserved Trader Services

There may be services that traders provide at zero marginal cost to farmers. These can be missed even in meticulous surveys. For example, traders know which crops are selling well in which markets, and know the premiums

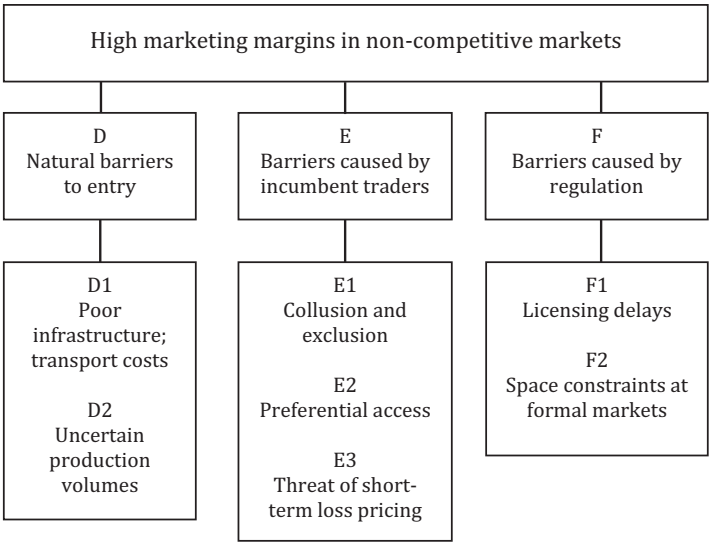

Figure 2. Factors that increase marketing margins in non-competitive markets

for particular varietals. If they communicate this during a purchase, the farmer's acceptance of a lower output price may include a payment for information. In addition, liquidity-constrained farmers may sell to small traders who arrive immediately at harvest time. Such sales often take place directly at the farm-gate, requiring minimal transport. This flexibility in the timing and location of sales may be reflected in slightly lower farm-gate prices. Finally, the connection between farmers and traders is a form of social capital that some farmers value. Traders are an important link with larger markets. A farmer may be willing to accept a slightly lower output price from a familiar trader because he is purchasing an option to call upon the trader in future years.

Category 2: Non-competitive Markets

Turning to the non-competitive case, let us now assume that food crop markets are not fully competitive, and traders earn non-competitive rents. This situation can only be sustained if there are barriers to entry. If entry is free, but no one enters to compete away what appear to be rents, it is difficult to argue that the market is not competitive.[2] In such a case, the equilibrium marketing margins reflect the market fundamentals. There may still be a case for intervention in such markets on social welfare or political grounds, but such policies would not be motivated by a lack of competition in output markets.

In this section we describe three types of entry barriers that may underlie a non-competitive market. The first are natural barriers (category D); the second are barriers due to the activities of current traders (category E); the third are barriers due to policy or regulation (category F). Figure 2 provides the taxonomy, which we detail in the following subsections.

Natural Barriers to Entry

Farmers in SSA are spatially dispersed and served by poor roads. In some years farmers have little marketable surplus. Under these circumstances, certain rural markets may only support profitable trading by a few traders. This is the case of a natural oligopsony. The traders who serve any one of these markets may enjoy some market power, and underpay farmers as a result. In this case, entry is precluded not by collusion, but by natural limits to entry due to high costs.[3]

[2] The exception may be a case in which the threat of retaliation by incumbent firms is sufficient to deter entrance, even though entrance would be profitable under current conditions. See the section titled *Barriers to Entry Imposed by Current Traders.*

[3] It is important to differentiate between markets with natural limits to competition and markets with high costs that drive up the equilibrium margin under competitive pricing (see the section titled *Unobserved Trader Costs*). The critical factor is whether the costs of doing business are so high that only a small number of traders can operate.

A related barrier may arise from the scarcity of certain physical assets for arbitrage, for example, long-haul trucks or large storage facilities. If incumbent traders have preferential access to transport or storage capital, and the creation or import of new capital is hampered by port congestion, lack of maintenance infrastructure, credit market imperfections, or other factors, this may limit the number of participants in certain links of the value chain. These barriers may be especially relevant for long-distance trading.

Barriers to Entry Imposed by Current Traders

Even if there are no natural barriers to entry, current traders could act to deter entry. We found no direct evidence of such collusion, but we can speculate on how it might work. One possibility is that established traders lobby village leaders for privileged access to storage facilities or permission to begin purchasing crops before the season opens. Alternatively, large traders may coordinate to divide up the countryside, thereby reducing competition in any given village. Larger traders might also engage in short-term loss pricing to drive out smaller competitors. Even the threat of these activities could deter entry. Finally, traders may actively or tacitly collude to fix prices. However, collusion is difficult to maintain in equilibrium unless there is some other barrier to entry; otherwise, we would expect entry by new traders to compete away the associated rents.

