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Date: October 2022

Research Statement

I am a development economist with a strong interest in topics related to technology adoption. In particular, I focus on market failures generated by information frictions associated with low adoption. My research uses both theory and empirical methods to answer related causal questions. I use theoretical modeling and simulation methods to generate testable predictions. My empirical analysis uses experimental data to validate the predictions of my theory.

My current research focuses on the empirical analysis of micro-development policies that aid economic agents in developing countries learn about new technologies and products. For this purpose, I use secondary survey datasets on large-scale interventions and primary data from lab-in-the-field experiments for empirical analysis. Specifically, my research addresses the following: (i) using existing social ties to improve the adoption of modern technologies, (ii) understanding and improving learning from experience for micro-insurance products, and (iii) assessing the role of active discussion in resolving information frictions regarding modern technologies.

Network-based Interventions to Improve Technology Adoption Technology adoption in agriculture can accelerate economic growth via structural transformation (Bustos et al., 2016). However, developing countries lag in the adoption of modern technologies (Bold et al., 2017; Suri and Udry, 2022). Information constraints contribute to this phenomenon, among other factors (Magruder, 2018). How do we use existing social ties to improve the diffusion of information regarding modern technologies? The literature documents that such diffusion is possible (Conley and Udry, 2010; Banerjee et al., 2013). Furthermore, it argues that the answer depends on the underlying diffusion process. If information diffuses only if a certain threshold of each agent's connections is informed, interventions using existing social ties for information transmission are required. In such a scenario, the optimal strategy is to target agents central to the network (Beaman et al., 2021). However, this result relies on the assumption that the diffusion only depends on the agents' positions in the network. What happens if the agents differ in terms of other characteristics that affect the diffusion process?

My job market paper explores network-based targeting strategies for improving technology adoption. I consider the situation where the new technology can be more beneficial to some agents than others, with this heterogeneity affecting the diffusion of information. I develop a theoretical framework of social learning for technology adoption that builds on Golub and Jackson (2010) and Banerjee et al. (2021). My model predicts the possibility of low information equilibria where information frictions lead to low adoption of modern technologies, even in areas where many should adopt them as an efficient choice. I argue the need for network-based targeting in such a scenario and use simulations to evaluate the relative importance of different targeting strategies. The simulations help me generate testable predictions that I test by combining two data sources from Malawi: the replication data of Beaman et al. (2021) and Agricultural

Extension Services and Technology Adoption Survey data collected by the International Food Policy Research Institute (IFPRI). For identification, I use experimental and non-experimental variations in the replication data and complement them with the survey data information.

My simulations suggest that targeting agents central in network ties works well if the population heterogeneity in the benefits from the technology is low. However, this type of targeting fails to reach the population of interest with a highly heterogeneous population. In such a scenario, targeting based on the adoption probability works better only if the network is highly assortative in the benefits of the technology. My empirical analysis provides evidence in favor of my hypotheses. In doing so, it also validates my assumptions of population heterogeneity in benefits affecting the diffusion of information and assortativity of agents in the benefits from the technology.

The paper highlights the need to understand possible population heterogeneity in benefits. The empirical analysis relies on assumptions to predict such heterogeneity based on observable demographics. For further research on this topic, I plan to collect primary data and conduct randomized controlled trials to understand how to design policies in practice based on my findings. Such an exercise will also help me to do a proper cost-benefit analysis for network-based targeting in light of the contributions of my paper.

Learning from Experience for Micro-Insurance Products   Developing regions lag not only in adopting modern technologies but also in the take-up of insurance products. This phenomenon is not surprising given the complexity of insurance products, the lack of financial literacy in developing countries, and the high cost of providing such insurance given the high-risk environment in these regions coupled with the asymmetric information issues related to insurance products. In the last few decades, researchers and policymakers have strived to develop micro-insurance products that cater to the needs of the relatively poor and aim to address the issues related to standard insurance products. However, somewhat surprisingly, the take-up and renewal of such insurance policies remain low despite their low cost and purportedly high benefits. My research focuses on the low take-up of two such insurance products: index insurance and micro health insurance.

