Conditional Contracts in Indirect Local Procurement

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1 Context and description of maize value chains in Uganda

Maize is one of the most widely cultivated staple crops in Uganda, serving both as a vital food security crop and a key source of income for farmers. Recognizing its importance, the government has prioritized maize production as part of its agricultural strategy to support household livelihoods and strengthen national food security. Maize accounts for approximately 30% of the total cropped land in Uganda, making it the most extensively grown crop, followed by beans at 15% (Uganda Annual Agricultural Survey, 2018).

A typical maize value chain in Uganda involves a network of interconnected actors. At the upstream level, agro-input dealers supply essential inputs such as improved seeds and fertilizers to smallholder farmers. These farmers, in turn, cultivate maize by combining these inputs with land and labor. Once harvested, the marketable surplus is sold to traders, who transport the grain to processors. Processors then transform the raw maize into final products, such as maize flour, which is distributed to retailers and ultimately purchased by consumers. Figure 1 provides an illustration of a stylized maize value chain in Uganda.

Most farmers in Uganda continue to rely on traditional farming methods with limited use of modern agricultural inputs. While some purchase improved seed varieties, such as hybrids or open-pollinated varieties (OPVs), many still depend on saved seeds from previous harvests, constraining potential yield improvements (McGuire and Sperling, 2016). Despite government efforts to promote

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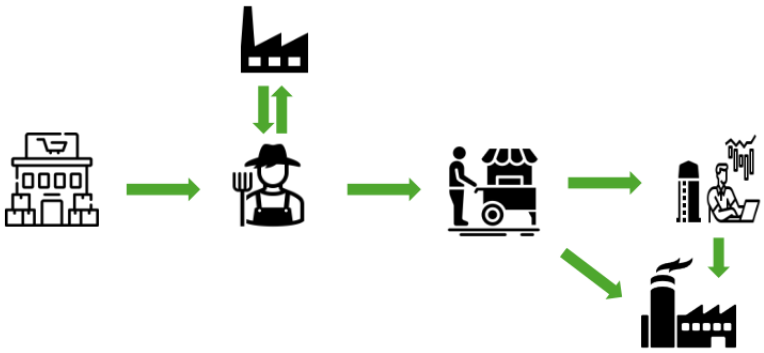

Figure 1: A canonical maize value chain

input use, challenges related to affordability and accessibility persist. Agro-input dealers, primarily based in towns and trading centers, supply essential inputs such as improved seeds, fertilizers, pesticides, and farming tools. However, rural farmers often struggle to access high-quality inputs due to distance, cost barriers, and supply chain inefficiencies. Additionally, concerns over counterfeit or substandard products further discourage investment in improved technologies, as studies have shown that input quality issues are a significant deterrent for farmers (Barriga and Fiala, 2020; Ashour et al., 2019; Bold et al., 2017; Miehe et al., 2023).

As a result of traditional farming methods, maize productivity remains low, with average farm yields of about 600 kg per acre, considerably lower than the potential yields reported by research stations, which range from 730 kg to 1,820 kg per acre (Fermont and Benson, 2011; Gourlay, Kilic, and Lobell, 2019). Furthermore, harvesting in Uganda is largely manual, and post-harvest handling remains a significant challenge. Farmers typically dry maize under the sun before shelling and storing it, but inadequate drying techniques and poor storage facilities lead to high post-harvest losses. Common storage methods include traditional granaries and polypropylene bags, though both are vulnerable to pest infestations and moisture buildup, further deteriorating grain quality. These post-harvest inefficiencies contribute to reduced market value and increased vulnerability to seasonal price fluctuations.

Market access is another key challenge for maize farmers. Many smallholder farmers sell maize through informal channels, including farmgate sales to itinerant traders who aggregate maize in trading centers and small towns. Small traders, often using bicycles or motorbikes (boda-bodas), play a crucial role in linking farmers to markets, yet their capacity is constrained by transportation limitations, storage capacity challenges, and fluctuating demand. Wholesale traders purchase maize in bulk—often from small itinerant traders based in

rural areas—and supply it to processors or exporters.

The role of traders is often contested, and indeed many development interventions supported by NGOs try to "cut out the middlemen". This is because traders, both small and large, also engage to some extent in arbitrage to capitalize on price seasonality, buying up maize grain from farmers immediately post harvest when prices are low and selling during the lean season when maize is scarce and prices are high (Van Campenhout, Lecoutere, and D'Exelle, 2015; Burke, Bergquist, and Miguel, 2019). At the same time, research also shows that traders enhance market participation, particularly for remote farmers who would otherwise struggle to sell their produce (Barrett, 2008; Mather, Boughton, and Jayne, 2013; Sitko and Jayne, 2014). However, inefficiencies in aggregation, storage, and transportation continue to limit the overall competitiveness of Uganda's maize sector.

