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Impacts of Market-Based Contractual Arrangements with Farmers in Guatemala and Honduras

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Globally, policy initiatives have addressed food insecurity and the increasing pressure on available land that has followed from growing populations and changing diets. These policies, however, have been aimed mainly at increasing agricultural yields and productivity and are often cost- and time-intensive. They have not focused on reducing food losses, nor considered food loss reduction as a tool that can help meet growing food demand. Any interventions in food value chains will have three impacts: (1) improvements in food security and nutrition through increasing food availability (which addresses Sustainable Development Goal [SDG] 2: Zero hunger); (2) improvements in productivity and economic growth, as farmers will be able sell more produce in the markets (SDG 8: Decent work and economic growth); and (3) emissions reductions (SDG 13: Climate action) and improved efficiency in natural resource use, especially use of water and land (SDG 14: Life below water; SDG 15: Life on land).

What Do We Need to Do?

Interventions to reduce food loss have not provided sustainable or long-lasting solutions (Leavens, Bauchet, and Ricker-Gilbert 2021). Within the limited existing studies, the focus has mainly been on tangible technical interventions to reduce losses during storage for both durable crops (cereals, legumes) and perishable products (fruits, vegetables, and roots and tubers). Future studies should therefore take into account the full value chain and the key actors (farmers, traders, wholesalers), with a particular focus on identifying critical loss points (Edwardson 2018). Stathers et al. (2020), for example, systematically reviewed loss reduction interventions for 22 crops across 57 countries in sub-Saharan Africa and South Asia. In the studies they examined, 79 percent of the interventions were for storage technologies, and other loss points had not been tackled. This highlights a clear need for studies of interventions beyond improved storage technologies. Investigations are needed into the effectiveness of interventions related to pests and diseases, handling practices, and weather-resistant varieties. More broadly, little systematic study has been done on the effects of training and financing or on the influence of policy or infrastructure interventions. To build up such evidence, future studies should incorporate these factors.

In addition, solutions offered for food loss are not linked with the other investments or institutions required by producers, which results in their being abandoned over time (Leavens, Bauchet, and Ricker-Gilbert 2021). For example, farmers can adopt practices to reduce aflatoxins in their maize, but if the market does not reward the improvement in the quality of the maize through a price premium, then farmers will discontinue those practices, which can be costly to maintain under their already tight budgets.

Testing an Alternative: A Randomized Controlled Trial of a Market-Based Intervention

We tested an innovative approach to reducing food losses across the value chain, which targeted producers of beans in Guatemala and Honduras for the *postrera* (second) season of 2017. We followed a contract farming design mechanism based on market incentives, as done by Saenger et al. (2013). The main hypothesis is that if small and medium-size bean producers use local technology and are able to meet quality standards, they could have access to a price premium for their better quality in the wholesale market and/or the industry.

Intervention design

In both countries, we implemented a randomized controlled trial (RCT) of market-based incentives to examine their effect on crop losses and on the degree to which farmers complied with quality standards. We tested the importance of providing technical assistance and packages of seeds and fertilizers to farmers versus technical assistance and incentives provided through price premiums to reduce losses and comply with the required quality standards. The control group only received generic information on extension. Similar quality standards applied in both countries (Table 1).

Table 1: Quality standards for beans in Guatemala and Honduras

Quality Standard	Guatemala (%)	Honduras (%)
Moisture	12–14	14
Impurity	Up to 3	Up to 1
Damaged grain	Up to 8	Up to 3
Broken grain	Up to 5	Up to 2
Presence of live pests	None	None
Odor	Normal	Normal