Existing literature extensively studies the reasons behind low take-up and renewal of index insurance contracts (Platteau et al., 2017). Many of these reasons relate to information friction, where learning from experience is recommended as a potential solution. However, the role of experience in learning for these products and the mechanism of such learning remained under-explored. In the paper *"The Role of Experience in Learning for Index Insurance Products: Evidence from Rural Kenya"*, I investigate how experiences shape learning for an index insurance product in rural Kenya. Theoretically, I build on the framework of Janzen et al. (2020) to understand the effect of two different types of experiences: experiencing disasters and receiving payouts. The model generates testable hypotheses that I test using public-use data from Index-Based Livestock Insurance (IBLI), Kenya. The results show that receiving a payout causes the demand and knowledge of the group receiving the payout to decrease. Moreover, I show evidence that this effect is driven, at least in part, by relatively optimistic households updating their beliefs

about the product design downward. Additionally, I explore policy directions using randomized interventions in the IBLI data and show that the interventions can act as tools for enhancing learning from experience.

My findings indicate that learning more about the index insurance product lowers its demand. Thus, contrary to common belief, I find information frictions are driving index insurance demand higher than optimal. For further research on this topic, I aim to explore the relationship between learning and demand using lab-in-the-field experiments. I am already in talks with Busara Center for Behavioral Economics (headquartered in Nairobi, Kenya) to discuss the logistics for one such experiment involving pastoralist subjects in Kenya.

Similar to index insurance products, demand for micro health insurance products also has been surprisingly low (Banerjee et al., 2014; Chemin, 2018). In 2011-12, Chemin (2018) implemented 20 randomized experiments in collaboration with the National Hospital Insurance Fund (NHIF) to increase health insurance coverage among the poor in Kenya. Most interventions, from providing information to full subsidy, failed to generate high take-up and renewal rates. However, a cost-effective intervention where individuals received presentations on the health insurance product with their informal group had promising results. Along with Matthieu Chemin (Associate Professor, McGill University), I plan to do a follow-up survey of the same individuals about a decade after the first study. Our objective is to assess the long-term impact of those interventions on the households' current health insurance take-up decisions. In particular, we are interested in understanding the role played by experience with the insurance product. We have already received the ethics approval for this survey from the McGill Research Ethics Board.

Active Discussion for Resolving Information Frictions   For my third area of research, I focus on the role active discussion plays in resolving information frictions related to technology adoption. The literature suggests uncertainty surrounding the relative riskiness of a technology may hinder its adoption (Alpizar et al., 2011; Engle-Warnick et al., 2011; Chavas and Nauges, 2020). Social learning can help in such a scenario by getting agents to learn from each other about uncertain technologies (Raeburn et al., forthcoming). The mechanism of such learning, however, remains under-explored in the literature.

In a paper still in progress, I collaborate with Sonia Laszlo (Associate Professor, McGill University), Jim Engle-Warnick (Associate Professor, McGill University), and Javier Escobal (Senior Researcher at GRADE) to study the topic. In particular, we focus on the role of active discussion in resolving information frictions related to the relative riskiness and uncertainty of different strategies to deal with Late Blight (LB) for Peruvian potato farmers. LB is a fungus perceived as the primary constraint to production by Peruvian potato farmers (Perez et al., 2022). The effectiveness of different technologies dealing with LB varies a lot across different potato varieties produced. This feature, coupled with the limited technical assistance to the farmers in Peru, implies that farmers have uncertainty surrounding many such technologies. We use data from a lab-in-the-field experiment with potato farmers in Peru to study whether active discussion can help to resolve these uncertainty-related information frictions. Our results suggest that

active discussion solidifies the agent's existing beliefs instead of getting agents with uncertain private beliefs to learn about the risk associated with various technologies dealing with LB. We also find that more educated subjects are more likely to understand the risk associated with these technologies. The result suggests the need for policy to complement active discussions with knowledge interventions for its intended effect.

Apart from the projects discussed above, I am also working on understanding the impact of judicial independence in developing countries. For a work still in progress, I collaborate with Matthieu Chemin (Associate Professor, McGill University) for this purpose. We are using secondary data from Bangladesh to study the impact of judicial independence on the effect of village courts.

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