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This survey is a collaborative effort to provide an up-to-date review of selected topics in international trade and development. It is based on the article written by Atkin and Khandelwal, and is reproduced with permission from the Annual Review of Economics, Volume 12 © 2020 by Annual Reviews, http://www.annualreviews.org. Fatima Aqeel, Emily Gallagher, Paul-Robert Laliberte, Hesham Nawaz and Vishan Nigam provided excellent research assistance. Pinelopi K. Goldberg and Nina Pavcnik provided very helpful comments on the original ARE article.

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Abstract

Over the last four decades, many developing countries initiated reforms that have lowered barriers to trade. Yet despite these reforms, developing countries still remain far less open than developed ones, both because of tariffs that remain high but also weak contract and regulatory enforcement, inadequate transport infrastructure, search frictions, and a plethora of other distortions that are more severe in the developing world. This survey summarises a broad set of empirical work that explores the impact of international trade in developing countries characterised by weak institutions, market failures and firm distortions. For each of these categories we ask how the effects of trade policy may differ in the presence of such frictions, how trade may moderate or exacerbate the friction itself, and how policies should respond in the light of the answers to the first two questions.

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Contents

Summary

No country has successfully developed its economy without integrating into global markets. However, while long established literatures analyse how international trade shapes the allocation of resources in an economy, these frameworks typically assume undistorted domestic structures that differ substantially from the realities faced by developing countries. As a result, when the costs of trading with other countries change for developing countries, interactions with existing distortions prevalent in these economies may generate outcomes that differ from those described in textbooks.

Will tariff reforms generate substantial increases in trade if customs officials are routinely bribed? How much does the absence of strong contracting environments limit the ability to trade overseas? Can multinational corporations ensure safe working conditions at their overseas suppliers if the local enforcement of regulations is weak? Will trade reforms themselves strengthen a country's institutions? Does the presence of a large informal economy exacerbate or minimise the gains from trade? To what extent do the impacts of lower international trade costs propagate through an economy if intranational trade costs are high? Does trade liberalisation reduce the extent of distortions by allowing firms without connections to government to thrive?

An exciting wave of recent research lying at the intersection of trade and development economics addresses these questions and more, and has given us a deeper understanding of how trade and globalisation interact with the myriad of distortions that typify developing countries. This review provides an up-to-date summary of this literature and provides a taxonomy to help organise our thinking on how international trade interacts with three broad sets of frictions: weak institutions, market failures, and firm-specific distortions.

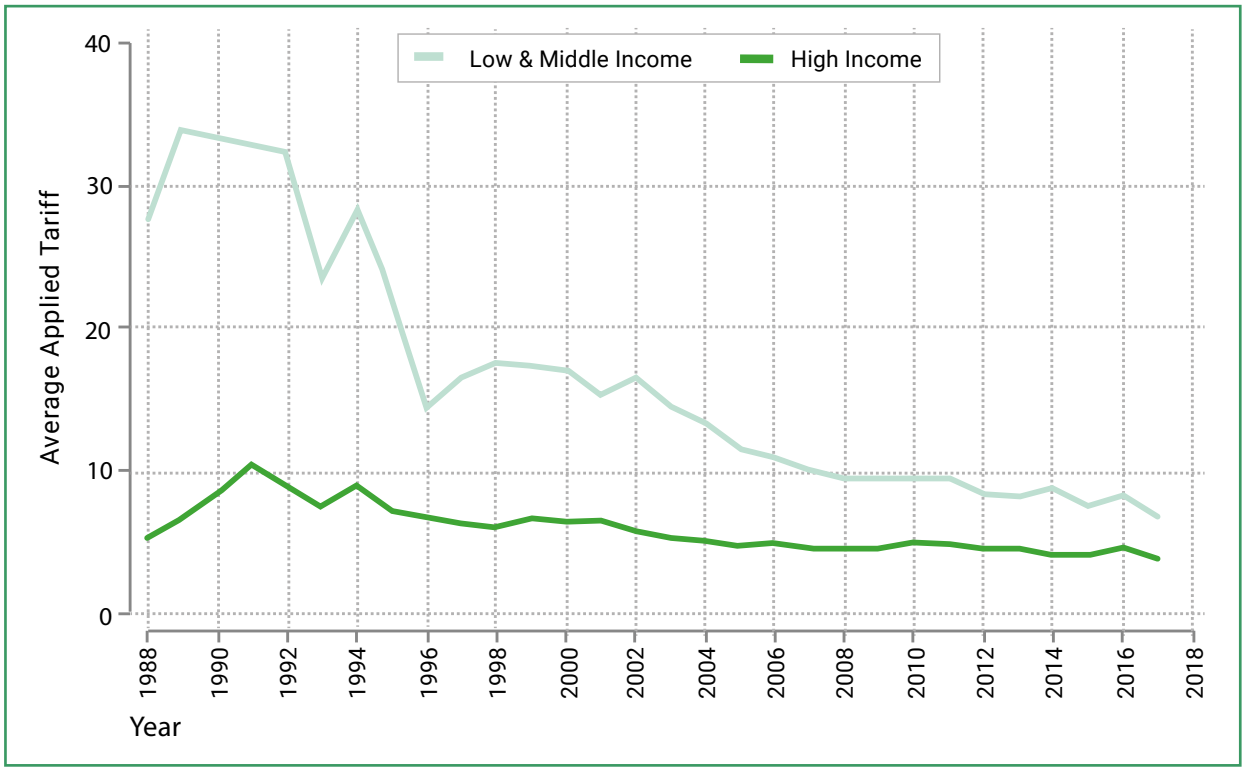
While we emphasise studies that utilise the rich microdata that is increasingly available in developing countries, we do not restrict attention to specific methodologies. Indeed, an important takeaway from this review is that a wide range of methods – from randomised trials to calibrated models – have helped us make progress answering these important questions. The review will be updated as new information becomes available, a particularly valuable exercise for a young literature such as this, where much more work needs to be done to establish whether results found in one country or time period extend more generally.