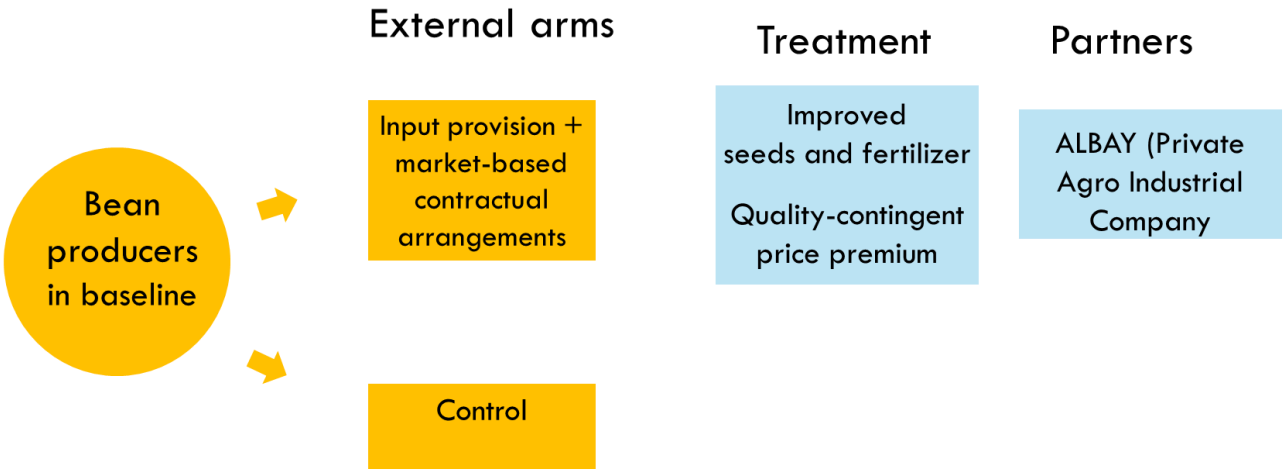
Source: Delgado, Nakasone, and Torero (2021).

In Guatemala, we implemented a single-arm RCT in which the treatment group received improved seeds and fertilizers and were given information on the standards required by the buying company and on the quality-contingent price premium paid by the firm (Figure 1). The control group only received the seed and fertilizer packages traditionally provided by the government.

In Honduras, a bigger sample size allowed us to have two treatment arms. We were thus able to differentiate (1) the effect of the input package of fertilizers and seeds versus (2) a market incentive intervention where the farmers are provided detailed information on the standards required by the company and the quality-contingent price premium they would receive if they met those standards (Figure 2). (The

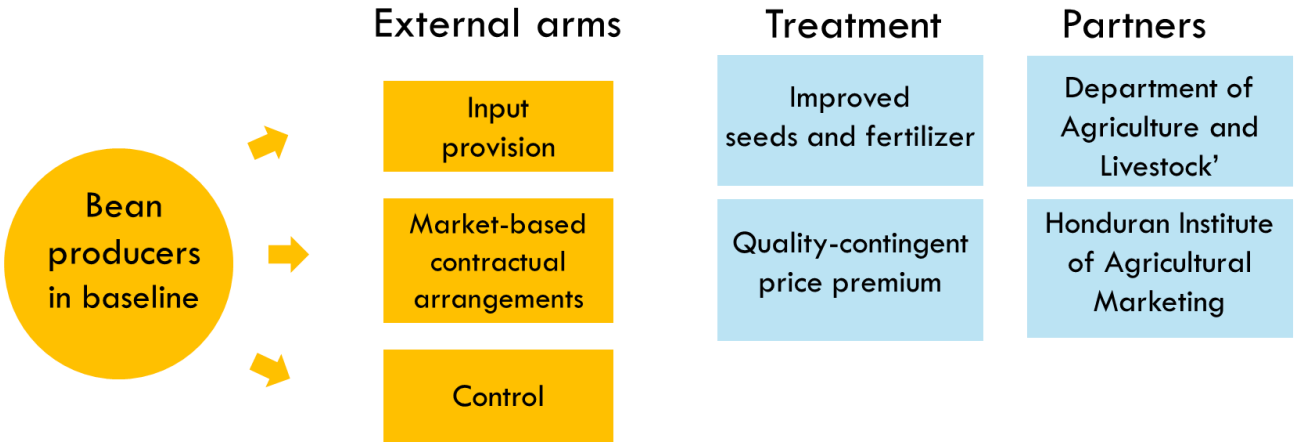
control group received nothing.) This RCT allowed us to differentiate between a traditional government intervention and a market-oriented incentive in the form of information on required standards and a quality-contingent price premium.

Figure 1: Diagram of the Guatemala intervention



Source: Delgado, Nakasone, and Torero (2021).