Barriers to Entry Due to Regulation

Lastly, there may be barriers to entry due to regulation. Possible examples include registration requirements, licensing of vehicles, taxes collected at roadside checkpoints, adherence to standards, or payments for inspections. However, these regulations only create barriers to entry if one of two other circumstances occurs. The first is if regulation creates long delays in authorizing new traders, thereby limiting entry. This is unlikely in many rural markets, though it may be relevant at ports, for large-scale trade, or in countries that only issue trading permits in the capital or in major cities. The second is one in which regulatory costs are so excessive that they create a natural barrier to entry.

Empirical Evidence

In this section we review the empirical evidence on the degree of competition in crop markets. We divide the empirical evidence into four groups. We chose these groups inductively after reading the literature to identify the most common empirical approaches. The first group includes analyses of market prices across space or time. The second involves careful measurement of trader profits. The third is for less common descriptive or regression-based approaches using trader or farmer surveys. The fourth group encompasses impact evaluations. To keep the ideas organized, we connect each type of evidence to the conceptual framework of the previous section.

Group 1: Analysis of Market Prices

The first body of evidence is based on the analysis of market price data. Most papers in this group use data from wholesale markets. These are not the primary point of contact for many farmers, but are still informative for studying competition along the value chain. The key logic underlying these studies is that if markets are connected and competitive, the spread $|p_{is} - p_{jt}|$ cannot be above the transfer cost τ for an extended period of time because traders arbitrage away the difference (for more detailed treatments of these empirical methods, see Ravallion 1986; Dercon 1995; Barrett 1996; Baulch 1997; Fackler and Goodwin 2001; and Barrett 2001).

Papers in this group employ one of two general approaches to estimation. The first is based on the parity bounds model of Baulch (1997), which uses observations or extrapolated estimates of transfer costs between markets to identify the probability of the market price spread being equal to, below, or above the transfer cost. The strength of this procedure is that it allows the trading state between any two markets to vary probabilistically. For example, two markets that regularly trade may be temporarily disconnected due to severe rains or negative production shocks leading to zero tradable surplus; the parity bounds approach can return an estimate of the proportion of periods during which such disconnection occurs. The second class of estimation approaches use cointegration analysis, threshold autoregression, or related time series techniques to examine the degree of integration between

two markets. Depending on the exact procedure used, these estimation techniques can provide a characterization of whether two markets are integrated, a measure of the speed with which price differences are arbitraged away, and an estimated threshold price spread for trade to occur.

Because these empirical methods are designed to study market integration, not competition, they rarely provide conclusive evidence about market structure. The number of entrants and the degree of competition may be endogenous to the cost of entry and the price spread, so that the threshold for entering is a function of both transfer costs and non-competitive mark-ups. Hence, price analyses without additional data cannot fully distinguish between transfer costs and market structure (see Atkin and Donaldson 2015, for a careful study of the endogeneity of non-competitive mark-ups to price spreads).

Despite these limitations, studies of market integration can in some cases still provide insights into the degree of competition between traders. If two markets are found to not be integrated, then traders are not arbitraging price differences, perhaps because arbitrage is not profitable. At the other extreme, if two markets are found to be integrated, with rapid arbitrage of any price differences, that is a strong indication (though not a sufficient condition) of robust trader competition. To make inferences about trader competition from studies of market integration, we look for results at these extremes.

These tests are effectively indirect tests for barriers to entry (categories D). Such barriers could impede market integration or delay the speed of adjustment, allowing active traders to earn medium- or long-run profits. However, without other information these tests cannot distinguish between barriers due to structural factors (D), collusion (E), or regulation (F). Also, statistical problems can bias studies of this nature in either direction. Prices may co-move spuriously because of shared exposure to macroeconomic shocks. If trade is competitive but highly discontinuous because of variable prices and transfer costs, competitive arbitrage may be hard to detect with price data alone (Barrett 2001).

Badiane and Shively (1998) use early models of cointegration to test for spatial price integration between a major central maize market and two local wholesale markets in Ghana. These authors employ monthly data from 1980–1993, and find clear support for spatial integration. Adjustment is rapid, but not immediate: price shocks typically transmit from the major market to the branch markets within four months.

Also in Ghana, Abdulai (2000) utilizes threshold cointegration analysis to study wholesale maize market integration, comparing price transmission between Accra and two local markets. Abdulai (2000) allows for asymmetric adjustment to price increases and decreases; data are monthly, covering 1980–1997. Abdulai (2000) finds rapid price transmission; all estimated transmission rates are above 34% per month, indicating that deviations from long-run equilibrium have a half-life of less than two months.[4] Price increases are passed on more quickly than price decreases, which Abdulai (2000) interprets as evidence of costs to adjusting prices (menu costs) or inventory levels, rather than imperfect competition. Given the relatively short adjustment periods in both directions, this interpretation seems warranted.

