Local networks of trade and exchange

STEG-PEDL Course on Private Enterprises, Productivity, and Economic Growth

Meredith Startz

March 13, 2026

Local networks of trade and exchange

- Literature on firms, trade, and networks has traditionally focused on:
  - Rich countries
  - Manufacturing
  - Formal (and therefore, often large) firms
  - Links that cross international borders
- For reasons of policy focus, and even more importantly, data availability
- This lens on the world shapes what we study
  - What we think the "stylized facts" are about firm networks
  - Consequently, the models and conceptual insights we come up with to explain them

Trade and exchange in LMICs

- We know that this is not a good portrait of LMICs!
  - Agriculture and wholesale/retail trade are two of the largest sectors
  - Vast majority of firms are small and informal
  - Most firms don't engage (directly) in international trade
- The prior evidence still has a big influence on models and questions
- New data availability in a wider range of countries is starting to change this
  - VAT and other tax microdata
  - Transaction-level customs data
  - Surveys and experiments focused explicitly on firm linkages
- Still more open questions than answers

Plan for this lecture

I'll focus on the converse: commerce, domestic, informal

1. Commerce, especially wholesale and retail trade
2. Measurement issues in domestic, informal networks
3. Empirical evidence on micro costs and frictions driving macro network structures
4. Some open questions

Commerce vs. production

- So much focus on production!
  - Obviously important
  - Arguably the driver of two major growth / structural transformation episodes in modern economic history
    - ★ Industrial revolution in 1800s Europe & North America
    - ★ Growth of East Asia in second half of 20th century
- Self-reinforcing cycle with policy, data, and research
  - Censuses and surveys of manufacturers
  - Input-output tables
  - Policy and research interest (old, but now back!) in industrial policy
- In contrast, commerce is firms and institutions focused on arbitrage and resale, not transformation of goods
  - Wholesale and retail
  - Enabling services and institutions: finance, transportation, standards and measures, commercial law, exchanges/clearinghouses

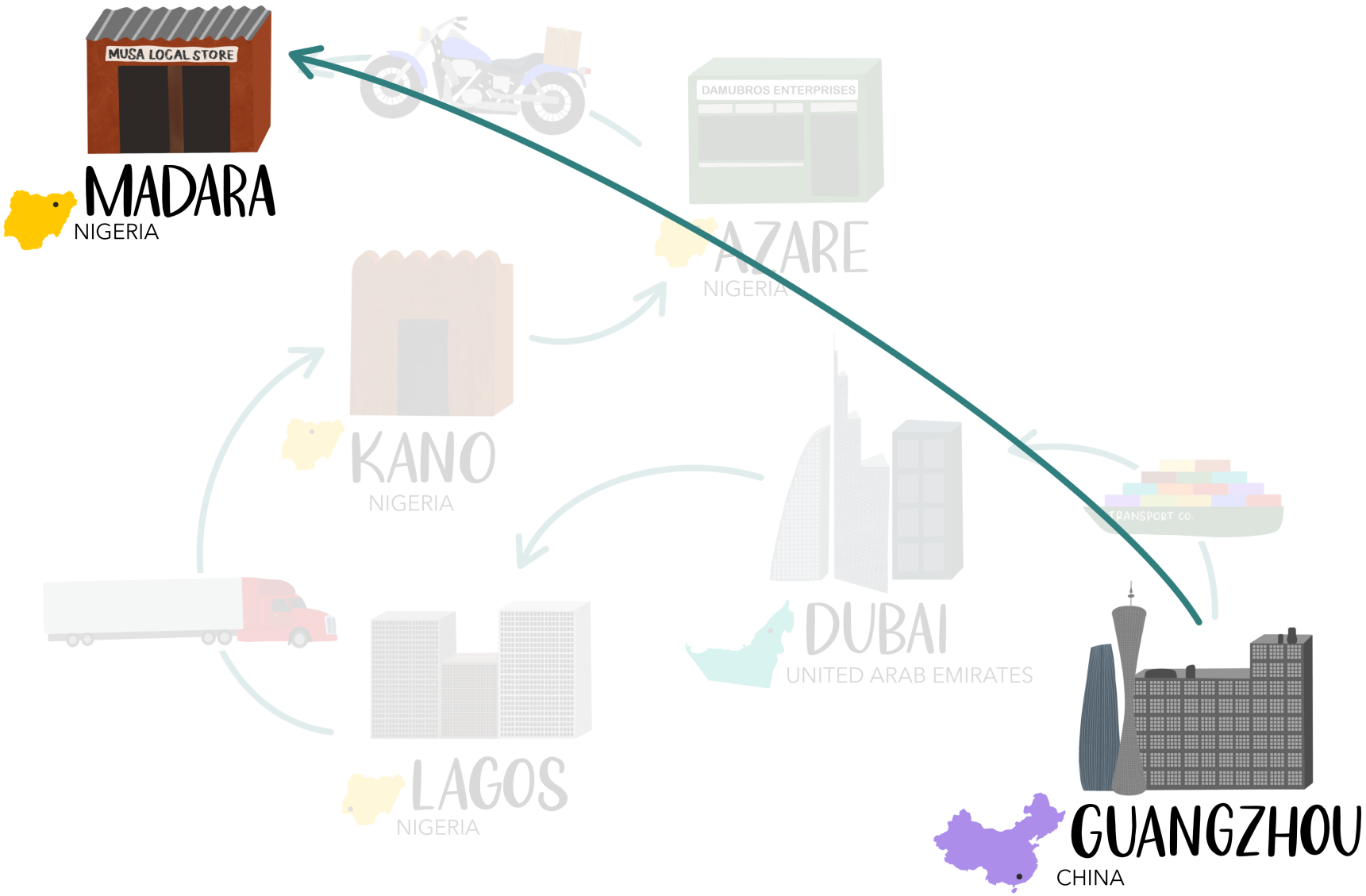
Wholesale and retail trade is a big part of the economy