Processing is another critical node in the value chain, where maize is transformed into flour, primarily consumed as *posho*—a staple dish made by cooking maize flour with water into a porridge or dough-like consistency. Processing businesses vary widely, from small-scale mills powered by combustion engines (*baga-baga*) that provide milling services for local farmers to large-scale industrial processors that produce fortified maize flour for commercial distribution. High-quality maize flour production requires multiple milling passes and advanced machinery, with some mills equipped for packaging and export.

Uganda's maize flour retail sector is shaped by strong demand, price sensitivity, and evolving consumer preferences. As a staple food, maize flour is consumed widely across all income levels, with demand driven by population growth, urbanization, and food security needs (Erenstein et al., 2022). While formal retailers offer branded, high-quality maize flour, most consumers—especially in rural areas—still rely on informal markets and local mills due to affordability and flexible purchasing options. Regional dietary habits also play a role, with higher maize consumption in northern and eastern Uganda, while central regions traditionally favor matooke. Government policies also impact price and availability, influencing consumer behavior. For instance, under Uganda's Food and Drug Act, producers of maize flour are required to fortify their products with a regulated blend of vitamins and minerals aimed at reducing national micronutrient deficiency.

2 WFP Conditional Contracting

Uganda is a relatively stable country in a region affected by conflict and food insecurity (Upton and Hill, 2011). As a result, it is a key contributor to the World Food Programme (WFP), the world's largest humanitarian organization, which buys more food commodities for its food assistance programs from Uganda than from any other low- and middle-income country. In 2018, WFP invested 50 million USD in the Ugandan economy and purchased over 188,000 metric tons of local food commodities—mainly maize, sorghum and beans—through open tendering from large traders (World Food Programme, 2019).

WFP's food assistance programs support disadvantaged populations, including food-insecure households, young children and refugees and internally displaced persons. In Uganda, these programs help address food insecurity and malnutrition and support the growing refugee population while bolstering the country's national social protection system; particularly important given that Uganda is currently Africa's largest refugee hosting country (Global Compact on Refugees, 2018).

Smallholder farmers have been a core focus of WFP's procurement policies for at least two decades. In 2004, the "Food Procurement in Developing Countries" policy was initiated, recognizing the role WFP had to play in developing markets, supporting small traders and farmers' groups and using procurement to encourage smallholder farmers and farmer groups to enter reliable and lucrative markets (World Food Programme, 2006). In 2007, WFP's Home-Grown School Feeding (HGSF) program was launched with the support of the Bill and Melinda Gates Foundation, once again emphasizing the need for local procurement from small producers.

Building on the HGSF but greatly expanding its scope and ambition, WFP then launched a 20-country pilot of its Purchase for Progress (P4P) initiative in the wake of the 2007-08 food price crisis. P4P explored procurement modalities with the potential to improve agricultural outcomes and develop country-level food markets in a way that would benefit smallholder farmers (World Food Programme, 2015). In addition to its focus on high quality locally sourced food commodities, the P4P pilot initiative also aimed to strengthen the capacity of smallholder farmers and farmer organizations and to build linkages to input and service providers and processors (World Food Programme, 2015).

Uganda was one of the pilot countries for the P4P initiative, along with Ethiopia, Kenya, Rwanda, South Sudan and Tanzania in east Africa, and other countries in central, southern and western Africa, Asia and Latin America. Evidence of the impacts of the P4P initiative is mixed: early studies indicate that it improved farmers' access to markets and post-harvest handling (Davies and Menage, 2010 as cited in Upton and Hill, 2011) and improved gender equity (World Food Programme, 2015), though Lentz and Upton (2016) do not find evidence of improved farmer wellbeing in the context of Tanzania despite greater commercialization. In Uganda specifically, large-scale local procurement by WFP appears to have accentuated price speculation among traders and resulted in an equilibrium where two types of maize quality exist: high quality, sold to WFP, and low quality, directed towards the local market (Upton and Hill, 2011).

Despite the fact that 80-90% of food procured was produced by smallholder farmers, WFP procures only a small fraction directly from smallholder farmers via farmer organizations (Leao et al., 2021). An analysis of Uganda's maize value chain revealed fragmentation, lack of integration among players and lack of credit and access to transport for farmers (World Food Programme, 2019). Using regular contracts and open tendering with large traders resulted in about 50% of the cash (market value) reaching smallholder farmers, suggesting that employing both indirect and direct pro-smallholder contract modalities could

address imbalances in the maize value chain, potentially increasing benefits for smallholder farmers (Leao et al., 2021). To tackle this, WFP shifted to various contract modalities including both direct and indirect conditional contracts to ensure that smallholder farmers benefit from WFP's stable demand (World Food Programme, 2019).

