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PRICES AND FARMER INVESTMENT EVIDENCE FROM EXPERIMENTAL STUDIES



Smallholder farmers make up about 90 percent of the world's 608 million farms and are often poor and food insecure (Lowder *et al.*, 2019). Their livelihoods depend heavily on market prices for their goods – either sold from their farm (the farm gate) or at a market (where they sell directly or through an intermediary). To ensure stable prices and livelihoods, governments and private entities influence commodity prices through levers such as government price supports, international certification, trade policy, and commodity exchanges.

Through private or public commodity price regulation schemes, more stable, predictable, or higher prices can give farmers increased revenue and the potential to reinvest in their business. Unlike large- and medium-sized farmers who can respond more swiftly to policy changes, smallholder farmers' finances, productivity levels and food security may suffer if pricing policies ignore them. Recognizing this, governments are starting to implement price support

policies such as the ones in the cocoa sector in Ghana and Côte d'Ivoire.

This investment brief reviewed over 40 studies in low- and middle-income countries to assess the effectiveness of commodity pricing policies on farmer livelihoods and farm investment decisions. It focuses on whether commodity price policies lead to increased farmer investment, and which factors encourage farmers to invest. It discusses pathways to improve farmers' welfare through pricing and considers barriers such as transport, intermediaries and lack of information that prevent price transmission from benefiting farmers – especially when intermediaries are involved. The brief addresses key questions facing policymakers such as the extent to which price changes (from price arrangement policies) transmit to farmers, what barriers may prevent transmission, and how such price changes can influence investment decisions and economic and social outcomes in farming households.

Context and limitations

The timing of this brief is prescient given that Ghana and Côte d'Ivoire have introduced a minimum price for cocoa as a living income differential (LID) in the cocoa sector. The aim is to ensure that cocoa farmers receive a share of revenue (Boysen *et al.*, 2021). The measure will potentially affect nearly 2.5 million cocoa-producing smallholder farmers in these countries, who account for 70 percent of the world's cocoa supply. The European Union imports 74 percent of its cocoa from West Africa, highlighting the potential magnitude of the policy on farmer welfare and provides a potential lens through which policymakers can assess the measure.

A limitation of the review is that there is insufficient evidence to draw broad conclusions across contexts and commodities. Still, it is possible to highlight interventions in specific contexts where commodity price policies have positively impacted farmer welfare. In particular, public sector price support policies, including trade policy and quality upgrade schemes, shape transmission and welfare positively. By reducing uncertainty, contracts can lead to higher prices. Barriers such as the presence of intermediaries and lack of information can block price transmission and undermine welfare gains.



Pathways to improve smallholder welfare: minimum prices, trade, quality and contracts

Evidence on government price support initiatives is limited; it suggests they can reduce poverty, albeit with distortionary effects.

Smallholder farmers are vulnerable to price swings in the wider market. For instance, governments, such as those that comprise the European Union, set a price floor for cocoa farmers, levying an extra fee on cocoa buyers to raise cocoa prices. Countries also use buffer stock operations and subsidies to smooth prices and guarantee stable or higher incomes for farmers. Agricultural income support policies constitute a large part of government expenditure in economies such as India, though they can also distort commodity markets (Tomar and Narayanan, 2020).

In Ghana, the government's National Buffer Stock Programme (NAFCO) offers price support through buffer stock operations (BSOs) to protect smallholders' incomes. The government generally coordinates buying and selling a commodity to ensure its prices move within a specific band, providing predictability for farmers. Abokyi *et al.* (2020) found that BSOs increased incomes by 12 percent through effects on farm gate prices, with income, by unit of output, increasing by 17 percent.¹ The results indicate that age, gender, access to market and use of extension services, as well as transport and packaging costs, drive smallholder farmers' participation in BSOs. However, BSO participation alone does not drive increased income.