1 Introduction

Over the last four decades, many developing countries initiated reforms that have lowered barriers to trade. Yet despite these reforms, developing countries still remain far less open to global commerce than developed ones. Figure 1 shows that average tariffs remain higher in developing countries compared to high-income countries, while weak contract and regulatory enforcement, inadequate transport infrastructure, search frictions, and other distortions mean that the same pattern likely holds for other trade barriers.

Understanding the impacts of these high trade barriers on developing countries – and policies to reduce them – should be of great interest to both international and development economists. However, the core insights provided by research in international trade have mostly been informed by neoclassical trade models and from empirical patterns of trade from developed countries (e.g., see Costinot and Rodriguez-Clare 2014 for a recent review article). Applying the lessons from these studies to developing countries requires caution given that standard models typically feature undistorted economies whose structures differ substantially from developing economies characterised by pervasive frictions. Understanding how trade policies interact with frictions such as informality, weak contract enforcement, and credit constraints is vital for policymakers who wish to implement more effective policies.

Figure 1 Average Tariff Rate



Source: World Development Indicators

Fortunately, in recent years, there has been a resurgence in research that examines how international trade interacts with specific frictions prominent in developing countries. These interactions take many forms: while the effects of a trade reform depend on pre-existing frictions, opening to trade can also exacerbate or mitigate their impact. To make progress, scholars have combined rich sources of data from developing countries with a diversity of empirical methodologies – from randomised trials that induce firms to export to structural models of large trade liberalisation episodes.

This survey provides an up-to-date assessment of the trade and development literature, and will be revised annually. It builds heavily on the structure proposed by Atkin and Khandelwal (2020) that classifies the

literature into three broad categories of frictions pervasive in the developing world. The first is *weak institutions* operating at the country level, with an emphasis on imperfect enforcement of tariffs, contracts, and other regulations. The second is *market failures*, such as artificially high input and transport costs, which affect most firms in a given market. The third consists of *firm-specific distortions*, such as political connections and knowledge spillovers, that can give rise to misallocation across firms. While imperfect, this taxonomy reflects the scale at which each friction operates and thus at which evidence must be collected. For a complementary perspective on this literature, we also refer readers to two recent surveys by Atkin and Donaldson (2022) and Verhoogen (2022)[1]. To limit the scope of this review, we restrict attention to micro-empirical papers that focus on the interaction of distortions with international trade for developing countries. Thus, we exclude important research on firms in developing countries, on links between trade and macroeconomic growth, as well as papers that evaluate neoclassical predictions of trade models such as the trade and inequality literature.

In each section, we highlight work answering three related questions. First, how do existing frictions impact trade flows, both directly and in interaction with trade reforms? Second, does trade change the severity of the friction? Third, what policy interventions are most effective in light of the friction? For many of the institutions, market failures, and firm-level distortions we cover, one or more of these questions remain unanswered. As we emphasise throughout the paper, these gaps provide promising directions for future research.

2 Weak institutions and rule of law

A defining feature of developing countries is that they have weak institutions, with weak rule of law perhaps the most obvious manifestation. An abundance of evidence documents differences between the developed and developing world along these dimensions (e.g. La Porta et al. 1998). Almost all transactions across and within borders rely on contracts being honoured – whether they be formal or not – and rules being followed. Thus, weak institutions interact with almost every step between an entrepreneur coming up with an idea for a product in one place, and the final good being purchased by a consumer in another. While, of course, institutions matter for domestic transactions, international transactions typically incur larger monetary and time costs between production and delivery, and require contracting across jurisdictions. These issues matter more than ever given the widespread belief that entering global value chains is now a key pathway to development (World Bank 2020, although see Rodrik 2018a for a counterpoint). Beyond contracting, the literature has uncovered multiple mechanisms through which international trade interacts with weak institutions and rule of law in ways that modify the predictions of canonical trade models. We relegate discussions of rent seeking and lobbying – which is often facilitated by weak institutional environments – to Section 4 that covers firm-specific distortions.

We first cover how weaknesses in three specific institutions – tariff collection, contract enforcement, and regulation – may constrain trade flows, and how specific solutions such as relational contracting enable firms to overcome institutional weakness. In the last section, we also cover how institutions themselves can change as a country opens to trade.

2.1 Tariff evasion

The implementation of trade policy is perhaps the most direct way that weak rule of law affects trade. Research has documented substantial tariff evasion, often accompanied by bribery at ports of entry in developing countries. This matters for trade policy. First, the missing revenues due to evasion dramatically change the calculations of the benefits of tariff policy. And, if the revenue that is collected is diverted from government coffers to other actors through bribes, this will further change the distribution of those benefits.

1 As discussed in Atkin and Khandelwal (2020) and Atkin and Donaldson (2022), there is a long history of thinking about the importance of trade for development; for example, see Krueger (1984) and references therein.

Second, the inconsistent application of tariff policy creates variability in (and uncertainty about) de facto tariff rates across firms, endowing some with a competitive advantage that is not necessarily based on their productivity. Inconsistent policy implementation can thus act as a size-dependent distortion. Third, in the presence of tariff evasion, attempts to target particular sectors through tariffs as a form of industrial policy may be ineffective.