WFP's current Local and Regional Food Procurement Policy (LRFPP) policy was approved in 2019 and began being implemented in 2020 (World Food Programme (WFP), 2024). Uganda was one of the first countries to implement the indirect conditional contracts to procure maize, instituted in 2021. Under this type of contract, 20% of the total volume of maize provided by traders must be sourced directly from smallholder farmers, with evidence of purchase (traceability evidence). This conditional contract is the focus of this study.

3 Methods

3.1 Research questions

The overall goal of the study is to assess the impact of the indirect conditional contracts between WFP and large maize traders on maize value chain transformation or upgrading. Within this broader goal, our study poses the following research questions:

- What is the impact of the conditional contract on key outcomes—price realization, quality standards, amount sold, household income and other welfare indicators—of actors along the value chain, especially for smallholder farmers and small maize traders?
- Does the conditional contract create access to reliable markets, result in value chain transformation or upgrading, e.g., through improved quality standards, and support sustained market engagement between traders and farmers?
- Does the presence of a formal/institutional buyer in an area (e.g. a WFP-affiliated trader or contract scheme) indirectly improve outcomes for nearby smallholders and traders who are not directly contracted? A large buyer requiring higher quality or offering better prices might spur spillover effects – non-participating farmers could adopt improved practices or get higher farmgate prices due to demonstration or competitive pressure, and independent traders might adjust their buying strategy.
- What are the challenges or barriers faced with respect to conditional contracts? How well are these contracts being implemented on the ground?

3.2 Data and identification

The study took place in Western and Central Uganda (see Figure 2). Maize cultivation plays a vital role in the agricultural landscape of Western and Central

Uganda, serving as both a staple food and a key cash crop for rural households. In these regions, maize is widely grown by smallholder farmers who rely on it for household consumption, income generation, and food security. Additionally, the growing demand for maize from urban markets and agro-industrial processors (both for consumption in Uganda or neighbouring countries) has increased its commercial value, encouraging investments in improved production practices and inputs. Furthermore, large parts of eastern Uganda that used to be known for maize production have converted to sugar cane production (Guloba et al., 2023).

The survey for the study of conditional contracts aimed to gather data from three distinct types of actors: smallholder farmers, small traders who act as intermediaries between these farmers and large suppliers, and the large suppliers themselves. In a first step, farmers were selected randomly after stratifying them into three groups (Figure):

- Group 1: Smallholder farmers from the traceability lists of WFP linked suppliers in four districts: Kasese, Kyegegwa, Kiryandongo, and Masindi.
- Group 2: Farmers who reside in the same four districts but do not sell to the major buyer's linked suppliers (that is, the nearest neighbor of each Group 1 farmer that is not supplying to a WFP linked supplier).
- Group 3: Farmers residing in two districts (Kabarole and Hoima) with characteristics similar to those of Group 1, but where the WFP was not procuring.

Traders were identified through referral by farmers. For traders, we only have two groups: those that are operating in areas where WFP was active and those that are operating in areas where WFP is not active. Sample sizes are in Table 1.

The primary identification strategy involves comparing mean outcomes across groups of actors. Beyond assessing differences between individuals in areas exposed to WFP's indirect contract policies and those in control areas, we also examine potential spillover effects at the farmer level. Specifically, within regions where WFP is active through indirect procurement, we distinguish between farmers who are directly linked to participating wholesalers and those who are not. This approach allows us to assess whether improved market access mechanisms—such as conditional contracts or institutional buyers—yield broader community benefits or primarily advantage those directly engaged.

Survey data were collected on general household characteristics of farmers and traders, including welfare and food security indicators. The primary focus, however, was on marketing behavior. We gathered detailed information on farmers' maize sales following both the first and second agricultural seasons of 2023, and on maize cultivation during the first season of 2024. For traders, data were collected on both purchase and sales transactions for the 2023 seasons. Additional data were gathered on actors' core business activities—for farmers, this included agricultural technology use and labor inputs; for traders, this encompassed handling and storage practices, as well as access to finance.