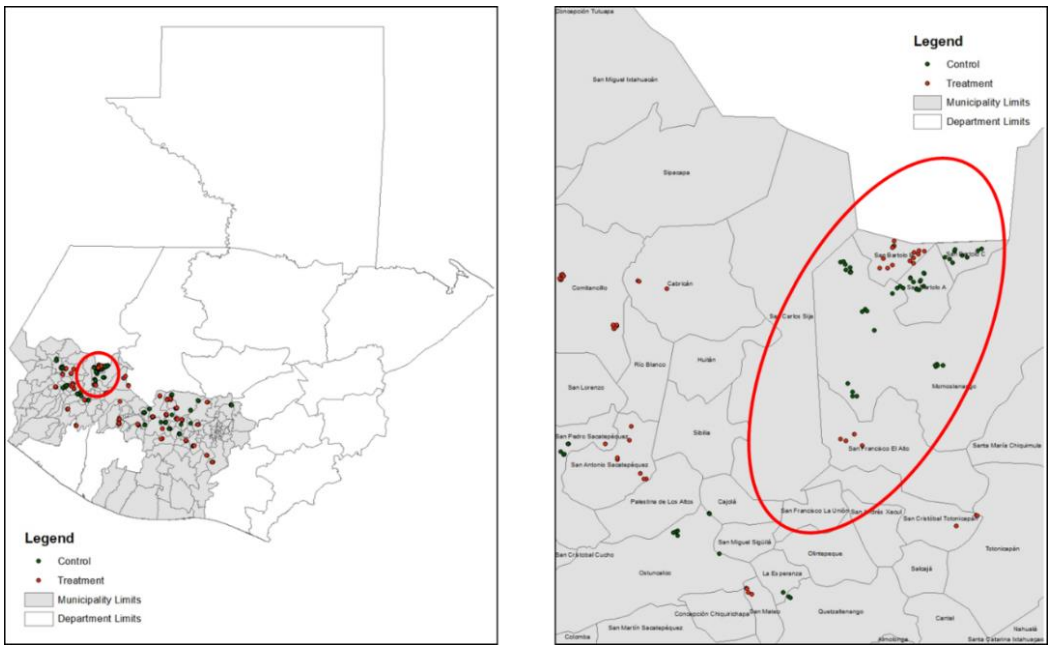
Figure 2: Diagram of the Honduras intervention



Source: Delgado, Nakasone, and Torero (2021).

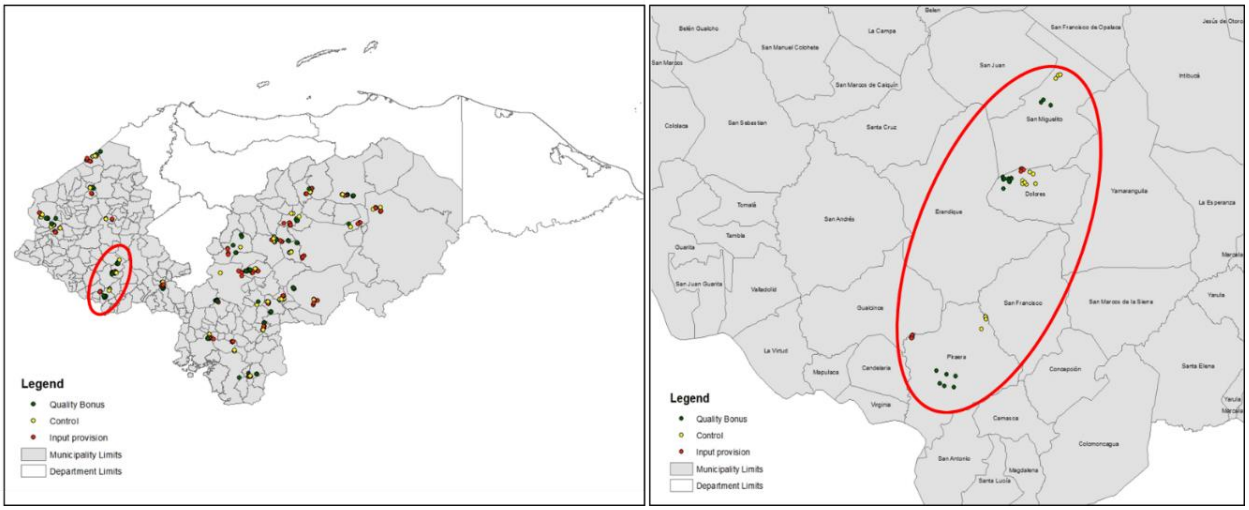
The Guatemalan sample consisted of 450 bean producers spread over 42 municipalities in 8 departments, and the distribution of the treatments was carried out by the municipalities (Figure 3). In Honduras, we worked with 685 bean producers who were spread over 107 villages in 10 departments, and the distribution of the treatments was carried out at the village level (Figure 4).

Figure 3: Random assignment of treatment distribution in Guatemala, by municipality



Source: Delgado, Nakasone, and Torero (2021).