The most common form of tariff evasion occurs through the under-invoicing of imports. Since tariffs are typically assessed on the transaction value, importers have an incentive to report a lower value on transactions to reduce their tariff payments. Evidence of this form of tariff evasion was first uncovered by Bhagwati (1964). Fisman and Wei (2004) pioneered the analysis of tariff evasion by utilising "mirror statistics." Their insight is that while importers have an incentive to under-invoice, exporters face no such incentive because they are not responsible for the tariff payment. Thus, the difference between reported export and import values – the "evasion gap" – could reflect tariff evasion. Unlike earlier work that typically assumed these gaps were measurement errors, they demonstrate a strong relationship between the tariff rate and the evasion gap when examining trade between China and Hong Kong. The paper also documents that evasion also occurs through importers changing the product category of the transaction to one with a lower statutory tariff rate. These findings have been replicated across a range of developing countries. Evasion has been shown to be especially prevalent for differentiated products whose price and quality are difficult to ascertain (Javorcik and Narciso 2008), in contexts of weak institutions and enforcement (Mishra et al. 2008), and to be disproportionately perpetrated by politically connected firms (Rijkers et al. 2017a).

Sequeira and Djankov (2014) survey imports at ports in Mozambique and provide direct evidence that customs officials work with importers to reduce the official tariff payments in exchange for bribes (lowering import costs), and also regularly hold up importers by demanding additional fees to clear transactions (raising import costs). Surveys reveal that firms are willing to double their transport costs to avoid this second "coercive" form of corruption, in part to avoid the uncertainty of bribe payments.

Sequeira (2016) argues that tariff evasion may be an important explanation for why estimates of tariff elasticities – by how much trade volumes change with tariffs – appear to be low in developing countries. Using variation due to Mozambique entering a trade agreement with South Africa, she estimates a tariff elasticity of just 0.1, well below developed-country estimates. She documents via audits that prior to the reform, bribes were paid on approximately 80% of shipments in order to avoid paying an onerous tariff rate. The payments were small, covering only 7% of the total tariff duties saved (an example of the Tullock paradox). When Mozambique reduced tariffs, trade volumes hardly changed since firms had previously been evading tariffs through bribes. Thus, estimates of the tariff elasticity are not particularly informative in quantifying the gains from reductions in trade costs. Put another way, Mozambique was already far more liberalised than it appeared based on official tariff schedules, given rampant tariff evasion and cheap bribe prices (and similarly the costs of protection in these contexts would be exaggerated).

There is a (surprisingly) small literature that studies policies that reduce tariff evasion. Javorcik and Narciso (2017) argue that the WTO Customs Valuation Agreement, which requires countries to use international rules to assess the price of imports in order to collect duties, reduces underreporting of prices when countries join the WTO. Yet, WTO accession also induces importers to shift towards other methods of tax evasion, such as underreporting of quantities and product misclassification. Yang (2008a) shows that hiring private firms to conduct pre-shipment inspections increases import duty collections. However, Yang (2008b) provides evidence that, in the Philippines, imports were simply re-routed to export-processing zones where duty charges could still be avoided. Attempts to crack down on evasion often trigger displacement of corruption.

The literature studying income and property tax collection in developing countries (Finan et al. 2017) could provide insights into how auditing, electronic customs records collection, and/or addressing incentive structures within customs departments can reduce tariff evasion. For example, Laajaj et al. (2019)

document how the staggered introduction of computerisation of import declarations in Colombia led to an increase in imports and tax collection in reformed ports relative to unreformed ones, partially driven by a reduction in underreporting. Relatedly, Carballo et al. (2022a) find that the adoption of electronic customs facilitation through the Central American International Transit of Goods raised El Salvador's exports by 7.5 percent.

However, evidence from Madagascar reminds us that anti-corruption technologies are themselves susceptible to mechanism design problems: Chalendard et al. (2021) identify manipulation of assignment of import declarations to inspectors by detecting deviations from random assignment prescribed by official rules. Deviant declarations were more at risk of tax evasion, yet less likely to be deemed fraudulent by inspectors, who also cleared them faster. The tax revenue losses associated with this evasion scheme were highly concentrated among a select few inspectors and brokers.

Improving our understanding of how to effectively implement trade policy seems particularly urgent for the least developed countries. If trade policy set in the capital is not applied at the border, it is effectively irrelevant.

2.2 Contracts

Strong contracts are central to relationships when trade entails substantial lags and physical distance between production and sale. Weak rule of law makes it difficult for suppliers to contract with producers, and producers with buyers. These constraints are especially prevalent in trade involving developing country firms, where the associated risks have the potential to reduce the gains from trade in the absence of mitigating technologies, such as the prevalence of long-term relationships.

The literature on institutions and trade has shown that weak contract enforcement distorts patterns of trade and comparative advantage beyond standard endowment or technology determinants. For example, Nunn (2007) demonstrates that countries with weak contract enforcement tend to export products that are less reliant on relationship-specific inputs. If these institutional differences exacerbate relative price differences in autarky in a Ricardian manner (e.g. by raising relative unit labour requirements for producing complex goods in developing countries), gains from trade will be magnified.

On the contrary, Levchenko (2007) observes that institutions may also influence the extent of transactional impediments to combining factors of production that are owned by different parties in ways that reduce the gains from trade. In his model, relationship-specific investments and imperfect contract enforcement lead to rents being paid to labour. Consequently, liberalisation in a country with weak institutions results in the development of sectors that do not require relationship-specific investments and the enforcement of contracts. Developing countries can thus be worse off under trade if enough of the high-rent jobs are shifted abroad. Krishna and Sheveleva (2017) present a related model in which non-enforceable contracts lead farmers to specialise in low-value crops instead of high-value and export-oriented crops.