Tostão and Brorsen (2005) test for integration between markets in northern, central, and southern Mozambique from 1994–2001. Segmentation is possible here, as southern Mozambique is a maize deficit region with poor road connections to the northern maize-producing areas. In some models, the authors use monthly prices in combination with transport costs to estimate a parity bounds model (Baulch 1997). In other models, they use weekly prices to estimate vector autoregressions without transport costs. The results of these two approaches are broadly consistent. Within each region, prices co-move in a manner consistent with competitive arbitrage. Additionally, markets in the southern and central regions are well integrated with each other. The north, however, is effectively isolated from the other two regions because the cost of shipping grain from the north usually exceeds the price spread. As the authors state, "The problem does not seem to be lack of traders to ship grain from low price areas to high price areas. The problem is that transport costs are so high that it is not profitable to ship the grain."

[4] The half-life is the period of time during which the difference falls by 50%.

Van Campenhout (2007) studies price adjustment between six wholesale maize markets in Tanzania using a threshold autoregressive model (TAR); the data are from 1989–2000. The approach allows transaction costs and the speed of adjustment parameters to change over time. Van Campenhout (2007) finds that market performance improved during the 1990s, with price differences decaying by 50% in one to five weeks across market pairs. Slower price adjustments are possibly due to bad road conditions or police checkpoints. Overall, the findings are consistent with rapid spatial arbitrage and robust competition.

In Madagascar, Moser, Barrett, and Minten (2009) use a modified parity bounds model to study rice market integration at the local, regional, and national levels. The data are unique for this subsection in that the time dimension is short: prices are only available for the four quarters of 2001. However, the data are spatially fine-grained, including rice prices and transport costs for almost all of the country's 1,394 districts. These authors aim to differentiate between three marketing regimes: competitive equilibrium in which the price difference is equal to the transfer cost; a segmented market regime where transfer costs are too high to warrant arbitrage; and a state of disequilibrium, or imperfect competition, in which traders are potentially earning positive rents because the price spread exceeds the transfer cost. When the authors do not allow for unobserved variable transfer costs, they find that small sub-regional markets are usually well integrated (regime 1), long-range national markets are usually segmented by high transfer costs (regime 2), and mid-range regional markets are most often characterized by imperfect competition (regime 3). However, when the assumption of zero unobserved transfer costs is relaxed, a competitive trading equilibrium (regime 1) is the most common state at all three scales. Thus, while the authors find possible evidence of imperfect competition at the regional level, they show that the findings are also consistent with perfect competition and unobserved trader costs. The authors argue that if competition is limited at the regional level, it is likely due to the high cost of trucks and storage facilities for medium-distance trade.

Myers (2013) uses weekly data from 2001–2008 to study price adjustment between 10 maize markets in Malawi. Using a model that allows for different regimes based on the possibility of trade in either direction, Myers (2013) finds rapid rates of adjustment. Half-lives for price spreads lie between 0.6 and 2.2 weeks, on par with the United States (Goodwin and Piggott 2001). The conclusion is that maize market integration is reasonably complete throughout the country, consistent with robust competition.

Casaburi, Glennerster, and Suri (2013) use a road construction program in Sierra Leone to study the effect of lower transport costs on price spreads between markets. These authors use a variety of data, including census data, farmer surveys, trader surveys, market prices, and data on road construction and quality spanning the period 2003–2011. They find that price spreads fall with the improvement of roads between markets, consistent with a model of costly search under competition, but not with various models of imperfect competition.

In Ethiopia, Minten, Stifel, and Tamru (2014) use cereal market price data to study changes in price spreads between markets from 2001–2011. Data are monthly for 66 markets and five crops: teff, barley, wheat, maize, and sorghum. Using TAR models with empirical estimates of transport costs, these authors find that markets became significantly more integrated over the study period. The average speed of adjustment increased by 25% for white teff, 50% for mixed teff, 22% for red teff, 45% for white wheat, 33% for maize, 11% for white sorghum, and 85% for mixed barley. In 2011, the average half-life of adjustment was less than two months for all crops other than white sorghum, and was less than one month for maize and white teff. Based on focus groups, the authors identify five factors leading to increased integration over 2001–2011: economic growth, urbanization, road-building, mobile phones, and improved extension and technology adoption.

The overall conclusion from this subsection is that crop markets in SSA are well integrated at the local and regional level, indicating the likely presence of robust competition. Two papers showed evidence of market segmentation over long distances when transfer costs exceed price spreads (Tostão and Brorsen 2005; Moser, Barrett, and Minten 2009). There is slightly less clarity at the level of medium-distance trade, where high transaction costs and physical capital requirements may dampen entry and reduce competition.

But the evidence for imperfect competition is far from conclusive, and is also consistent with unobserved transfer costs. While this literature remains subject to some important methodological caveats—for example, many papers do not account for possible cointegration between market prices—the evidence shows widespread competitive arbitrage between wholesale crop markets.

Group 2: Analysis of Trader Accounts

The second group of empirical tests involves detailed surveying of traders and analysis of their balance sheets. The goal of these papers is to measure traders' costs and revenues as completely as possible to sharpen measures of profits and marketing margins.