- We don't have great internationally comparable data, but:
  - In the US:
    - ★ 17.1% of nonfarm employment in 2024 (BLS)
    - ★ Approx 12% of value-added (FRED)
  - In Nigeria:
    - ★ 25% of employment (NBS)
    - ★ 17% of GDP (NBS)
  - Around the world: maybe 15-20% of employment, 10-15% of GDP, 50% of household expenditure (Atkin et al. 2018)
- Matters on an aggregate level for jobs and growth
  - E.g. in Nigeria, 2nd biggest sector after agriculture, and top contributor to growth in 2010s

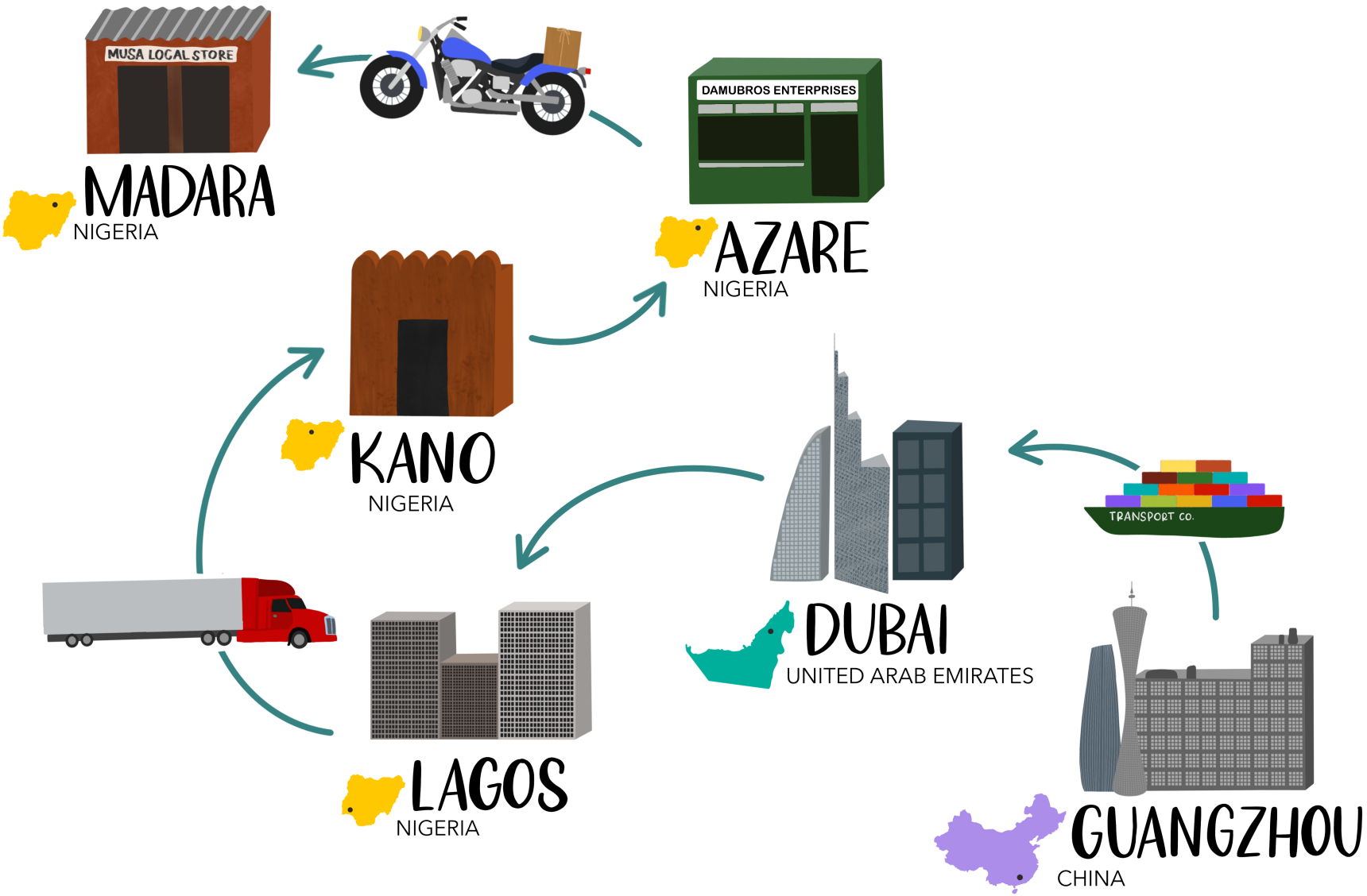
Wholesale and retail trade is a big part of the economy