Antras and Foley (2015) present direct evidence on how contractual frictions affect the gains from trade for developing countries. They examine cross-border transactions of a US-based poultry exporter and find that only firms in importing countries characterised by weak rule of law are required to pay the poultry exporter cash in advance. These expensive contractual terms reduce trade volumes. As demonstrated by Ahn et al. (2011a), trade flows are sensitive to cross-border payment terms, and the need to pay up front for cash-constrained importers may be a key barrier to international trade for firms in developing countries.

Taken together, the above evidence on contractual frictions and international trade paints a pessimistic picture for developing countries. However, a closer examination of trading relationships reveals partial solutions to problems stemming from weak contract enforcement: relational contracts. Following Baker et al. (2002), these are arrangements defined as "informal agreements sustained by the value of future relationships."

Historical studies have documented the prevalence of relational contracts or 'self-enforcing' informal agreements that enabled trading parties to mitigate commitment problems. Greif (1993) discusses the role of reputation, information transmission, and collective punishments to motivate cooperation between Maghribi merchants and overseas agents in the 11th century. Kranton and Swamy (2008) examine trade among Indian export procurement agents and producers of cotton textiles and opium in the 18th century, and argue that variation in buyer market power (or outside options) can explain why textiles procurement was rife with enforcement problems despite repeated interactions between local agents and weavers (in contrast, opium procurement was considerably more successful).

Evidence from more contemporary developing country contexts further corroborates the role of reputation and repeated interactions, rather than a formal legal system, in sustaining cooperation in economic transactions. McMillan and Woodruff (1999) document that trade credit in Vietnam is more readily extended to firms with a history of purchases with the supplier, firms that have been referred by another manufacturer, and firms with limited options for alternative suppliers. Banerjee and Duflo (2000) study the nature of contracts between Indian software companies and foreign buyers. They find that software firms with stronger reputations – measured, for example, by the age of the firm or whether the client is a repeat customer – are more likely to enter time and materials contracts which stipulate that the client pays for any overruns (rather than fixed price contracts where the supplier does)[2]. Macchiavello (2011) documents that new Chilean wine producers who export to the UK initially match with high-cost distributors who specialise in discovering new wines. Over time, the exporter's brand reputation improves and it is able to move up to better distributors who pay higher prices and engage in long-term relationships.

While they may partially substitute for formal enforcement, informal agreements create new hurdles to trade: to trade today, the (future) relationship must be sufficiently valuable so that there is limited temptation to renege to the next best alternative. Forming such a relationship can be costly. Macchiavello and Morjaria (2015) develop a framework to quantify the value of informal trading relationships and the costs of acquiring them. They focus on the Kenyan rose exporting sector where written contracts are impractical given the perishable nature of the product. The authors leverage the co-existence of a spot market alongside direct supply relationships to compute lower bounds on the value of a relationship. They calculate this by estimating the profits foregone when an exporter chooses to supply a direct buyer at a pre-agreed price when the spot market price spikes. Notably, the paper shows that the quantity of roses supplied in direct relationships drops during spot-market spikes. This implies that trade is indeed constrained by contract enforcement difficulties and the need to satisfy incentive compatibility constraints. In related work studying Rwandan coffee producers, Macchiavello and Morjaria (2020) explore the hypothesis that relational contracting may be harder to sustain in high-competition environments as it increases the temptation to renege on relational contracts. However, Ghani and Reed (2022) show that a history of repeated exchange may also predict the survival and evolution of past relationships that would otherwise unravel in response to changes in market structure.

Hansman et al. (2020) document a different margin for overcoming contractual frictions in the Peruvian fishmeal industry: vertical integration. In response to exogenous changes in demand for high-quality fishmeal from foreign markets, downstream manufacturing firms vertically integrate with upstream suppliers (fishing boats) in order to ensure the supply of fresher fish required for high-quality production. Relatedly, Macchiavello and Miquel-Florensa (2017) show that vertically integrated coffee producers in Costa Rica can sustain a larger scale of operations. We refer readers to Antras (2016) and Antras and Chor (forthcoming) for in-depth reviews of important (and growing) issues related to production fragmentation across national boundaries.

Consistent with the recent evidence related to vertical integration, a small empirical literature in development is now focusing on long-term relationships, in particular relational contracting, within firm

2 The role of network-led enforcement in enabling informal financial access has been documented in many developing countries, e.g. Townsend (1994), Udry (1994), Greif (2000), Banerjee and Munshi (2004), Kinnan and Townsend (2012), Chandrasekhar et al. (2018).

boundaries. These papers leverage rich micro-level data on firms and their workers to test how cooperation among co-workers affects firm performance and organisation. Atkin et al. (2017a) present a case study of how employment contracts (i.e. wage structure) can hinder the adoption of a demonstrably beneficial production technology in Pakistan's soccer ball industry. Adhvaryu et al. (2021) study how cooperation across managers in an Indian ready-made garment exporter enables them to adapt to production uncertainty from worker absenteeism shocks. In related work, Adhvaryu et al. (2020) show that reputation concerns in buyer-supplier relationships affect the allocation of workers to production lines where managers assign high productivity workers to low productivity lines (foregoing between 1% and 4% of productivity) to avoid falling behind on orders from large buyers. The survey by Macchiavello (2022) provides further detail on the role of relational contracts in the process of development.