In a similar government programme in Madhya Pradesh, India, the Price Deficiency Payments (PDP) scheme (Bhavantar Bhugtan Yojana), pays the difference between the farm gate price and a fixed price floor, if the farm gate price falls below that for two major crops: urad (black gram) and soyabean. The government compensates farmers under the scheme if their selling price is lower than the minimum support price (MSP) (Tomar and Narayanan, 2020). The PDP scheme had high payouts for urad, causing a fall in the minimum price for farmers. This led to excess supply and thus lower prices for urad. Farmers earned less revenue because the government paid the difference between the floor and average sales price rather than the farmer's sale price even if it decreased more than the average sales price. To reduce the negative impacts from a dip in commodity prices, Tomar and Narayanan (2020) concluded that the government could instead pay the entire difference between the floor and sale price, which would shift the loss burden onto the government rather than farmers even if commodity prices dropped.

Trade policy affects price transmission to smallholder farmers, but outcomes vary by context.

The impact of trade on poverty and income distribution varies across countries and by policy instrument. Various trade policy dimensions, such as safety or quality standards and tariffs, shape price transmission to smallholder farmers differently. In theory, they raise prices and incomes for domestic farmers, but in practice this may not occur due to certain barriers (Artuc *et al.*, 2019). For instance, downstream prices, such as for domestic commodities, may react negatively to the effect of the prices in the upstream section of the same value chain that are higher due to import tariffs.

In Senegal, Maertens and Swinnen (2009) examined the effect of higher food safety standards – e.g. for produce

imported into the European Union – on the welfare of the vegetable producers in exporting countries. The study found the increase in standards raised incomes and reduced poverty by 14 percent. As a result of improved standards, smallholders moved from contract farming to large-scale integrated estate production, offering their labour to larger farms rather than switching production on their own farms in order to meet those standards. The authors note that while estate production is not happening at the expense of smallholder landholdings, it is important to consider the channel through which households living in poverty benefit: through labour markets instead of product markets.

¹ Methodological caveat: the authors use cross-sectional data, which has limitations when measuring the impacts of output price support, potentially better captured through dynamic analysis.

Despite potential benefits of more profitable export markets, farmers still grow crops for local consumption. Ashraf, Giné and Karlan (2009) evaluated the impact of a Kenyan programme helping smallholder farmers to switch to export crops, by offering in-kind loans for inputs, and marketing services for rice, cassava, and maize. These interventions increased export crop production (including first-time growers of these crops) and lowered marketing costs, leading to a 32 percent income gain for new adopters. However, farmers' inability to satisfy European Union export requirements over the longer term led to the cancellation of the programme a year later. One potential policy solution is to cover the substantial infrastructure and maintenance costs to help farmers achieve and maintain these standards.

In international trade, "dumping" occurs when producers sell products abroad at a lower price than the domestic sales price or lower than the cost of production cost. In response to dumping claims by catfish producers in the United States of America, the Department of Commerce (DoC) introduced tariffs in 2003 on imported frozen catfish from Viet Nam. Brambilla, Porto and Tarozzi (2012) studied the effects of the import tariff on Vietnamese catfish farming households and found significantly lower income growth among these households. The trade shock forced Mekong farmers to stop catfish production and expand to other agricultural products such rice production.

Edwards (2019) examined the impact of Indonesia's palm oil export expansion on poverty and household consumption in rural communities. The fourfold increase in exports since 2000 is the world's largest modern agricultural expansion with strong poverty reduction and broad consumption gains for palm oil producing regions. These positive effects came not only through expanding palm oil crops onto additional lands, but also increasing returns to

labour and land (e.g. changing crops and practices). The time taken from planting to exporting is often long and income gains do not come immediately: e.g. smallholders must switch livelihoods, prepare land, plant trees and wait for the first harvest two and a half years later. Changes in behaviour and reduced poverty were driven mostly by future demand and alternative livelihood opportunities rather than short-term changes in socioeconomic conditions or commodity prices.

Governments use export taxes to shield against revenue losses from declining prices and deteriorating agricultural commodity trade in some developing countries. Soumahoro (2017) examined the effect of export taxes on cocoa farmers' living standards in Côte d'Ivoire. They exploited the 75 percent differential in tax rates faced by exporters in the southern part of the country relative to the north to measure the effects of export taxes on farmer livelihoods. Cocoa farmers in northern provinces with lower tax rates experienced higher living standards after the implementation of the tax policy. The research suggests transmission of international prices to local producers is one mechanism through which export tax incentives contribute to improved farm household living standards. It also suggests that exorbitantly high export taxes adversely affect farmers' earnings and living standards.