- We don't have great internationally comparable data, but:
  - In the US:
    - ★ 17.1% of nonfarm employment in 2024 (BLS)
    - ★ Approx 12% of value-added (FRED)
  - In Nigeria:
    - ★ 25% of employment (NBS)
    - ★ 17% of GDP (NBS)
  - Around the world: maybe 15-20% of employment, 10-15% of GDP, 50% of household expenditure (Atkin et al. 2018)
- Matters on an aggregate level for jobs and growth
  - E.g. in Nigeria, 2nd biggest sector after agriculture, and top contributor to growth in 2010s
- What does this have to do with "local networks of trade and exchange"?

How do consumers in Madara, Nigeria get a mobile phone?



How do consumers in Madara, Nigeria get a mobile phone?



Why pay attention to commerce?

1. Large segment of economic activity all over the world
   - Especially in LMICs, in terms of jobs
2. Essentially universal mediator of consumers' access to goods
   - Especially in LMICs, firms' access as well!
3. Determines alignment of incentives and price signals for production and consumption
   - In the long run, implications for specialization, innovation, structural transformation, and spatial distribution of economic activity

Form and productivity covary with development

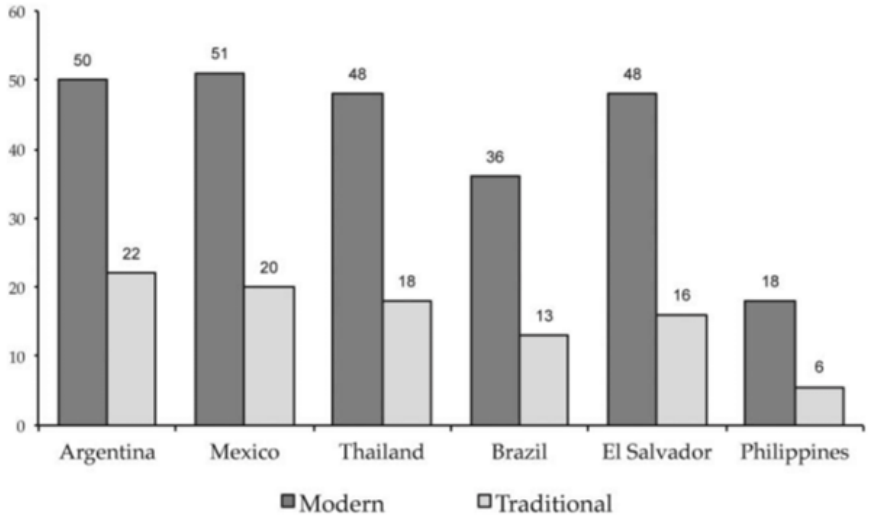


FIG. 2.—Value added per worker by retail segment

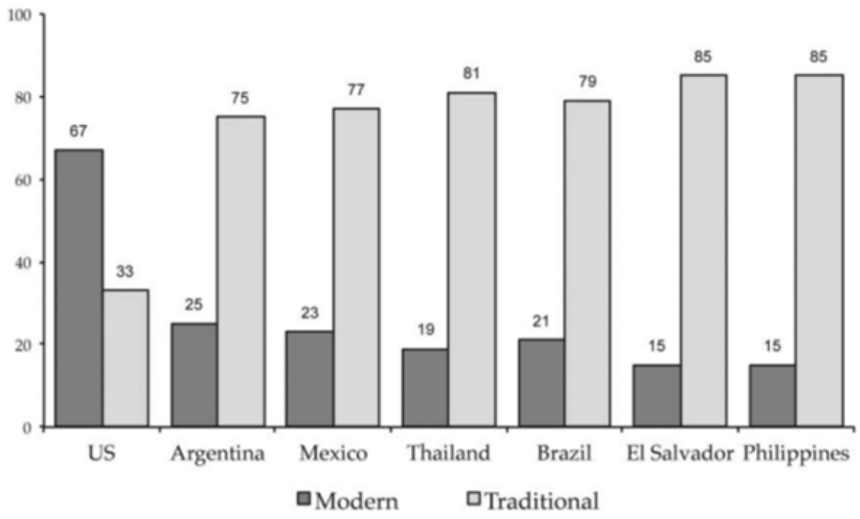


FIG. 3.—Employment share by retail segment

Lagakos (2016)

Form and productivity covary with development

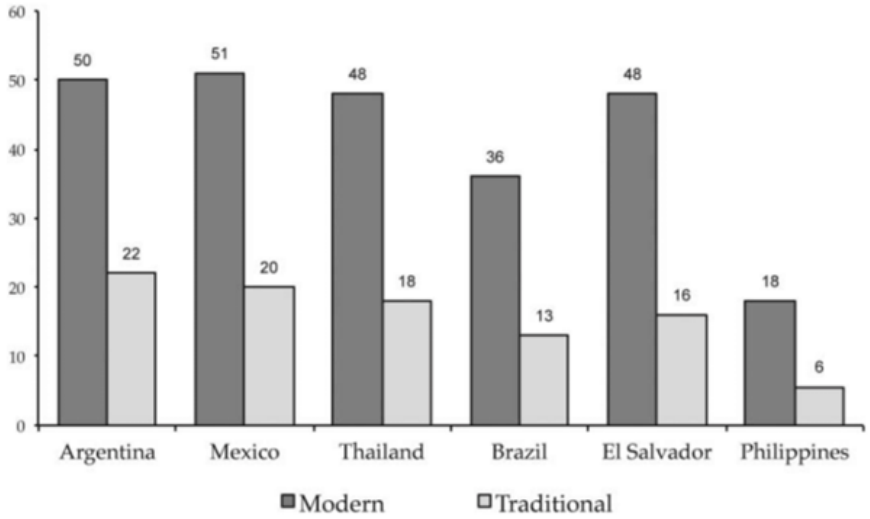


FIG. 2.—Value added per worker by retail segment

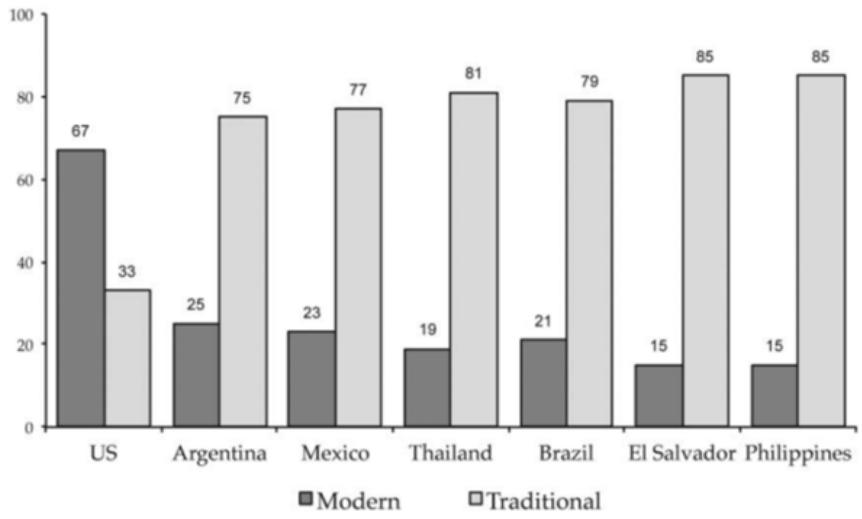


FIG. 3.—Employment share by retail segment

Lagakos (2016)

- "Traditional" wholesale/retail is small-scale, fragmented, labor-intensive
- Best evidence suggests majority looks like this in LMICs: 98% of CPGs in Nigeria, 96% in Ghana, 92% in India (Nielsen 2015)

Supermarket revolution?