Recent contributions to the study of contracting frictions in trade and production have expanded the frontier by combining granular data on transaction patterns with structural models, which enable the researcher to quantify how much contracting frictions affect trade flows. Startz (2021) combines a retrospective transaction-level panel survey of Nigerian traders with a model of search and moral hazard. She estimates the effects of search and contracting frictions on imports by using variation in traders' observable choices to travel and resolve these problems in-person and finds that these two frictions reduce welfare by 14%. Ryan (2020) compiles data on bids, contracts, and ex-post re-negotiations from power procurement auctions in India to estimate a model of renegotiation (following coal price shocks) with heterogeneous bidders. He finds that politically-connected firms renegotiate more often, and bid below cost in anticipation of future renegotiation. Model estimates help quantify the efficiency costs of weak (vs. perfect) contractual enforcement in India's power sector. In a similar vein of using administrative datasets, Brugues (2020) studies relationship dynamics between buyer-supplier pairs using VAT data and financial statements from manufacturing firms in Ecuador, and finds that there is too little trade in the early stages of relationships because of the combination of contracting frictions and market power on behalf of the sellers.

Kelley et al. (2020) experimentally evaluate the impacts of a novel monitoring technology on labour contracting arrangements, employee behaviour, and output in Kenya's informal public transit sector. They investigate the technology's welfare consequences through a structural model of relational contracting between "matatu" owners and their drivers. While the welfare effects of technology-enabled monitoring on employees in their setting is unclear (the owners clearly benefit), this study suggests that the advent of monitoring technologies may help firms to overcome contracting frictions such as moral hazard.

A common thread in the recent papers cited above is the analysis of transactions within specific industries or firms, often author-collected datasets via bespoke surveys and/or administrative datasets from regulatory agencies. We believe this is a particularly fruitful path to learn about contractual issues in production chains. The combination of such data with structural methods further helps us understand important counterfactual environments. In contrast, input-output tables only reveal fragmentation across coarse sectors and mask the nature of transactions (e.g. it is hard to infer from transaction data whether trade occurs through long-term relationships via relational contracts or simply through spot market transactions). While external validity is a concern, generalisable patterns can emerge through studies across several industries or several countries.

2.3 Enforcement of regulations

Another characteristic of developing countries is weak enforcement of regulations in areas such as pollution, child labour and working conditions. Trade will improve matters if export-oriented firms in developing countries adhere more strongly to regulations and use cleaner technologies than typical domestic firms. Trade agreements, which increasingly go beyond tariffs and quotas, may even drive such improvements if developed-country labour groups lobby to insert strong labour and environmental standards in order to prevent capital from "racing" to the bottom. However, the impacts of trade may be pernicious for developing

countries if they lead to reallocations of labour and capital into polluting sectors or those with poor work conditions. Rodrik (2018b) further argues that redistributive gains via profit shifting to developed countries may dwarf any direct gains from tighter regulatory standards in developing countries. In one of the few rigorous studies that examines cross-border regulatory enforcement, Chaudhuri et al. (2006) estimate substantial losses to Indian consumers in the market for quinolones from enforcing intellectual property mandated by the WTO.

Edmonds and Pavcnik (2005) explore the impacts of the liberalisation of Vietnam's rice trade on child labour. Removing export controls and quotas increased rice exports and domestic prices rose. The authors demonstrate that the income effects from price increases dominate, and child labour declines among net rice producers. In a follow-up paper, Edmonds and Pavcnik (2006) provide cross-country evidence that international trade lowers the overall incidence of child labour. Thus, these two papers suggest the claims that international trade exacerbates (or even perpetuates) child labour are inconsistent with the evidence. However, given the importance of this issue, and the continued perception that international trade may worsen child labour, we are struck that there has been little recent work on these issues.

Where governments lack the capacity to enforce regulations, multinational firms (MNCs) may privately enforce standards if they believe that the reputational risk from media exposure of poor working conditions or an industrial disaster exceeds the costs of implementing stronger protections to health and safety. A growing body of evidence suggests that trade, through the incentives of MNCs working in the country, can lead to better enforcement of regulation in contexts where government capacity is weak.

Harrison and Scorse (2010) find that export-oriented textile, footwear and apparel firms in Indonesia targeted by anti-sweatshop activists in the 1990s raised wages 10-20% (with no effect on employment). However, profits among these firms declined, potentially foreshadowing future job losses as MNCs relocate elsewhere. Using a novel survey of working conditions, Tanaka (2019) finds that Myanmar firms that export to high-income countries experience large improvements in both wages and working conditions (e.g. fire safety, health-care, union recognition). In fact, labour standards of domestic firms rise to the levels of MNCs operating in Myanmar. This is in part due to improvements in management practices, but also because foreign buyers demand audits of their foreign suppliers, which serve as an alternative monitoring regime for exporters. Boudreau (2019) implements a randomised trial that allows her to study how effective MNCs are at enforcing local labour laws on their suppliers. Bangladesh requires factories to form worker-manager safety committees, yet few firms comply. By randomising which suppliers were initially targeted, she demonstrates the effectiveness of a new program to enforce compliance spearheaded by an alliance of MNCs. Encouragingly, compliance with the law increased for well-managed firms without any detectable impact on productivity, wages or employment.

Alfaro-Ureña et al. (2021a) develop a quantitative general equilibrium model to study the incidence of responsible sourcing policies – broadly defined to include policies related to worker compensation, benefits and working conditions – on MNC suppliers and their workers. They show that the welfare implications of these activities are a priori ambiguous. They depend on whether or not MNCs face consumer demand that values responsible sourcing practices, and on the potential monopolistic market power of MNCs vis-à-vis their suppliers (or if suppliers have monopsonistic power over workers). They apply the model to study the impacts of private enforcement in Costa Rica and find that it has negatively affected the sales and employment of exposed suppliers but has positively affected the earnings of their workers. On net, the authors calculate positive but minor effects on domestic welfare. McLaren and Im (2021) explore related questions in a model that examines whether increasing globalisation strengthens or erodes labour rights. Their findings suggest an ambiguous impact where stronger rights raise worker's bargaining power but discourages foreign investment.