Table 1: Achieved samples of maize farmers and traders by stratification group

Group/Farmer type	Achieved sample	Men	Women	Achieved sample	Men	Women
Group 1: Conditional contract farmers	392	176	216	143	139	4
Group 2: Spillover farmers	389	178	211			
Group 4: Control group farmers	503	270	233	154	147	7
Total	1,284	624	660	297	286	11

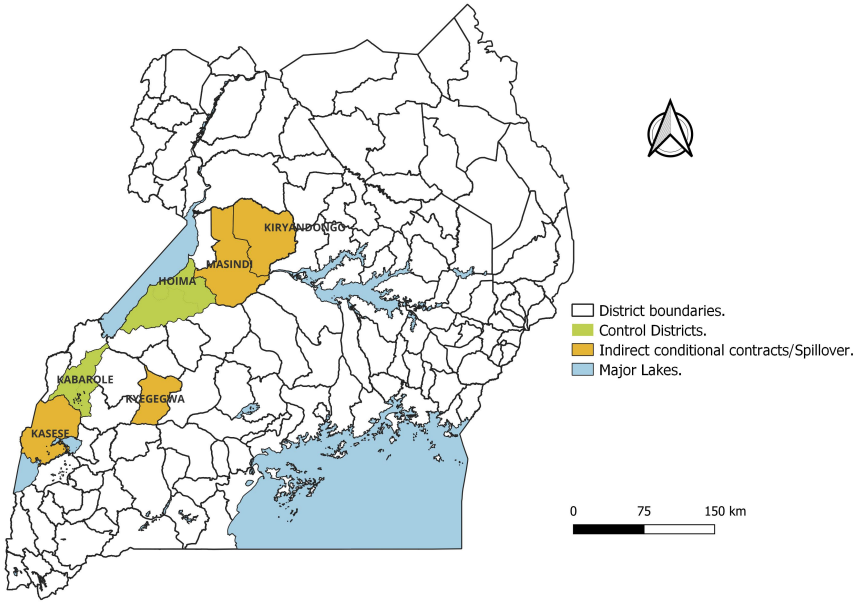

Figure 2: Study area

Regarding actual engagement with WFP, our data reveal that only about 30% of farmers in policy-exposed areas delivered maize to a WFP-affiliated trader in either season of 2023. From the WFP-linked farmer list, approximately 23% reported selling directly to WFP or through a connected trader. Among spillover farmers, this figure drops to 12%. In contrast, no farmers in control areas reported any sales to WFP, whether directly or indirectly.

4 Analysis

Overall, if there are no real difference between the first season of 2023 and the second season of 2023, we will report outcomes for season 2023.

4.1 Reliable market access

Do farmers in different groups have different types of storage?

4.2 Inclusivity

We also asked traders what percentage of buyers are women. Figure 4 shows that about 30 percent of farmers are women. We see that this percentage is slightly higher in areas where the policy is implemented. Similarly, we find that about 30 percent of farmers can be classified as youth, but this seems to

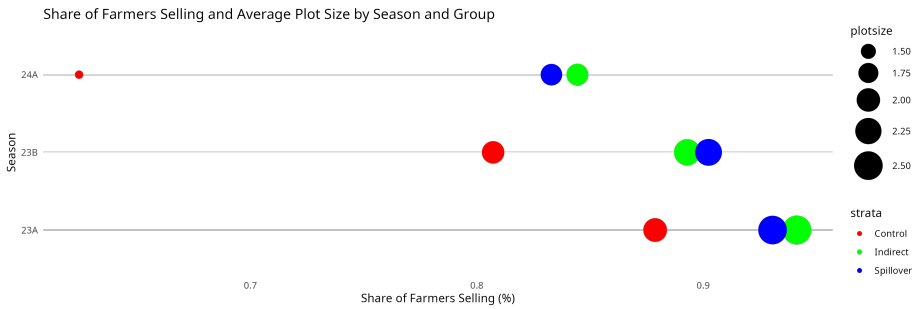

Figure 3: Production

be similar in both groups. Finally, we asked traders about the percentage of smallholder farmers in their customer base. Also on this inclusivity indicator, we see progress in areas where the policy is implemented, reaching almost half of the sellers being smallholders.

Let us also have a quick look at prices in the different groups using farmer level data. Let us start by looking at prices received during transactions in the first season by interacting gender with group. We start with simple regressions.

Table 2:

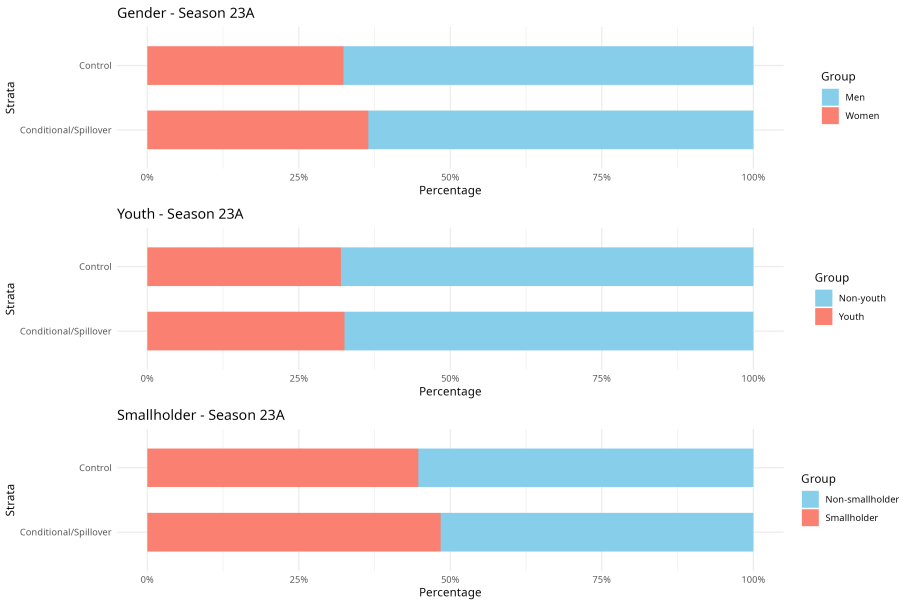

Figure 4: Gender, age and scale of farmer bought from

Table 3: Regression Results: Price Analysis

	Dependent variable:						
	Price						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
strataIndirect	43.733*		50.460		40.470		55.233*
	(22.966)		(34.108)		(27.025)		(30.209)
strataSpillover	35.254		51.593		39.746		51.824
	(24.053)		(34.392)		(28.881)		(34.547)
genderMale		0.217	15.252				
		(19.504)	(31.141)				
strataIndirect:genderMale			−11.656				
			(46.240)				
strataSpillover:genderMale			−32.022				
			(48.464)				
youth				26.421	27.900		
				(21.457)	(35.862)		
strataIndirect:youth					5.820		
					(51.693)		
strataSpillover:youth					−21.021		
					(52.994)		
small						−6.693	4.555
						(20.093)	(32.895)
strataIndirect:small							−27.019
							(48.359)
strataSpillover:small							−25.545
							(50.273)
Constant	760.711***	784.587***	752.091***	777.058***	753.874***	792.882***	763.376***
	(15.406)	(14.113)	(23.412)	(11.541)	(17.753)	(13.222)	(19.642)
Observations	636	636	636	636	636	612	612
R^2	0.006	0.00000	0.007	0.002	0.009	0.0002	0.008
Adjusted R^2	0.003	−0.002	−0.001	0.001	0.001	−0.001	−0.0001
Note:							*p<0.1; **p<0.05; ***p<0.01

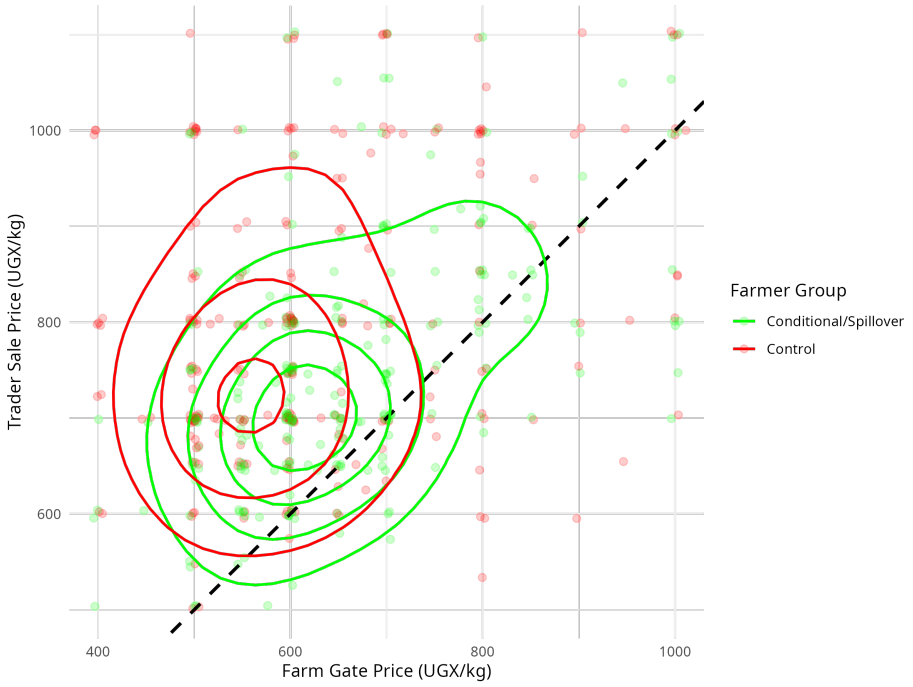

Figure 5: Price margin analysis using trader level data

4.3 Impact on key outcomes

4.3.1 Price margin analysis

A key question that many value chain studies address is how rents are distributed over different value chain actors. A convenient way to illustrate this is by price spread plots, that plot prices received by the actor upstream (eg the farmer) against prices received by the actor downstream (eg the trader). One can then plot a 45 degree line, were prices paid to upstream actors are equal to prices received from downstream actors. As such, points above the 45 degree line represent transactions were the downstream actor earns a positive margin, while points below the 45 degree line are instances where a loss is incurred as commodities are sold at lower prices than at which they were bought.