This approach is useful in two ways. First, a high average margin may narrow considerably with better measurement, mitigating concerns about non-competitive pricing. This relates to categories B and C. To make an inference, the researcher must have a prior about what constitutes an excessive margin. Although there is no clear guideline for determining this prior, some progress can be made by comparing the profitability of trading to the profitability of other activities requiring similar levels of human and physical capital investment. More common is that the researcher and reader use their knowledge of the setting to make judgment calls about whether trader margins or profits are excessive.

Second, if the sample is large enough, the researcher can estimate the distribution of trading margins or profit. The variance of this distribution is a proxy for the equilibrium level of risk in the sector, which relates to category A (risk). If traders earning high margins are found to operate alongside others earning low or even negative margins, this suggests that trading risk may be significant. Under such circumstances, the average margin must be great enough to compensate traders for the underlying uncertainty. This approach has its limitations. There is no way to distinguish risk from unobserved trader heterogeneity, and there is no fixed standard for relating the level of risk in the trading sector to the margin consistent with competition. The researcher must interpret findings with respect to some prior about a risk-return tradeoff consistent with full competition.

We found five papers that provided estimates of margins or related statistics (table 2). Most estimates are of net margins, except for those from Fafchamps and Gabre-Madhin (2006), which are annual profits. Average net margins in table 2 range from below 5% in Ethiopia to 37% in Malawi, with substantial variation. Yet, these net margins are overstated because each excludes some trader costs. Missing from most estimates are the value of work by family members, the opportunity cost of capital, the value of overtime work by the trader, and other costs (e.g., bribes). Minten and Kyle (1999) are explicit about this: net marketing margins in their paper are net of transport costs, but no other costs.

In Ethiopia, Dessalegn, Jayne, and Shaffer (1998) study grain market performance using data from 4,000 farming households and 220 traders. The data are from 1996, six years after liberalization. The authors compare the return to storage with traders' borrowing costs. They estimate the monthly return to post-harvest storage to be 5.18% for maize, 3.66% for teff, and 3.24% for wheat, compared with a real opportunity cost of capital equal to 0.8% per month. The difference between the return to storage and the cost of borrowing may indicate a lack of competitive arbitrage. But as the authors acknowledge, these gross returns do not include the costs of storage such as rent, labor, and fumigation. Nor does a comparison of average returns account for the risks from price movements or depreciation. We find the estimated spreads to be surprisingly narrow, given these factors.

Using data from 1990, Minten and Kyle (1999) study variation in trader earnings and transport costs in the Democratic Republic of Congo (DR Congo). The sample consists of 1,405 traders selected from the river port or truck parking lot in Kinshasa. Trading in DR Congo during this period was made difficult by poor roads and a lack of security: 86% of traders report dangerous conditions as they travel from the capital. The authors find that variation in transport costs explains a large majority of the variation in prices paid to farmers. They calculate daily wages for sample traders, then estimate Mincerian earnings functions to examine how wages co-move with crop type, distance traveled, and trader characteristics. The authors find that trader earnings are increasing in distance traveled on poor quality roads, but not on higher quality roads, consistent with greater risk and higher costs of business in remote areas with inadequate transport infrastructure. However, the

Table 2. Marketing Margins from Reviewed Papers

Paper	Country	Timeframe	Average Margins
Dessalegn, Jayne, and Shaffer (1998)	Ethiopia	8-month average	8.2%
Minten and Kyle (1999)	DR Congo	Monthly (Oct/Nov)	34.3%
Gabre-Madhin (2001)	Ethiopia	Annual	<5%
Fafchamps, Gabre-Madhin, and Minten (2005)	Benin	Annual	11%; Median 8%
	Madagascar	Annual	27%; Median 11%
	Malawi	Annual	37%; Median 27%
Fafchamps and Gabre-Madhin (2006)	Benin	Annual	6% (profit)
	Malawi	Annual	14% (profit)

average per-transaction gross marketing margin, exclusive of direct transport costs, is estimated to be 34.3%. This figure is high enough that it could be consistent with excess profits to some traders, especially those serving the more remote areas. Unfortunately, the paper cannot distinguish between non-competitive rents and an equilibrium in which unobserved transport costs, other costs, and risks explain the high average margin in some areas.

Gabre-Madhin (2001) studies the market structure of the Ethiopian grain trade after liberalization. The relevant findings for us are the analyses of trader accounts from a 1996 survey of 152 wholesale traders. Traders had substantial working capital, at $14,000 per year, on average. Gabre-Madhin (2001) calculates gross and net marketing margins from traders' most recent transactions. The variation is substantial—in 3 of the 12 markets, the average trader earned *negative* profits on the most recent trade. The overall mean margin is just below 5%, which is the return to the trader for his or her time, capital, and other unaccounted costs. Using additional data on annual sales and costs, the author estimates average annual trader profits to be $2,300. Profits are highest in the capital Addis Ababa, at $5,364; in all but 2 markets, average profits do not exceed $1,600. However, these are not truly profit estimates, as these earnings must cover all fixed costs, labor costs, interest on debt, and the trader's time. In sum, while there is some variation across markets, the take-home earnings of the average trader are not indicative of significant windfall profits.