- Arrival of foreign retail chains into LMICs in the 1990s - 2010s
- Atkin et al. 2018 study entry of Walmart, and other modern, large-format retailers in Mexico
  - Amazing compilation of microdata on prices, barcode-level consumer scanner panel data, retail census, employment data
- Impacts on household welfare, traditional retail sector, and employment
  - Reduction in average household cost of living gain equiv. to 6% of income
    - ★ Net of negative impact due to exit of traditional retailers (-0.7%), but large direct value of low prices and variety at new retailers ($+5.5\%$) and pro-competitive effect at traditional retailers ($+1.6\%$)
  - Small but concentrated losses profits and employment in traditional retail ($< 0.5\%$)
  - Gains are regressive: whole distribution benefits, but wealthy consumers who shop at new stores gain the most

Mediates consumers' access to goods

- Trading sector determines who has access to which goods, at what prices
- Atkin & Donaldson (2015) uses CPI price microdata from Ethiopia and Nigeria to look at spatial distribution of trade costs, prices, and passthrough
  - Remote locations pay higher prices due to high transportation costs – trading sector is less competitive, but on net markups are actually lower
- However, remote locations also lose access to variety
  - See this indirectly in CPI completeness in Atkin & Donaldson (2015)
  - Directly through survey data in Gunning, Krishnan, & Mengistu (2024)
    - ★ Remote villages in Ethiopia have half the product variety and 8% higher markups than their nearest market town

Important for firms' access too

- Trading sector also matters for firms' access to goods and markets
  - Relatively few firms import or export directly
  - Many more are exposed to international markets indirectly
    - ★ "Factor content" approach – imported inputs to their inputs
    - ★ Via trading sector – literally buy imported products via intermediaries (or sell via them)

- 40% of intermediate inputs are imported via domestic intermediaries in Chile (Blum et al. 2025)
  - This indirect access is particularly important for SMEs
  - Without intermediaries, small domestic producers exit, and domestic industry concentration increases

- Doesn't go away with development, although form may change
  - Almost all firms use foreign factors content, but fewer than 20% import directly in Belgium (Dhyne et al. 2021)
  - Fraction of manufactured goods trade intermediated by wholesalers in US increased from one-third to one-half between 1992 and 2012 (Ganapati 2025)

Market power of intermediaries

- Longstanding interest in how middlemen influence prices
  - Distaste for middlemen; just a price wedge between producers and consumers
  - Policies to prohibit or restrict intermediation (Bangladesh, India, Ethiopia)
  - Enthusiasm that falling trade costs will connect producers and consumers more directly (e.g. e-commerce, buyer linkage platforms)

Market power of intermediaries

- Longstanding interest in how middlemen influence prices
  - Distaste for middlemen; just a price wedge between producers and consumers
  - Policies to prohibit or restrict intermediation (Bangladesh, India, Ethiopia)
  - Enthusiasm that falling trade costs will connect producers and consumers more directly (e.g. e-commerce, buyer linkage platforms)

- But mixed empirical evidence on market power and passthrough
  - **Dillon & Dambro (2017)** on crop markets in sub-Saharan Africa: evidence is "...broadly supportive of the notion that crop markets are competitive"
  - **Casaburi & Reed (2022)**: RCT in cocoa markets in Sierra Leone shows high passthrough from traders to farmers, and "effective" competition is 40% higher than suggested by number of traders operating in village
  - **Bergquist et al. (2025):** RCT with matching platform in agricultural markets in Uganda shows only traders use platform, but market price changes from improved arbitrage pass through to farmer revenue

- We know less about non-ag trade – an area for future research!

Middlemen in networks

- What happens when you cut out middlemen?
  - **Bartkus et al. (2022):** Getting boats to Amazon fishing communities to bypass middlemen increased prices and income
  - **Emran et al. (2021):** Ban on a type of intermediation in Bangladeshi oil markets increased prices and reduced passthrough
  - **Iacovone & McKenzie (2019):** Colombian start-up circumventing a wholesale market to sell directly to small vendors failed
- Thinking about market power requires endogenizing entry
  - Explicitly modeling the role and production function of intermediaries
- Scale economies: more or less present in all models of wholesaling in trade
  - E.g. Blum et al. (2009); Bernard et al. (2010); Ahn et al. (2011); Crozet et al. (2013)

Chains of intermediation: Why?