In summary, the evidence summarised above suggests trade is potentially a force for improving enforcement of labour regulations as developed-country consumers (and workers) value enforcement more than local agents do. Yet, MNCs still struggle with monitoring and enforcing regulations in markets

where the government is a reluctant (or incapable) partner. As the 2013 Rana Plaza building collapse in Bangladesh revealed, MNCs whose suppliers are involved in labour-related scandals can respond by reallocating production chains to countries with stronger regulations (see Koenig and Poncet 2022). That incident underscores that the weak enforcement of regulations can have aggregate consequences for developing countries.

Turning to environmental regulation, pollution regulation is the most studied area relating trade to enforcement of regulations. In particular, several recent reviews, such as Cherniwchan et al. (2017) and Copeland et al. (2022), examine whether trade exacerbates pollution by moving industry to less regulated locations – the pollution havens hypothesis – and find limited evidence that trade liberalisations shift dirty good production to low-income or weak-regulation countries. Consistent with this evidence, Duan et al. (2021) evaluate a general equilibrium trade model with pollution as a byproduct of production. They find that environmental regulations provide a source of comparative advantage, but other determinants of trade (e.g., productivity and trade costs) are more important and suppress the influence of environmental regulation. For example, Rodrigue et al. (2022) demonstrates that Chinese exporters reduce pollution emissions by 36%. That said, stronger environmental policies can result in reallocation of "dirty" trade to countries with weaker regulations, as documented by Tanaka et al. (forthcoming). They show that an increase in the stringency of the US air quality standard for lead resulted in US exports of used lead-acid batteries (ULABS) to Mexico for recycling. The resulting increase in Mexico's local ULAB recycling raised the incidence of low birth-weight babies, especially among babies born to poor mothers.

Finally, one reason developing countries maintain high tariffs is because duties are relatively easily collected on observable imports at a few major ports of entry by a small number of officials. In contrast, tax collection from domestic firms and individuals is costly, difficult to enforce, and challenging in settings where most businesses are informal and most people are self employed. This raises the concern that in the absence of complementary reforms to broaden and deepen the tax base, trade liberalisations can impose large and negative fiscal consequences in developing countries. Cage and Gadenne (2018) find that in the post-1970 period, 45% of countries that liberalised tariffs were unable to recover the lost revenue five years after the reform, and 20% had yet to regain the lost revenue. However, Bachas et al. (2022) provide reason for greater optimism. Using event study and IV strategies, they study the effect of liberalisation on effective capital and labour tax rates in developing countries. They find that trade openness increases these rates, especially effective capital taxation rates; they provide evidence that this is due to increased concentration of economic activity in the formal sector. Together, the two papers suggest that the net effects of trade liberalisation on government revenues in developing countries depends on how liberalisation impacts the amount of economic activity that is visible and taxable by the government.

2.4 Trade, growth and institutional change

For the reasons discussed above, as well as weak property rights and shareholder protections, the gains generated by access to trading opportunities may be very different for developing countries. These differential gains can be exacerbated if trade acts as a force for changing institutions themselves. Indeed, in their review of the trade and institutions literature, Nunn and Trefler (2014) argue that "the impact of international trade on domestic institutions is the single most important source of long-run gains from trade."

The insight from this literature is that international trade can have very different impacts on institutions depending on initial conditions and comparative advantages. The empirical studies have emphasised three mechanisms through which long-distance trade impacts institutions: 1) an increased demand for the rule of law; 2) a shift in the distribution of income that allows certain groups to capture the local institutions; and, 3) changes in shared beliefs and out-group trust that could impact state capacity.

The first strand of literature, mainly focused on European history, has emphasised that long distance trade increased the demand for growth-enhancing institutions aimed at reducing transaction costs. In the Middle Ages, Europe experienced a commercial revolution: long-distance trade re-emerged after an extended period of decline. In order to make this commercial expansion possible, a series of institutions had to be created to mitigate different kinds of commitment problems associated with long-distance trade. Milgrom et al. (1990) focus on the rise of the Lex Mercatoria, or Law Merchant, a body of customary rules and principles relating to merchants and mercantile transactions, which were administered by private judges drawn from the commercial ranks. This institution, which has been argued to be at the origins of Western contract-enforcing institutions, created the incentives to gather information, honour agreements, report disputes, and adhere to the judgments of the merchant courts. Greif et al. (1994) focus instead on the ruler-merchant relationship. Specifically, they argue that the merchant guilds provided an institutional framework to enforce agreements between merchants and rulers, thus overcoming the commitment problem of rulers and enabling trade expansion. Acemoglu et al. (2005) focus on the impact of the Atlantic trade between 1500 and 1800. They argue that Atlantic trade strengthened the merchant class in countries where political institutions already placed constraints on the monarchy. The merchant class's increased political power brought about improvements in property rights that made future growth possible. Jha (2015) provides direct evidence for how a merchant class can steer the institutional choices made by governments. He focuses on the English Parliament's struggle for supremacy against the monarch during the Civil War (1642-1648). He constructs a dataset of the biographies of Parliament members and shows that ownership of assets in the overseas joint-stock companies significantly increased an individual's support for constraints on the executive. Widening ownership increased the number of supporters of parliamentary supremacy over dictatorial rule. Levchenko (2013) formalises a related idea by combining his earlier model discussed in Section 2.2 with a political economy game.

The second strand of literature on trade and institutions has emphasised the shifts in the distribution of income produced by a trade expansion. Within this literature, trade could become detrimental to institutional development if it allows a small group of enriched merchants (or rentiers) to capture the local institutions. Puga and Trefler (2014) show that Venetian trading opportunities in 10th-12th centuries led to a broad-based merchant class that pushed for constraints on the executive class and the establishment of well-functioning contracting institutions. In the long run, however, wealth concentrated in a narrower set of merchant families who formed a (growth-inhibiting) oligarchy.