Fafchamps, Gabre-Madhin, and Minten (2005) use trader surveys to estimate returns to scale in the trading sectors of Benin, Madagascar, and Malawi. Data are from trader interviews and market surveys in 1999/2000.[5] These authors find that transport costs represent the largest share of direct marketing costs, at 50%–60%. The authors do not report the distributions of marketing margins, but they write "Margins vary dramatically across traders, however. Some respondents appear to be incurring massive losses while others make windfall profits." Median annual trader earnings, which are to compensate the trader for her time, unpaid labor by family and friends, working capital, vehicles, storage costs at self-owned facilities, and other physical assets and equipment used in trading, are estimated to be $116 in Benin, $536 in Madagascar, and $1,147 in Malawi. The between-country variation is largely due to differences in the composition of trader types—small bundlers, large wholesalers, etc.—between the samples. These earnings levels offer no definitive evidence of non-competitive rents. After subtracting costs, it is possible that the annual earnings of the median trader in each country are well below the poverty line.

Osborne (2005), working in Ethiopia in 1994/1995, uses yearlong surveys of 10 traders to estimate the slope of the supply curve facing each trader. This slope is zero under perfect competition and marginal revenue pricing. For the more remote of the two studied markets, traders appear to reduce the price they offer by 3% during the post-harvest period, when supply is greatest. In the context of a Cournot model, this is consistent with non-competitive pricing. This result

[5] The study is motivated by the possibility that if there are significant returns to scale in trading, due perhaps to high fixed costs, then a rationale exists for restricting entry to promote scale up by active firms. The authors find no evidence of returns to scale. It is notable that after spending significant time in the field, the authors consider fierce competition and free entry to be so obvious that they assume perfect competition throughout.

is subject to numerous caveats, however. The evidence is from only ten traders in one market, a remarkably small sample. The model underlying the analysis assumes that traders are effectively risk neutral. The empirical results are only interpretable under the assumption that per-unit costs are declining in quantity traded, an assumption that is by no means obvious.[6] Finally, the core results are only marginally statistically significant with robust standard errors. But with inference from time series data from 10 traders, clustering at the trader level is surely warranted. Based on these considerations, and the small magnitude of the estimated non-competitive markdown, we find little evidence in Osborne (2005) of insufficient competition.

Fafchamps and Gabre-Madhin (2006) use data from Benin and Malawi to study variation in trader earnings. These authors emphasize the significant degree of risk in the sector: some traders make large losses, while others earn substantial profits. More than 20% of traders fail to cover their costs. The authors calculate that the gross trader margin in Malawi is 2.4 times that of Benin, possibly reflecting a difference in competitiveness between the two countries. However, these authors interpret this as evidence of structural differences. Malawi traders are more vertically integrated, so higher compensation is to cover the costs associated with a greater number of activities. Traders in Malawi also have substantially higher levels of education, raising the opportunity cost of time.

Finally, Minten et al. (2016) examine the teff supply chain from rural farmers to retail markets in Addis Ababa, Ethiopia. Their analysis is based on surveys with 1,200 farmers, 205 rural wholesale traders, 90 truck drivers, 75 urban wholesalers, and 282 urban retailers. These authors find that the median price to farmers is 79.2% of the urban retail price, and that half of that margin accrues after the grain arrives in Addis Ababa. This suggests lean, competitive marketing channels linking farmers to the capital. Of course, a high producer share of the urban retail price is not *prima facie* evidence of competitive markets because we do not know how the 21% total marketing margin is distributed across traders. Yet, Minten et al. (2016) do show that transport costs represent a significant share of trader margins, especially in remote areas. As a whole, the paper suggests robust competition.

In sum, there are three takeaways from this section. The first is that trading is indeed risky. Margins are highly variable, with many traders earning zero or negative profits. The second is that remote areas are generally served by fewer traders, which may enable oligopsony pricing. But the estimated margins in less accessible areas are still too small to provide conclusive evidence of imperfect competition. And third, there are potentially important trader costs that remain unobserved in every study, despite researchers' best efforts. We do not know whether the returns to trading, after accounting for the full set of costs that traders face, are too high to be consistent with competitive markets. However, based on the evidence reviewed here, we have no clear reason to believe so.

Group 3: Other Analyses with Trader or Farmer Survey Data

The third empirical group is ad hoc, and contains tests that do not fit elsewhere. We split the category into three subgroups: estimation of the degree of market concentration, examination of the correlates of trader profits, and examination of entry and exit.