We start by using data at the trader level, who were asked about both prices at which they buy maize (mostly from farmers) and prices at which they sell maize further downstream (mostly to wholesale traders - see Section 4.3.3).

We can also combine data at the farmer level with data at the trader level to triangulate the findings above. Figure 6 calculates average prices obtained from sales to traders as reported by farmers and compares this to prices that traders report to be getting in onward sales (to eg. WFP, larger processors, etc, see also Section 4.3.3 below)

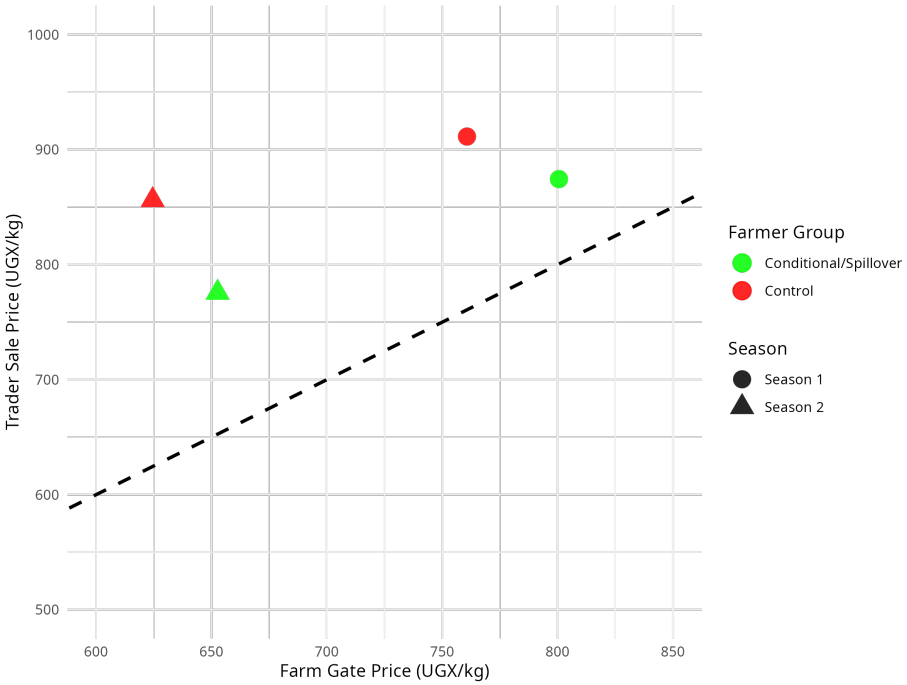

Figure 6: Price margin analysis combining farmer and trader level data

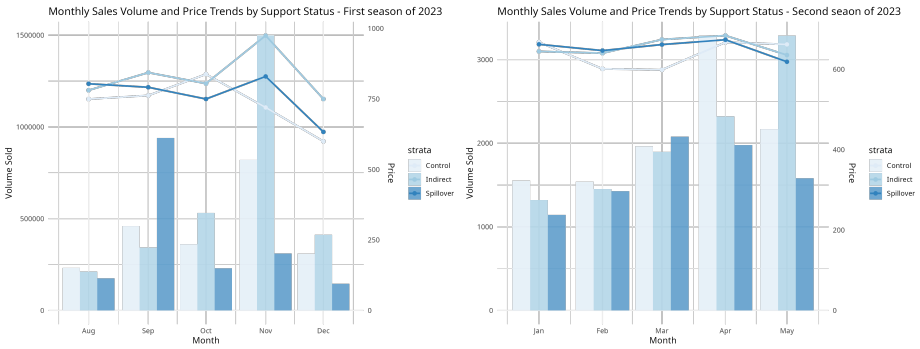

Figure 7: Prices and volumes in each month

Figure 6 shows that in areas where WFP was active with Indirect conditional contracting, intermediaries caputre less of the rents than in control ares. For example, in the first season of 2023, farmers sold maize at about UGX800 per kg, while traders sold at about 875, implying a margin of about 10 percent. In the control areas, farmer sell at about 750, while traders sell at 900, implying a margin of 20 percent. We also see that the margin reduces with overall price levels. In the second season of 2023, farmers in the treatment areas sold at 650, while traders sold at 775, implying a 20 percent margin; in control areas the margin increase to 36 percent.