Figure 4: Random assignment of treatment distribution in Honduras, by treatment



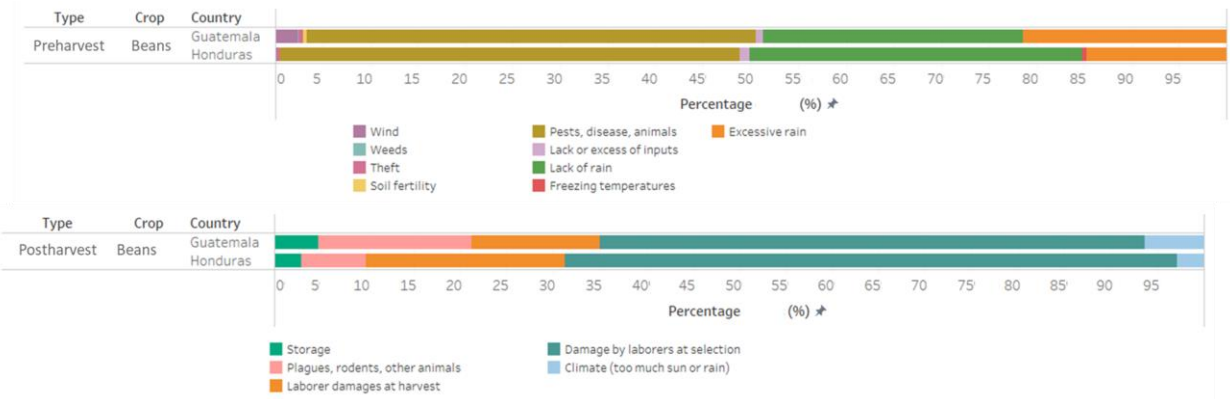
Source: Delgado, Nakasone, and Torero (2021).

Why Beans and Why Guatemala and Honduras?

Beans are among the most produced and extensively consumed legumes in Central America and serve as a source of income for most rural areas. Globally, postharvest loss of cereals and legumes can be as high as 9 percent (FAO 2019), including quality and quantity. Delgado, Schuster, and Torero (2021) found that the major preharvest causes of loss of beans in Guatemala and Honduras were pests, lack of rain, and weeds; postharvest losses were primarily due to damage caused by laborers during selection (Figure 5).

In Guatemala and Honduras, beans are the second-most important basic grain that is planted and produced for consumption. In Guatemala in 2019, 263,432 metric tons (mt) of beans were produced and an average of 263,659 hectares (ha) was planted, with a yield of 999.1 kilograms per hectare (kg/ha) (FAOSTAT). In Honduras in the same year, bean production was 134,000 mt, and 167,574 ha were planted, with a yield of 802 kg/ha (FAOSTAT).

Figure 5: Self-reported causes of losses



Source: Delgado, Nakasone, and Torero (2021).

What Were the Results?

In both Honduras and Guatemala, the interventions reduced food losses using the available inputs, technology, and markets already in place.

In Guatemala, the treatment that consisted of a combination of information, seeds, and fertilizer packages had an impact; the effect was especially noticeable in terms of insect damage and wrinkled grains, where a 6 percent reduction in losses was observed compared with the control group.

In Honduras, we observed that the treatment consisting of market incentives to farmers (relative to government incentives already in place) had a significant effect. This was especially noticeable in terms of reduced dirt and impurities—an improvement which farmers were able to achieve by themselves; here, a 7 percent reduction in losses was observed compared with the control group. Without any government intervention, farmers were thus able to increase the share of their production that garnered the premium price.

These results are extremely important as they show that farmers will be motivated to produce more and better beans if they are given information on quality standards and on price premiums for higher quality beans. Going a step further, what occurred in Guatemala showed that merely *possessing information* about quality-contingent price premiums was enough to prompt farmers to comply with those standards; this, in turn, led to improvements in food quality, reduced losses and, as a direct result, increased payment of premium prices to farmers.

Conclusions

The market-based incentives treatment seems to perform better than traditional subsidized packages of fertilizer and seeds. This could mean that farmers with the proper incentives and

full information on quality standards required by the market know better how to reduce losses relative to those provided just with technological packages.

It is therefore important to design interventions that are based on market incentives. For greatest effect, farmers must be linked to buyers through contract farming or through horizontal coordination arrangements such as farmer associations or cooperatives. Our results also show that governments could play an important role by setting market standards and recognizing produce quality or just providing detailed information on the quality standards required by the private companies so that the market rewards quality improvements through price premiums. Such interventions will not only incentivize farmers to reduce their quality losses; it will also motivate them to increase their revenues, from which will follow an increase in investment in their future planting seasons.

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