Research Statement

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I am a development economist interested in understanding the interactions between agricultural policies, technology adoption, and environmental consequences. My research uses experimental and quasi-experimental methods to study the impact of agricultural modernization interventions in Sub-Saharan Africa (SSA). I combine administrative, survey, and remote sensing datasets (including satellites and drone images) with applied econometrics and machine learning tools to investigate the constraints preventing the modernization of the agricultural sector in SSA. My ongoing work is organized into three complementary strands: (i) the general equilibrium effects of policies in rural contexts; (ii) the barriers to the modernization of the agricultural sector; and (iii) the relationship between agricultural technologies, policies, and local ecosystems.

1 General equilibrium effect of Policies in Rural Development

How public policies affect local development and economies is a central topic in academic and policy debates. Social protection, in particular, is often considered a key tool to reduce population vulnerability and mitigate shocks. Yet, little is known about the general equilibrium effects of such policies when implemented nationwide. In my job market paper, *"The Double-Edged Sword of Social Transfers: Evidence from Ethiopia,"* I estimate the general equilibrium effects of Ethiopia's Productive Safety Net Program (PSNP), the largest social protection program in Africa, on local markets. Using a staggered difference-in-differences approach, I combine monthly retail price panel data, newly digitized administrative program implementation data, and nationally representative income, expenditure, and agricultural production data to analyze the period from 2001 to 2015.

I find that cash transfers increase local prices by 5%, while in-kind transfers show no significant average price effects. This divergence depends on local market conditions: cash transfers are most effective in integrated, high-productivity markets, whereas in-kind transfers perform better in remote, low-productivity areas with weak market access. Price increases also yield unintended negative consequences on child nutrition: children under five in cash-dominant districts exhibit higher rates of underweight and wasting. These findings highlight the importance of tailoring social protection programs to local market conditions and considering transfer modalities when scaling interventions.

This paper is part of a broader research agenda focused on the general equilibrium effects of policies in rural development. In *"Competition on Agricultural Markets and Quality of Smallholder Supply: The Role of Relational Contracting and Input Provision by Traders"* (*Economic Development and Cultural Change*, 2024), co-authored with Erwin Bulte (Wageningen University) and Banawe Anissa (Wageningen University), we analyze how trader competition affect local quality supply and productivity in SSA. While competitive markets are theorized to foster innovation and welfare, this assumption relies on robust contract enforcement mechanisms, often absent in rural low-income contexts. Our theoretical and empirical analysis reveals that policies promoting market competitiveness (e.g., trader permits, rural infrastructure investments) may have distributional consequences and complex effects on crop quality and market efficiency.

Looking ahead, I plan to further investigate the general equilibrium effects focusing on at-scale agricultural policies using tools from spatial and trade economics.

2 Identifying the Barriers to the Modernization of the Agricultural Sector

With half of SSA's extremely poor population residing in rural areas and relying on agriculture, policymakers prioritize agricultural technology and value chain modernization as key strategies for poverty reduction and food security. My research examines the demand-side constraints impeding this modernization. In *"Returns to Quality in Rural Agricultural Markets: Evidence from Wheat Markets in Ethiopia" (Journal of Development Economics, 2024)*, I use original survey data from 60 Ethiopian wheat markets to assess whether quality is adequately rewarded. The findings reveal that farmers often misinterpret the quality of their output and are imperfectly compensated for higher-quality wheat, suggesting that imperfect quality recognition must be addressed to incentivize quality supply.

Another published paper explore related themes. In *"Buyers' Response to Third-Party Quality Certification: Theory and Evidence from Ethiopian Wheat Traders" (American Journal of Agricultural Economics, 2025)*, co-authored with Gashaw Abate (IFPRI), Tanguy Bernard (University of Bordeaux), Erwin Bulte, and Elisabeth Sadoulet (UC Berkeley), we explore the conditions under which third-party certification systems can address imperfect quality recognition. Our theoretical model and lab-in-the-field experiment with Ethiopian wheat traders show that middlemen are more likely to adopt certification when their competitors do so, while market conditions play a limited role in their decisions.

In collaboration with Gashaw Abate (IFPRI), Tanguy Bernard (University of Bordeaux), and Joshua Deutschmann (University of Chicago), we investigate the potential of artificial intelligence to deliver tailored agricultural extension information. We are currently conducting a clustered randomized controlled trial across 15 districts with 240,000 farmers to evaluate *Farmer.Chat*, an AI-powered digital agriculture tool developed in collaboration with *Digital Green*, supported by a €1.5 million grant from the Fund for Innovation in Development (FID). This study addresses a critical knowledge gap regarding the benefits and scalability of AI-driven agricultural extension tools, particularly as AI adoption accelerates globally with limited empirical evidence on its impacts.

Finally, in a working paper co-authored with Berber Kramer (IFPRI) and Carly Trachtman (IFPRI), *"Market Information and R&D Investment under Ambiguity: A Framed Artefactual Experiment with Plant Breeding Professionals,"* we investigate how ambiguity in crop varietal development contributes to low technology adoption and mismatches between smallholder needs and breeder priorities. Our experiment reveals that breeding research is influenced by preferences for informal and imprecise evidence, often resulting in less efficient varieties.

Future work will continue to address barriers to agricultural modernization. With Jedediah Silver (Hebrew University) and Mathew Kato (Independent Researcher), we are implementing an RCT in Uganda to introduce small-scale cassava processing technologies and contract arrangements with downstream buyers, aiming to reduce market uncertainty and promote quality upgrading. Another project with Tanguy Bernard, Yanyan Liu (IFPRI), and Tesfamichael Wossen (IITA) focuses on incentivizing quality supply among Nigerian maize farmers without artificially creating quality markets.

3 Analyzing the Relationship Between Agricultural Technologies, Policies, and Local Ecosystems

The adoption of agricultural technologies presents an environmental paradox: while productivity gains may reduce land pressure (the Borlaug hypothesis), lower production costs can also incentivize agricultural expansion. In SSA, where natural resources are vital and environmental regulation is weak, rapid technology diffusion risks accelerating biodiversity loss, ecosystem degradation, and adverse health impacts.

During my postdoctoral position, I am collaborating with environmental and food scientists at Addis Ababa University and University of Twente to launch this research pipeline. In one ongoing project with Gashaw Abate, we evaluate the environmental side effects of Ethiopia's Agricultural Commer-

cialization Cluster program, which promotes modernization through improved input and mechanization access. Combining household survey and remote-sensing data in a difference-in-differences framework, we measure the program's effects on household income, nutrition, and land degradation.

Another ongoing project with Kaleab Baye (Addis Ababa University), Mariana Belgiu (University of Twente) and Tanguy Bernard, aims to identify the diffusion of improved-crop varieties (e.g., maize, wheat, tef) and estimate its effects on environmental outcomes. We will use drones and high-resolution satellite images to trace technology adoption, yields, and nutritional attributes.

Lastly, in a recent project, I aim to pilot a feasibility study for a larger intervention to estimate the willingness-to-pay (WTP) of Ethiopian coffee growers and local populations for improvements in environmental quality. Results from this pilot will inform the design of a larger intervention measuring the effects of coffee production on water quality through a controlled field experiment, bridging the gap between agricultural productivity and environmental sustainability.

I am committed to advancing research on effective agricultural policies and their broader impacts, using rigorous empirical methods to address pressing policy questions. I look forward to collaborating with colleagues to further this agenda and contribute to evidence-based policymaking.