Sokoloff and Engerman (2000) focus on the impact of the expansion of trade in the Americas following European colonisation and seek to understand the different paths of development of the Western offshoots: United States and Canada versus Latin America. Their main argument is that the Latin American colonies enjoyed climate and soil conditions that were well suited for crops with economies of scale in production. These crops were therefore most efficiently produced on large slave plantations that resulted in extremely high levels of land ownership inequality. The concentration of wealth allowed a small European elite to dominate politics, and eventually led to the development of extractive institutions characterised by skewed land-tenure rights, commercial legal codes that favoured incumbents, and abusive labour practices. In contrast, the Western offshoots had soils best suited to the production of grains, which presented few economies of scale. These colonies developed relatively egalitarian societies that were characterised by more inclusive institutions. While the analysis of Engerman and Sokoloff is mainly descriptive, Bruhn and Gallego (2012) provide a formal empirical validation of the argument using an impressive dataset capturing economic activities performed across different regions of the Americas during the colonial period. They find that those regions that relied on activities with large economies of scale and with scope for labour exploitation are characterised by lower economic development today. The mediating mechanism is the absence of sufficiently representative political institutions.

Dippel et al. (2020) provide another example of potentially detrimental effects of international trade on political institutions within this strand of literature. They analyse the impact of sugar demand shocks on the legal institutions and the agricultural wages in the British West Indies from 1839-1913. The authors document a negative relationship between the political power of the plantation owners, measured by the

share of sugar in total exports, and the wages of agricultural workers. A causal mediation analysis shows that the large majority of the negative effect of the plantation system on wages operated via incarceration rates, thus supporting the role of legal coercion in reducing agricultural wages. The authors also provide suggestive evidence that planters shaped legal coercion both through legislation passed in the islands as well as through personal connections to the police and judicial apparatus in the countryside.

A third strand of literature has emphasised the impact of trade on culture and trust, and through this channel, on state formation. Nunn (2008) provided the first empirical evidence for this channel. The analysis focused on the third corner of the Atlantic trade triangle in the 17th-19th century: the African slave trade. Typically, individuals were enslaved through villages raiding one another. This generated distrust between villages and impeded the formation of larger polities. At the same time, the pre-existing states were either destroyed by bands of slave raiders or collapsed under the corruption engendered by the slave trade. Eventually, those regions that, for geographic regions, were more exposed to the slave trade ended up with higher levels of ethnic fractionalisation, which later retarded the state formation process.

In summary, there is growing evidence that the gains from trade are larger in stronger institutional environments, and that trade itself can both improve or worsen the quality of institutions. As the effects of trade through changing institutions potentially swamp static gains, it is very surprising there is not more work on this topic. Since institutions evolve slowly over time, studies have explored historical episodes. But, perhaps, there is something systematic to be learned from the more recent past, particularly the experiences of East Asian countries that have developed rapidly alongside spectacular export growth.

3 Market-level distortions

Market-level distortions such as poorly functioning credit or labour markets are extensive and well documented in developing countries. These distortions make it difficult for firms and workers to take advantage of trade opportunities and thus directly alter the magnitude of the gains from trade. Relatedly, economists have long known that in the presence of such distortions, reducing trade barriers to better align domestic and world prices can actually lower welfare by exacerbating these other distortions (Bhagwati and Ramaswami 1963). The possibility that trade magnifies or alleviates existing distortions is particularly relevant for the developing world.

We summarise recent empirical work that explores how trade barriers affect economies in the presence of factor market distortions. We further consider the emerging literature that studies the implications of information and knowledge frictions. Although the distinction is sometimes murky, here we restrict attention to market-level distortions that equally constrain all firms in the economy. In Section 4 we turn to firm level distortions that differentially affect certain firms (or possibly sectors) and so lead to misallocation and justify firm-specific interventions.

3.1 Labour markets and human capital

Standard trade models typically abstract from labour market frictions, unemployment, job quality, and informality. Yet, these elements are at the heart of policymakers' concerns with global integration.

A large body of evidence amassed in the past decade – focusing on the experience of developing countries with important trade liberalisation episodes in the 1970s, 1980s and 1990s – has shown that globalisation can lead to substantial disruptions in the labour market. This literature has emphasised that trade shocks have geographically concentrated impacts, induce unemployment in the short to medium term, and displace workers from manufacturing toward low-paying service or informal jobs.

Partly as a result of this evidence, further research has honed in on specific labour market frictions that interact with trade reforms – either because a friction directs impacts onto certain groups, or because trade magnifies or shrinks a distortion. As we emphasise both here and in Section 4.1, one key market failure in developing countries, which starkly contrasts with richer economies, is the high prevalence of an informal sector. Other important frictions include barriers to migration; firm labour market power over workers (oligopsony); worker and firm rents; the presence of minimum wages and firing restrictions; positive externalities from agglomeration; and negative externalities from unemployment or employment in criminal activity.