The first papers in this subgroup estimate concentration ratios, which measure the extent to which a limited number of traders control a market. The most widely used measure, the four-firm concentration ratio (CR4), is the percentage of output sold to the four traders that purchase the greatest volumes. A CR4 statistic must be interpreted with reference to some scale that connects it to levels of market competition. Widely used scales offer rough guidelines tailored to wealthy countries. A common rule of thumb is that a CR4 ratio below 20 is consistent with substantial or perfect competition, a range of 20–60 suggests possible non-competitive behavior, and greater than 60 indicates a high likelihood of some degree of market power. While a high CR4 suggests possible market power, it is not positive evidence that farmers receive prices below the competitive level. And vice versa, anti-competitive behavior can coexist with a low value of the CR4, although it would be

[6] For example, the author asserts that the unit price of capital is surely declining in quantity because of scale economies in transport that allow for rapid repayment. But it is equally plausible that traders face an upward-sloping credit supply curve because of credit market imperfections leading to heavy reliance on family and friend networks for loans.

difficult to maintain in equilibrium. The CR4 relates to categories D, E, and F.

The second subgroup is for a single study of how marketing margins vary with trader characteristics. Fafchamps and Minten (2002) test whether traders with greater social capital enjoy higher marketing margins. If they do, this is a possible mechanism by which some traders earn non-competitive rents. Although a positive result would be neither necessary nor sufficient evidence of rents, it would suggest that traders face varying degrees of competition. Tests of this nature are primarily related to category E: the possibility of barriers to entry from the actions of current traders.

The third subgroup is for studies of entry and exit. These are descriptive measures of how readily new or lapsed traders can enter a market, and of how likely it is that traders will exit the sector. These studies relate to categories D–F. Low rates of entry do not indicate non-competitive pricing, yet they are a necessary condition for hypotheses related to entry barriers. Also, the firm exit rate gives some indication of the risks inherent in the sector. Treating the exit rate as a proxy for trading risk relates to category A.

It is not easy to measure entry and exit. Traders who are active seasonally may appear to have exited the market when they are in fact waiting for the next season. Careful longitudinal survey work would be the best way to measure entry and exit; even then, it is likely that some types of traders would be missed.

Dessalegn, Jayne, and Shaffer (1998), using a slightly non-standard method to calculate the CR4, report concentration ratios by market and grain type in Ethiopia, and find substantial variation.[7] Addis Ababa has the lowest CR4 for all grains (4%). Markets in Gonder and Dire Dawa have the highest average CR4, at 44% and 34%, respectively. Concentration ratios are typically higher for barley, which is traded in fewer locations, than for teff, wheat, maize, and sorghum. For 17 of 27 market-crop pairs, the CR4 is below 35%. At the market level, the all-grain CR4 is below 35% for 10 of 11 markets.

Aker (2010) estimates that at the national level, the CR4 for the grain markets of Niger ranged between 23%–26% during the period 2004 to 2006. In addition, at the regional level, CR4 estimates were all below 25%.

Chamberlin and Jayne (2012) conduct a maize marketing survey in 33 Kenyan villages. They do not estimate a CR4, but do find that over 80 traders visited each village in the post-harvest period. These numbers indicate substantial competition in the maize market, given that Kenyan villages typically have a few thousand residents.

While these three studies are not representative, none suggests that trading is dominated by a small number of players in most markets. Of course, there are surely some crop markets in SSA with few traders. The evidence in these papers is primarily from larger markets, not from small rural markets where there may be less competition. Yet, the one study that does include numerous small village markets, Chamberlin and Jayne (2012), finds dozens of traders operating in every village. Overall, this subgroup of papers adds to the evidence of robust competition in crop markets.

The evidence in the second subgroup consists only of the findings in Fafchamps and Minten (2002). These authors use data from interviews with staple crop traders in Madagascar in 1997. Measuring social capital as the number of relatives who are agricultural traders, the number of other traders known, and the number of potential informal lenders that can be accessed, they show that both total sales and aggregate revenues are increasing in social capital, conditional on other variables. However, social capital has no statistically significant effect on the gross marketing margin. This paper provides no evidence that trader social capital facilitates collusion or non-competitive pricing.

Finally, in the third subgroup, Barrett (1997) uses interviews with 261 traders in Madagascar, in 1992/1993, to study entry and market structure post-liberalization. He finds that market inter-linkages are common, farmer-trader relationships underpin many deals, most traders are also farmers, and trading risks are significant. Entry into local trade is easy, even for women and ethnic minorities with little capital. In contrast, entry further along the value chain is significantly more difficult because of fixed costs related to storage and shipping. The paper does not take a stand on whether the profits earned by traders reflect non-competitive rents, or reflect the

[7] The measure is based primarily on the share of trade controlled by the largest firm. It is not clear whether the method used would overestimate or underestimate the CR4 relative to the usual approach.

competitive return given the required capital investments and the associated degree of risk.

In Ethiopia, Dessalegn, Jayne, and Shaffer (1998) note that many formal traders complain of easy entry into trading by unlicensed merchants. Because unlicensed traders do not pay registration fees or taxes, they are able to undercut the prices offered by formal traders. Thus, even when regulations exist that raise entry costs, weak enforcement capacity may reduce the effective barrier to entry. Like Barrett (1997), Dessalegn, Jayne, and Shaffer (1998) note possible barriers to entry at higher-level marketing levels due to limited access to finance, reliable marketing information, and storage and transport capital.