- In survey data on distribution chains in Nigeria (Grant & Startz 2024):
  - Chains are long: at least 2 - 3 intermediation links between producer and consumer
  - Characteristics, costs, and prices covary systematically with chain position
- Why? Internal economies of scale, e.g. costs of time, travel, truck/container, financing, etc
- Key: you can buy the same product from the producer, or a reseller
  - A small retailer may maximize profits by paying a higher price to a local wholesaler with lower fixed costs to access
  - Iterate this logic, and you can get a whole chain of resellers
- **Result 1:** Longer chains where firms and markets are small, and access barriers are high – i.e. in LICs

Markups vary with chain positions

- **Result 2:** In multi-intermediary chains, expect markups to vary with upstreamness
- For instance, in a setting with CES demand at the retail level with elasticity σ_r and wholesalers making discrete choices across differentiated suppliers at upstream steps l, markups follow:

$$\sigma_l = (\sigma_r - 1)\left(\frac{\mu_w + 1}{\mu_w}\right)^{l-1} + 1$$

where $\frac{1}{\mu_w}$ is the shape parameter of buyer-seller match value

- Upstream of final consumers, demand is more elastic because it reflects compound elasticity of all downstream steps

Markups vary with chain positions

	(1) % of purchases from wholesaler	(2) Log unit cost ($US)	(3) Markup (%)
% of sales that are wholesale	-0.14	-0.79**	-0.33***
	(0.11)	(0.35)	(0.12)
% of purchases from wholesaler		0.12	0.01
		(0.17)	(0.06)
Log unit cost ($US)			-0.09***
			(0.02)
Obs.	715	714	714
Mean of dependent variable	1.62	2.07	0.67
Product category FEs	x	x	x

Grant & Startz (2024)

Chains of intermediation: So what?

- Costs and markups are added at each step. Would shorter chains increase consumer welfare?
- **Result 3:** shorter chains mean fewer, larger firms
  - Fundamental trade-off between lower variable costs and lower entry/competition
  - Related results in production setting in Blum et al. (2025) and Tsai (2025)
- Distribution chains will endgenously restructure in response to changes in costs and policy
  - Welfare can increase due to lower costs
  - Or, decrease due to higher markups, lower variety, and less access to retailers

Limited empirical evidence on domestic linkages

- Historically, haven't known much about domestic trade networks and buyer-seller linkages within country borders.

- Why do we want microdata on networks?
  - Truer picture of access
  - Network structure matters for aggregate outcomes
  - Gives insight into firm and relationship heterogeneity (that we don't see in e.g. an economy- or industry-wide IO matrix)
    - ★ Help us undertsand costs and frictions in linkages, which in turn matter for private sector development, e.g. search, trust, finance, transportation

- Increasingly, we have data from two sources:
  - VAT data increasingly available and used in LMICs
  - Survey data, both to understand links and networks per se, and to measure spillovers/indirect effects of interventions

Using VAT data to understand firm networks

- Lots of evidence and literature from rich countries now (see overview in Bernard & Moxnes 2018)
- Increasingly, VAT or similar tax microdata available in LMICS
  - Turkey, Ecuador, Chile, India, Pakistan, Uganda, Kenya
- Patterns from rich country VAT data that may be relevant to development:
  - "Indirect" exposure important for understanding propogation of shocks – MANY are exposed via suppliers or customers
  - Stickiness and sparseness of relationships indicative of underlying relationship-formation costs
  - Assortative matching in networks – e.g. firms higher quality/productivity in turn sell to firms with higher quality/productivity (Demir et al. 2023)

Pros and cons of VAT data

- Advantages of VAT data
  - No other way to get this "big" / comprehensive a picture of sales and production networks within a country
  - Allows for coverage across space, industries, and time to capture heterogeneity along these dimensions

- Limitations of VAT (or similar tax) data
  - Temporal aggregation (e.g. at the annual or quarterly level, rarely transaction-level)
  - Typically lacking product identifiers beyond the firm level (e.g. don't know exact content of transaction, or how this maps to sales/outputs beyond firm's overall industry designation)
  - Generally observe few indicators relevant to pinning down specific mechanisms or frictions, e.g. no prices, no quantities, no financing terms or timing, etc
  - And... only covers formal firms (and above a certain size)

Informality in firm networks

- We know most firms in LMICs are informal (see Gabriel's earlier lecture)
- We know that informal firms differ on many dimensions from formal ones
- Most common sources for firm data in developing countries condition on some kind of formality
  - VAT or transaction tax data
  - Firm registries (which form the basis for other sources like manufacturing surveys or standard WBES data)
- Open question: to what extent does this drive what we think we know about production and distribution networks in LMICs?