Overall, these studies suggest government price support programmes help improve smallholder livelihoods by reducing price risk or increasing income but they may also create market distortions. The literature also suggests that export production reduces poverty through price increases, even when product standards are high. However, outcomes vary considerably depending on the commodity, the labour market, the type of support policy, the market structure (e.g. whether competitive or not), and country.



Quality upgrading schemes can affect income positively, but only under certain conditions

Certification systems, such as Fairtrade, set and monitor voluntary standards for social, environmental and economic sustainability. They generally include bundles of interventions to raise standards, enhance farmer capacity, develop supply chains, apply labour standards and stabilize or standardize prices (Oya *et al.*, 2017). Certification and quality upgrading schemes can raise smallholder income if they do not create burdensome requirements that outweigh the benefits of participation.

However, smallholder farmers may struggle to meet the standards to participate in international markets. New technologies to improve quality may help, but farmers may be unaware how to access or use them, they may have limited access to credit to buy them, and may be uncertain of their future benefit – i.e. that they can earn a higher price for better quality production (World Bank, 2020).

In Senegal, Deutschmann, Bernard and Yameogo (2021) designed a new contract offered through cooperatives that provided credit for a groundnut quality-improving technology (Aflasafe), training in it, and a guaranteed price premium conditional on quality certification. Producers offered the contract were more likely to purchase and use the technology, delivered significantly higher quality groundnuts and increased sales to the cooperative.

Abate and Bernard (2017) examined Ethiopian farmers' uncertainty around financial returns from investments in quality enhancing technologies and the role of information in reducing this uncertainty. Despite positive returns from improved quality, farmers often lacked information about proper grades, standards and certification systems. A short video that made information available to farmers led to significant changes in commercialization. It prompted them to assess wheat quality, examine the accuracy of the buyer's equipment and contact more than one buyer before selling wheat. The training increased the share of output sold, price received, fertilizer used and collective marketing. Further information on improved technologies and commercialization could prove effective in increasing adoption and greater returns from quality enhancing technologies.

Bernard *et al.* (2017) found similar results through an intervention that attempted to increase quality recognition in market transactions for onion producers in Senegal, selling onions by weight instead of volume with quality certification. This led to significant investments by farmers in quality

recognition, using more quality enhancing, instead of volume enhancing, fertilizers, and sorting onions to grade bags by quality level. Prices were higher for same yields, leading to significant income gains for farmers. The results suggest farmers can respond to price incentives by changing their production and marketing practices.

Several other studies found that certification increased farmers' incomes. Tran and Goto (2019) found that adopting sustainability standards increased selling prices, sales volume, and net income of small-scale speciality green tea farmers in Viet Nam. Becchetti, Conzo and Gianfreda (2011) found that Fairtrade certification and organic farming practices boosted incomes for Thailand's rice farmers. Macchiavello and Miquel-Florensa (2019) studied a coffee quality programme in Colombia and found that farmers upgraded their plantations, expanded land under coffee cultivation, increased quality, and received higher farm gate prices. Dragusanu, Montero and Nunn (2021) found that Fairtrade led to greater sales, higher prices and more revenue in Costa Rican coffee mills from 1999-2014. They also found that certification gave farm owners higher incomes, but it had no effect on unskilled workers.²

Not all studies indicate positive results from quality upgrading for farmers. In Ethiopia, Minten *et al.* (2018) found that producers received only one-third of the quality premium directly from Fairtrade and organic certification of coffee. Further, small quality premiums and low average production implied that only coffee farmers with incomes of USD 22 or more per year increased their income even with perfect transmission and, overall, this had little impact on farmer welfare.

Oya *et al.* (2018) found mixed evidence on the effects of certification systems on a range of socioeconomic outcomes for agricultural producers and wage workers in developing countries. Certified farmers enjoyed higher positive effects on prices and income from the sale of produce. However, overall household incomes did not increase and there was no statistically significant impact on assets or wealth. Oya *et al.* (2018) concluded these schemes operate in complex social, institutional, and economic contexts with varying outcomes. Specific enabling conditions and characteristics – such as location, crop, information availability, labour force makeup and institutional quality – allow schemes to transmit the intended benefits to their participants.