Fafchamps, Gabre-Madhin, and Minten (2005), in a study of the trading sector in Madagascar, find evidence of substantial trader exit. Only 47% of traders interviewed in 1997 were still operating in 2001, an average annual exit rate of 17%. Such high turnover suggests significant risks, low profits, or both. The paper finds that despite the fixed costs of entry, large enterprises do not have an advantage over small enterprises. With constant returns to scale in trading, there would be no welfare gain from policies to limit entry.

One study involving cash crops is relevant here. Fafchamps and Hill (2008) study price transmission from export markets to the farm-gate for the coffee sector in Uganda. Data are from surveys with exporters, traders, and farmers conducted in 2003. The key finding is that when the export price rises, wholesale prices rise proportionally, triggering entry by small-scale assembly traders who purchase at the farm-gate. The ease of entry is a central finding of the study. It is also notable that price transmission is nearly complete at the wholesale level. This suggests that at least in this market, barriers to entry at the large-scale wholesale level have not led to non-competitive pricing.

Sitko and Jayne (2014) study trader competition in four countries: Mozambique, Kenya, Malawi, and Zambia. Their data are from various sources: 205 farmer group discussions, 2,703 farmer interviews, 166 trader interviews, and 48 interviews with processors. On average, farmers receive over 80% of the retail/wholesale price from the next step in the supply chain. Local assemblers who purchase at the farm-gate pay 0–15% less than large wholesalers or processors to compensate for transport costs and for making purchases immediately after harvest. Farmers in isolated villages receive 83%–96% of the prices that farmers receive in more accessible locations. There is no way to determine whether this difference reflects the higher cost of working in remote villages, non-competitive rents, or both. But the survey data shows that 76% of isolated villages are served by 10 or more traders, compared to 82% of accessible villages; on the other hand, 12% of isolated village are served by 0–5 traders, as compared to 9% of accessible villages. These minor differences suggest that if non-competitive mark-ups are present, they are unlikely to be the main drivers of the lower prices received in more remote areas.

In sum, the findings of the third subgroup of papers in this section suggest that across various countries and time periods, barriers to trader entry at the first level of exchange—between farmers and traders—are minimal. There is descriptive evidence of greater barriers to entry at the level of wholesale exchange or inter-regional trade due primarily to greater risks and fixed costs. However, there is no positive evidence that these higher costs create natural oligopsonies or foster collusion.

Group 4: Experiments and Impact Evaluations

The final category of empirical tests includes impact evaluations based on randomized, controlled trials or natural experiments. All but one of the studies in this group involves an information intervention to provide farmers with market price data. These studies rest on the hypothesis that farmers and traders bargain over the sale price, with farmers being at a disadvantage because they have less information about other options available to them. These experiments jointly test the presence of trader rents, the relevance of the information provided, and the effect of information on farmer bargaining power.

These studies relate to possible barriers to entry from anti-competitive behavior by current traders (category E) because the underlying hypothesis is that traders use information asymmetries to extract rents. For such an arrangement to be maintained, some force must prevent other traders from entering the market and competing away the excess margins. Without such a barrier, there is no reason to believe that marketing margins reflect insufficient competition. This branch

of the literature should not be confused with papers that show how information and communications technology (ICT) reduces price spread between markets, such as Jensen (2007) and Aker (2010). These papers tell us how changes in trader costs lead to a new set of equilibrium prices; they do not provide evidence on the competitiveness of the market.

Svensson and Yanagizawa (2009) study the impact of radio information on producer prices in Uganda. Identification is made through variations in access to market information services that broadcast weekly price information over FM radio. Maize farmers with radios in treated districts receive a 15% higher price than those with radios in control districts, suggesting significant gains from information access. The main concern with this finding is that because the difference-in-difference is not fully specified —the level control for being in a treated district is not included in the main difference-in-difference regression (table 2, column iv)—treatment effects may have been driven by other unobserved differences between treated and control areas. Treated areas were those where the United States Agency for International Development (USAID) was active, and which therefore may have received other interventions.

Using panel data covering 2003–2005, Muto and Yamano (2009) study the effect of mobile phone network expansion on farm-gate prices for maize and bananas in Uganda. These authors find that network expansion had a positive and significant impact on the farm-gate price of bananas, but not of maize. They also find an increase in the sales volume of bananas in remote areas. The authors interpret the differential effects for bananas and maize as evidence that the perishability of bananas made segmentation and non-competitive pricing easier in the pre-treatment equilibrium.

Courtois and Subervie (2014) use propensity score matching to evaluate the impact of a text message (SMS) information service in Ghana on the prices farmers receive for groundnuts and maize. These authors find that the treated group received 10.4% higher maize prices and 7.3% higher groundnut prices than the control group.