How informality changes network structure

- Chacha et al. (2025): VAT, macro, and survey data from Kenya
- Network of formal firm activity is not representative of the whole economy
  - Regardless of own location, formal firms have more links with formal buyers/suppliers in urban hubs
  - Informal firms are more downstream, unevenly distributed across sectors
  - Informal firms are located in smaller, poorer regions within the country
- Should not expect patterns based on VAT data to accurately reflect overall firm network in LMICs
- If informal firms' linkages are like the smallest formal firms, then:
  - More local, intra-regional (vs. inter-regional) trade than we think
  - Economic activity less concentrated in major hubs than we think
  - Transmission of shocks is different
    - ★ Less exposed to international shocks
    - ★ More transmission of domestic shocks

Alternative: Survey data on firm linkages

- Pros and cons are converse of those for VAT/tax data
  - Typically limited in terms of geographic or sector coverage, or both
  - Smaller samples
  - Potentially incomplete in terms of coverage due to unwillingness to report, recall problems, or simple complexity limits
- Not aware of data that characterizes multiple links in production or distribution networks (working on changing this!)
- However, often best suited to very detailed information at a single link that informs our understanding of underlying costs and frictions driving macro network patterns

What are determines firm networks?

1. Information frictions
    1. About products (quality, characteristics, prices)
    2. About partners (suppliers / customers)
2. Trust and contract enforcement
3. Interlinkages – across products, locations, or time, e.g. trade credit

Search & Intermediation in Ugandan Agriculture

- Large-scale RCT of a digital clearinghouse platform (Kudu) in Ugandan agricultural markets (Bergquist et al. 2025)
- Very, very simple technology:
  - Buy and sell offers posted (good, quantity, location, price) via feature phone
  - Platform connects people who might want to trade
- Creates experimental variation in search costs on a large scale
  - Randomize across 110 subcounties (50K ppl/subcounty), covering 12% of Uganda
  - Shot at moving equilibrium outcomes like prices and trade flows
  - Test whether buyer-seller search frictions are a barrier to trade