4.3.2 Sales over time

In this part, we restrict attention to non AMS farmers that made transactions between August and December 2023 (following the first season of 2023). Farmers report up to 4 separate transactions, but most (94 percent) report only a single transaction.

We also look at sales transactions following the second season, with sales taking place between Jan and May 2024

Figure

4.3.3 Commodity flows

We start by using trader level data to look at commodity flows within maize value chains. In particular, we asked traders about maize purchase and maize sales in both the first and second season of 2023. In particular, we asked how much maize you purchased in the 1st season of 2023 (purchase_2023A) as well as in the 2nd season of 2023 (purchase_2023).

We assume that all maize that was procured was also sold.

Looking at farmer data, we find that virtually all sales are to traders

Notes: One of the ideas we had for identification was the exploit the fact that farmers may not sell to only one trader and maybe some would sell to WFP traders and normal traders. Unfortunately, most farmers report only a single

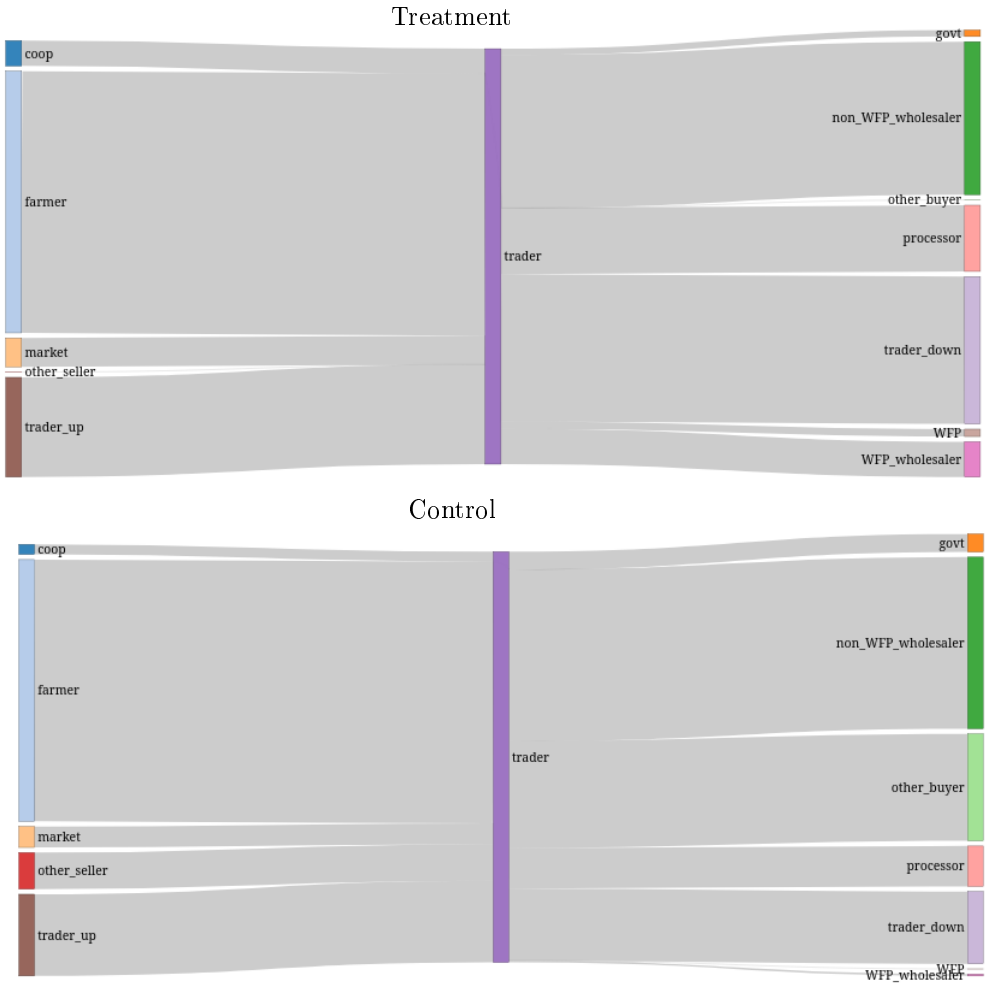

Figure 8: Commodity flows

transaction; only about 130 farmers report more than one transaction and it would be unlikely that all these farmers are selling to a WFP trader in at least one occasion. I ran a quick simulation to what the MDE for a price effect would look like and it seems we would only have reasonable power for effects that are larger than 16 percent, so I parked this idea for now...