However, Hildebrandt et al. (2015) implemented a randomized controlled trial (RCT) of the same service in Ghana (Esoko), and find no effect on maize or groundnut prices when variation in program access is exogenous. They do find a small effect (5%) on prices received for yams in the first year of the program, which disappears in year 2. The authors interpret this as evidence of a "bargaining spillover," in which traders are uncertain about farmer information and so bargain less aggressively with everyone. Yet, it is unclear why such spillovers would result from a research project involving only a tiny fraction of maize farmers and traders. There are alternative interpretations that do not require traders to have price-setting power, including *(a)* trader margins in year 1 may have been unsustainably low, resulting in exit or claw-backs in year 2; and *(b)* higher prices for everyone in year 2 may have been the result of higher wholesale prices for yams. On balance, the evidence in this paper suggests little to no impact of information on farmer prices.

One final paper bears mention here. Casaburi and Reed (2014) implemented a randomized experiment in Sierra Leone to study whether cocoa traders pass on quality premiums to farmers.[8] The intervention involved a price bonus to treated traders of 5.6% per unit of high quality cocoa brought to the wholesale market. Under competition, the premium would be passed on to farmers, minus any extra trader costs associated with quality screening. The motivation underlying this intervention relates to possible non-competitive barriers to entry (D, E, F), though the findings are ultimately informative for understanding market inter-linkages between traders and farmers (categories B and C). Casaburi and Reed (2014) report no significant effects on prices paid to farmers. However, farmers who regularly sell to treated traders were 14% more likely to receive credit than farmers selling to non-treated farmers. Additionally, traders were more likely to extend credit in villages where competition and cocoa volumes are high. The takeaway is that when markets are interlinked—as credit and output markets often are for cash crops—traders can pass on higher wholesale prices via mechanisms other than the farm-gate price.

To summarize, three papers report significant effects of information on farm-gate prices. Yet each is subject to important caveats. Svensson and Yanagizawa (2009) and Muto and Yamano (2009) find impacts on only some crops, and cannot exclude possible non-random access to the information service.

[8] This paper is technically outside of our scope because it does not involve food crops. We include it because it is the only paper we know of in SSA involving an experiment at the trader level.

The positive finding in Courtois and Subervie (2014) is contradicted by the null results for the same crops in Hildebrandt et al. (2015), which has a stronger identification strategy. Hildebrandt et al. (2015) find three null results and one positive effect that does not last beyond a season. Overall, while there is suggestive evidence that information leads some farmers to receive higher prices in some years, particularly for perishable crops, it does not appear that traders use information asymmetries to earn non-competitive rents on a large scale. This is consistent with most evidence from other regions, showing little effect on farm-gate prices from randomizing access to market prices (see Aker, Ghosh, and Burrell 2016; and the supplementary online appendix). Of course, lack of a treatment effect is not evidence that the market is competitive. For example, if traders are oligopsonistic and are aware of farmers' limited outside options, better information may not increase farmers' bargaining power.

Conclusion

The goal of this article has been to categorize and review the empirical evidence on the question of whether food crop markets in sub-Saharan Africa appear to be competitive in the post-structural adjustment era. We first developed a conceptual framework that summarized the competitive and non-competitive forces that can increase marketing margins above the level expected based on observables. We then reviewed the evidence in four sub-categories of the literature. Our overall conclusion is that the evidence is generally consistent with the notion that food markets are competitive.

There are a number of limitations to this review. For one, our focus has been primarily on food markets, rather than export-oriented cash crops that may be characterized by different levels of competition. Additionally, the evidence presented here is from only 13 countries—hardly a representative picture of sub-Saharan Africa. Also, we have not addressed the possibility of higher-level forms of non-competitive behavior, such as the lobbying of transporter organizations to prevent the expansion of rail trade. Finally, as we have discussed, there are substantial empirical challenges to detecting imperfect competition. The first stems from the possibility of selective participation in surveys by traders. The second is due to the inherent difficulties of distinguishing between non-competitive rents and unobserved costs borne by traders. Because of these difficulties, evidence on this question must come in the form of general tendencies that emerge from patterns in numerous and varied studies; "smoking guns" are unlikely to be found.

In addition, some of the factors raised by the framework have not been directly tested in the literature. We have very little quantitative evidence of explicit trader collusion, or of the effects of regulatory barriers on competition. Furthermore, there are few avenues available to researchers that deal with all of the possible competitive and non-competitive mechanisms simultaneously. It is much easier to reject a specific theory of non-competitive pricing than it is to simultaneously test all of the possible factors that might increase marketing margins above the level expected by observers.

Our review suggests little rationale based on current evidence for intervening in food crop markets to increase the level of competition between traders. However, claims of non-competitive trading are motivated by the genuine concern that many farmers may earn too little for their crops. Given the high rates of poverty and significant risks to small-scale farming across the region, there may be scope on social welfare grounds for some other forms of intervention. A recommendation about exactly what those interventions should be is outside the scope of this paper. But if there is a general lesson from this review, it is that intervening in the markets for private goods is not only difficult to do well, but may be premised on assumptions and suspicions that have not been rigorously tested.

Supplementary Material

Supplementary material are available at *American Journal of Agricultural Economics* online.

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