² However, evidence from experimental and quasi-experimental studies – beyond the methodological scope of this review – suggests that in some contexts Fairtrade price floors lead to certification of more output than can be sold, eroding producer benefits.

Contracts can contribute to higher prices and reduce uncertainty

Agriculture contracts vary in terms of services, credit arrangements, payments, and price-setting mechanisms (FAO, 2021). While governments and donors promote contract farming as part of agricultural development policies, questions remain around whether smaller farmers can benefit from these institutional arrangements (Ton *et al.*, 2017).

Contracts contribute to higher prices and smallholder incomes and reduce uncertainty (Bellemare, 2012). The literature highlights that the primary benefit to farmers is reducing price risk, through a simple contract or mechanisms such as training inputs on credit.

For example, in Benin, Arouna *et al.* (2019) found that contract farming had a positive and significant impact on the scale, productivity, and commercial orientation of rice processing farms. Contract farming households increased the area planted with rice by 23 percent, yields by 29 percent, and per capita income by half. Deutschmann, Bernard and Yameogo (2021) found that contracts with training, credit, and reduced risk for Senegalese groundnut producers increased purchases and technology adoption, improved production quality, and increased average sales to the cooperative.

Ton *et al.* (2017) reviewed contract farming effectiveness in 13 countries and found it increased smallholders' income, on average, by 63 percent. However, many contracts benefited larger farms and left out the poorest farmers, potentially because wealthier farmers have market alternatives and can take more risks, so are able to opt out of unprofitable contracts (Ton *et al.*, 2017). Contract farming needs to offer clear incentives to farmers to participate.

Similarly, Meemken and Bellemare (2020) found that contract farming raised farmer incomes by 10 percent on average compared to non-contract farms and increased

the demand for hired labour in six countries (Bangladesh, Côte d'Ivoire, Mozambique, Nigeria, United Republic of Tanzania and Uganda).

Cooperative memberships, where farmer-producers pool their resources to meet common needs, also help reduce risk. Evidence shows that cooperative memberships benefit farmers, but wealthier farmers tend to accrue the benefits. For example, Gelo *et al.* (2020) recently evaluated the World Food Programme's (WFP) Purchase for Progress (P4P) programme in Ethiopia. The P4P invests in physical and human capacities of farmer organizations (FOs) to aggregate commodities and add value. Gelo *et al.* (2020) found that the P4P intervention increased per capita smallholder consumption, including food, investments in child schooling, and asset holding. However, farmers with fewer resources were less likely to benefit owing to elite capture within the organizations, often dominated by powerful management committees.

Institutional quality matters for contract enforcement and effectiveness in Viet Nam (Saenger, Torero and Qaim, 2014). For example, buyers who offer contracts with financing or inputs risk farmers diverting inputs to other crops or selling their output to other buyers. Farmers run the risk that the purchasing company may have a non-transparent system of grading quality and they may thus manipulate prices. Saenger, Torero and Qaim (2014) found that product quality verification and contract enforcement by an independent agency led to increased input use and output levels (quantity of milk fat and total solid), meaning higher revenue and household welfare for dairy farmers in Viet Nam. From a policy standpoint, independent monitoring could help overcome asymmetric information in cases where quality testing may be costly or complex.



Substantial barriers can block commodity price transmission to smallholder farmers

Facing high transaction costs or complicated supply chains, farmers may underinvest in agriculture. For instance, geographic remoteness coupled with a lack of rural infrastructure can raise substantial barriers to price transmission for smallholder farmers, especially with respect to accessing

markets. Traders may charge farmers high fees to transport goods, distorting prices and reducing farmer incomes. Well maintained transport infrastructure reduces costs significantly, leading to more favourable outcomes for smallholders.

Intermediaries can both help and hurt farmers

Intermediaries facilitate the flow of money and outputs between farmers and the market. They include traders who purchase commodities from farmers and deliver them to markets where they are sold to consumers, as well as trade organizations dealing with single commodities, such as cocoa. Given their diverse contexts, intermediaries' effects on farmers vary by market, their local power and sector.