5 Conclusion

We find significant price effects from indirect conditional contracts, with farmers affected by the policy receiving better prices for their maize and consumers paying lower prices.

We find that indirect conditional contracts have community-wide benefits or only help those directly involved.

References

Ashour, M., D. O. Gilligan, J. B. Hoel, and N. I. Karachiwalla. 2019. "Do beliefs about herbicide quality correspond with actual quality in local markets? Evidence from Uganda." *The Journal of Development Studies* 55 (6): 1285–1306.

Barrett, C. B. 2008. "Smallholder market participation: Concepts and evidence from eastern and southern Africa." *Food Policy* 33 (4): 299–317.

Barriga, A. and N. Fiala. 2020. "The supply chain for seed in Uganda: Where does it go wrong?" *World Development* 130: 104928.

Bold, T., K. C. Kaizzi, J. Svensson, and D. Yanagizawa-Drott. 2017. "Lemon technologies and adoption: measurement, theory and evidence from agricultural markets in Uganda." *The Quarterly Journal of Economics* 132 (3): 1055–1100.

Burke, M., L. F. Bergquist, and E. Miguel. 2019. "Sell low and buy high: arbitrage and local price effects in Kenyan markets." *The Quarterly Journal of Economics* 134 (2): 785–842.

Davies, K. N. and N. Menage. 2010. "Connecting Farmers to Markets: Insights from the Purchase for Progress Initiative." In "Revolution: From Food Aid to Food Assistance," , edited by W. Omamo, U. Gentilini, and S. Sandstrom. World Food Programme.

Erenstein, O., M. Jaleta, K. Sonder, K. Mottaleb, and B. M. Prasanna. 2022. "Global maize production, consumption and trade: trends and R&D implications." *Food security* 14 (5): 1295–1319.

Fermont, A. and T. Benson. 2011. "Estimating yield of food crops grown by smallholder farmers: A review in the Uganda context." .

Global Compact on Refugees. 2018. "Comprehensive Refugee Response Model in Uganda: Case Study." Accessed: 2025-03-13.

Gourlay, S., T. Kilic, and D. B. Lobell. 2019. "A new spin on an old debate: Errors in farmer-reported production and their implications for inverse scale-Productivity relationship in Uganda." *Journal of Development Economics* 141: 102376.

Guloba, M. M., S. Mbowa, F. Nakazi, D. Mather, and E. Bryan. 2023. "Sugarcane production and food security in Uganda."

Leao, R., G. Ferrera, B. Zhao, Food, and A. O. (FAO). 2021. "Leveraging Food Procurement to Achieve Developmental Goals: World Food Programme's Practices and Lessons Learned." In "Public Food Procurement for Sustainable Food Systems and Healthy Diets," FAO; Bioversity International.

Lentz, E. and J. Upton. 2016. "Benefits to smallholders? Evaluating the World Food Programme's Purchase for Progress pilot." *Global Food Security* 11: 54–63.

Mather, D., D. Boughton, and T. Jayne. 2013. "Explaining smallholder maize marketing in southern and eastern Africa: The roles of market access, technology and household resource endowments." *Food Policy* 43: 248–266.

McGuire, S. and L. Sperling. 2016. "Seed systems smallholder farmers use." *Food security* 8 (1): 179–195.

Miehe, C., R. Sparrow, D. Spielman, and B. Van Campenhout. 2023. *The (perceived) quality of agricultural technology and its adoption: Experimental evidence from Uganda*. Intl Food Policy Res Inst.

Sitko, N. J. and T. Jayne. 2014. "Exploitative briefcase businessmen, parasites, and other myths and legends: assembly traders and the performance of maize markets in eastern and southern Africa." *World development* 54: 56–67.

Upton, J. and E. Hill. 2011. *Local and Regional Procurement of Food Aid in Uganda: The Experience of Maize Traders*. Tech. rep., Working Paper, March 2011. http://dyson. cornell. edu/faculty_sites/cbb2 ....

Van Campenhout, B., E. Lecoutere, and B. D'Exelle. 2015. "Inter-temporal and spatial price dispersion patterns and the well-being of maize producers in Southern Tanzania." *Journal of African Economies* 24 (2): 230–253.

World Food Programme. 2006. "Food Procurement in Developing Countries." Accessed: 2025-03-13.

———. 2015. "Purchase for Progress (P4P): Reflections on the Pilot." Accessed: 2025-03-13.

———. 2019. "WFP Uganda's Agricultural Market Support Programme - 2019." Accessed: 2025-03-13.

World Food Programme (WFP). 2024. "Eastern Africa, Evaluation of Local and Regional Food Procurement Pilot Programmes 2021-2023." Accessed: 2024-03-13.