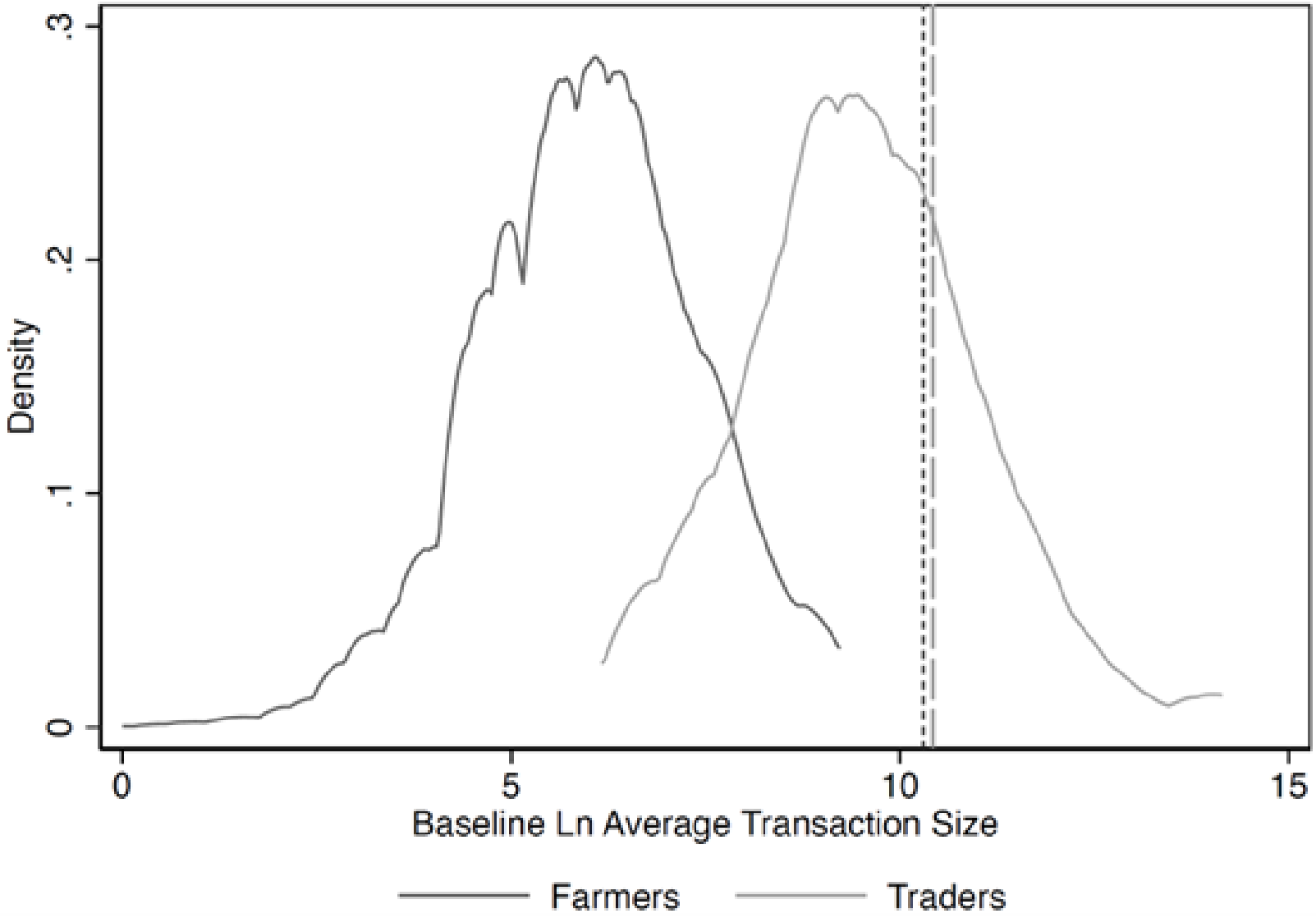
Kudu improved market integration

- Access to platform substantially improved integration
  - Trade between markets increases
  - Price gaps between markets fall
  - $\Rightarrow$ Consistent with a reduction in search costs lowering overall fixed costs of trade by 21%
- Accounting for equilibrium effects matters
  - Price changes in treated markets drive trade and prices in control markets – randomization doesn't prevent this!
  - True effect on trade flows is $\frac{1}{3}$ naive estimate, but still positive and substantial
- Platform was high impact, but had trouble monetizing – a great candidate for innovation and investments!

Helping farmers by helping traders

- Practitioners often believe platforms like Kudu will enable smallholder farmers to cut out traders $\Rightarrow$ shortening the chain
- Platform was a failure?
  - 95% of posts to platform are traders
  - 26% of farmers try the platform, but only 2% transact successfully
- Farmers are still affected!
  - Prices rise in production surplus areas and fall in deficit areas
  - Equilibrium price changes pass through to farmers and are reflected in revenue
  - People don't need to engage directly with new technology to benefit when arbitrage works well
- Why don't farmers engage directly?

Farmers are (still) too small for cross-market trade



Information frictions even drive local links

- Cai et al. (2024): RCT to change firm links in Chinese paintbrush industry
- Intervention provided "referrals" to buyer-seller pairs
  - "Screened" – might be a good match based on existing network
  - "Subsidized" – 50% discount for a first transaction within a two-month period
- Screened, subsidized referrals increased trade
  - Increased probability of transactions after subsidy period by 45 percentage points,
  - Increased number and value of transactions too
  - These were useful links: increased revenue and profits of treated firms
- Even though firms are in same location and industry, often for decades!
- Suggests major search frictions, and possibly incorrect beliefs

Key areas for future work

- Still lacking basic facts about what firm networks look like in LMICs
  - Do stylized facts follow those in rich countries?
  - Especially lacking in distribution, domestic links, informal economy
- Extent of market power, especially outside of agriculture
- Underlying drivers of link stickiness: search, trust, risk?
  - How are these affected by technology?
  - How are these affected by market institutions (quality regulation, legal systems, financial tools)
- How do policies need to be informed by network structure and complementarities
  - Quality upgrading requiring "big push" that goes along whole chain
  - Barriers at interface of formal and informal
  - Unseen actors (intermediaries) mediating passthrough of policy to other firms and consumers