Greater competition among traders in intermediary-dominated markets is a prerequisite for policies such as paving rural roads, implementing market price intelligence systems and uniform quality to improve consumer and farmer welfare (Bergquist and Dinerstein, 2020). In Kenya, for example, intermediaries exert considerable power in the rice, cassava, and maize markets, capturing 82 percent of total surplus. They pass only a small proportion of cost

savings onto consumers (Bergquist, 2017). Similarly, in the West Bengal potato value chain in India, marketing intermediaries earn large margins but do not fully pass on wholesale price changes to farmers (Mitra *et al.*, 2018). In Ecuador, their market power often leads to a wide gap between prices received by domestic farmers and export prices; that is, farmers earn significantly less than the market prices for cash crops (Zavala, 2022).

The cocoa market in Sierra Leone offers insight into a mutually beneficial farmer-intermediary relationship. Although traders do not pass on much of the price to farmers, they very likely provide credit to farmers, suggesting that intermediaries transfer value to producers through channels other than prices (Casaburi and Reed, 2021).

Price information is necessary but not sufficient for farmers to attain better outcomes or invest more

Information on prices, market conditions and new technologies helps farmers to make optimal management decisions. The internet and text messaging systems have enabled farmers to obtain real-time information about commodity pricing. Ideally, farmers use information to make better decisions about whether and where to sell their goods, as well as navigate the complex network of commodity market participants.

In two information interventions in Ghana, farmers received better prices for their goods as a result of more information. In northern Ghana, farmers using a short message service (SMS) based Market Information System (MIS) programme received significantly higher prices for maize and groundnuts, about 10 percent more for maize and 7 percent more for groundnuts than they would without the MIS programme. In a different evaluation, providing rural farmers with commodity price information via text messages

gave them increased bargaining power and a sustained positive impact on the prices they received: a 9 percent increase, on average.

However, information alone may not be sufficient to receive higher prices, reduce poverty, or increase investments. Fafchamps and Minten (2012) found that sending agricultural information to farmers in Maharashtra, India via SMS did not have a significant impact on the price they received. The imbalance in market power between farmers and traders at Maharashtra markets could be a factor behind the ineffectiveness of price information. Similarly, in Colombia, Camacho and Conover (2019) found that price and weather information via SMS changed farmers' perceptions of prices, but did not seem to affect actual sale prices. Surveys indicate farmers found the information useful, and on average it reduced the probability of weather-related crop loss.

Main takeaways

Commodity prices, and the policies to manage them, profoundly shape the investment decisions and livelihoods of smallholder farmers in low- and middle-income countries. While many public and private sector programmes aim to directly benefit smallholders, the evidence base is mixed on whether they actually achieve the intended effects. Often,

farmers face trade-offs and distributional effects of price changes that impact on their incomes and investments. Barriers to price transmission such as transport quality, information flows, and intermediary market power may also limit the benefits from high commodity prices, though this varies by geography and commodity type.

FACILITATING PRICE TRANSMISSION FOR SMALLHOLDERS

The review on price transmission in low- and middle-income countries' agricultural markets highlighted seven key messages.



This review highlights that even if the impact of commodity pricing policy on smallholders' welfare may be small, the welfare impacts for specific groups of farmers may be larger than other groups. As policymakers design and implement policies and initiatives around commodity pricing and evaluations to measure their effectiveness, it is important to consider the relative differences in wealth, land ownership,

technology adoption, region, and household composition, all of which have been shown to affect whether farmers benefit from pricing arrangements. From an investment perspective, taking these barriers into account while designing commodity price programmes and policies can help enhance farm level income and investment.

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Abbreviations and acronyms

3ie	International Initiative for Impact Evaluation	NAFCO	National Buffer Stock Programme
BSOs	buffer stock operations	ODI	Overseas Development Institute
DoC	Department of Commerce, United States of America	P4P	Purchase for Progress
FAO	Food and Agriculture Organization of the United Nations	PDP	price deficiency payments
FOs	farmer organizations	RCT	randomized controlled trial
IPA	Innovations for Poverty Action	RDD	regression discontinuity design
J-PAL	Abdul Latif Jameel Poverty Action Lab	SMS	short message service
LID	living income differential	SP	selling price
MIS	Market Information System	SSA	sub-Saharan Africa
MSP	minimum support price	VSS	voluntary sustainability standards
		WFP	World Food Programme

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