We begin by discussing more recent reduced form work before highlighting more structural exercises. For a complementary discussion that predates our discussion, see Goldberg and Pavcnik (2007) and Goldberg and Pavcnik (2016).[3]

Topalova (2010) pioneered the estimation of local labour market effects of trade, exploring the Indian trade liberalisation episode of the 1990s. The main insight is that different regions of a country are specialised in different industries. Therefore, if tariff reductions vary across industries, liberalisation should have uneven effects on labour demand across locations. She finds that regions specialised in goods facing larger tariff declines experienced larger wage reductions relative to the national average. Exploiting this cross-regional variation within a country to examine the impacts of national trade reforms or shocks has become known as the "local labour markets approach." Kovak (2013) rationalises (and amends) Topalova's specification with a specific-factors model of regional economies and shows a similar result in the context of the Brazilian trade liberalisation: even ten years after the start of the liberalisation process, regions more exposed to tariff declines experienced relatively larger reductions in wages.[4]

The results in Topalova (2010) and Kovak (2013) point to very long-lasting effects of liberalisation on local wages. This evidence points to potential migration frictions: are workers slow to move away from regions with declining labour demand? Dix-Carneiro and Kovak (2017) revisit the Brazilian trade liberalisation episode and find that regions more exposed to tariff cuts experienced slow-moving and large long-run declines in formal employment relative to the national average, consistent with workers being immobile in the short run and slowly moving away. However, while delayed migration should lead wages in affected regions to recover over time, Dix-Carneiro and Kovak (2017) instead find that the long-run (15 year) negative wage effects in the formal sector are three times as large as medium-run (5 year) effects. They investigate potential mechanisms and find that a combination of capital slowly moving away from relatively hard-hit regions coupled with local productivity declines due to agglomeration economies can explain these patterns. Thus, in the Brazilian case, a combination of inefficiencies – migration frictions, imperfect short-run capital markets, and (the loss of) agglomeration externalities – exacerbated the negative effects of opening to trade.

Felix (2021) investigates an alternative mechanism through which the Brazilian trade liberalisation could have led to lower wages in more exposed regions: firm labour market power. She documents an increase in employment concentration at larger firms in exposed regions, and then estimates a model of imperfectly competitive local labour markets to show that: (a) Brazilian firms command large market power over their workers, substantially marking down wages; and (b) wage markdowns indeed increased in these harder-hit regions, but that this channel only explains 2% of the effect of tariffs on wages. Nonetheless, recognising that firms can exert substantial labour market power over their workers is a topic that deserves further attention.

3 That survey also extensively covers the literature examining why (Stolper-Samuelson) predictions that trade would reduce inequality in developing countries did not materialise. We omit re-reviewing these papers here.

4 Estimates of local impacts are only informative about relative effects: how outcomes of places very exposed to shocks evolve relative to outcomes of places less exposed to shocks. See Adao et al. (2021) for methods that can be used to obtain aggregate effects. In this section, we sometimes drop the adjective "relative" in the interest of clarity of exposition.

Dix-Carneiro and Kovak (2019) show that while initially these trade shocks create unemployment, eventually employment recovers. However, manufacturing workers are displaced into low paying service sectors and informality, with non-manufacturing workers similarly affected by these trade shocks: both because local demand for non-tradable services decreases, but also because their sectors are flooded by former manufacturing workers. There is no indication that workers responded to these deteriorating local conditions by migrating to less-affected regions. As a result, the presence of an (typically inefficient) informal sector may have partially mitigated the negative effects of trade reform on workers. This hypothesis is corroborated by Ponczek and Ulyssea (2022) who investigate how the effects of liberalisation differed across regions with varying degrees of enforcement of labour regulations. They find that the effect of liberalisation on unemployment is larger and the effect on informality is lower in regions that are more tightly monitored and audited by the Ministry of Labour. The interpretation is that, in regions where labour inspections are more frequent, firms and workers have less wiggle room to smooth adverse shocks by moving to the informal sector and lower their costs. Instead, they tend to leave the market/employment altogether.

The local labour markets approach has been used in a variety of other contexts and countries to study shocks to import exposure and also to examine the impacts of shocks to export opportunities. For example, the 2001 US-Vietnam Bilateral Trade Agreement (BTA) expanded market access for Vietnamese exports, and McCaig (2011) finds that regions more exposed to tariff cuts on exports experience wage increases, particularly for workers with low levels of education.[5]

This reasonably consistent set of reduced-form findings have motivated researchers to develop structural models of the labour market that recover the underlying parameters governing the labour market frictions. These papers have focused on measuring frictions and costs workers face in response to labour demand shocks, and on the implications of these frictions for the adjustment process and the distributional effects of trade. Some of these papers also use their frameworks to analyse the impact of active labour market policies and their effectiveness in smoothing labour market outcomes.

Dix-Carneiro (2014) outlines an equilibrium model where workers face several barriers to mobility across sectors, and estimates it using data from Brazil. The model features heterogeneous workers who choose which sector to work in and have differing comparative advantages across sectors. Their sectoral choice reinforces this comparative advantage, making them less likely to move in response to sector-specific shocks. The model also features overlapping generations with older workers leaving the labour market to be replaced by younger workers with potentially higher levels of mobility. The estimates reveal that workers face important mobility costs in switching sectors but these are very heterogeneous across the population; e.g. older and unskilled workers face larger intersectoral mobility costs (and hence larger losses from shocks affecting their industries). The model predicts a slow adjustment process following trade liberalisation with the gains from trade significantly lower than if reallocation was instantaneous. Turning to policies designed to compensate losers, subsidising workers in adversely affected sectors to switch to a new sector tends to outperform policies that retrain workers to enter new sectors.

Artuc et al. (2015) estimate intersectoral mobility costs for a large sample of countries and investigate their consequences for the adjustment process. They estimate that mobility costs are very dispersed across countries, but that they tend to be larger in countries that are poorer and with lower-quality labour markets. Consequently, poorer countries tend to face larger labour adjustment costs in response to globalisation shocks.

An additional friction that can affect the gains from trade is the presence of rents to be bargained over. Firm-level data reveal substantial differences in wages across firms, conditional on worker characteristics. In particular, wages tend to increase with firm-level productivity and export status. Helpman et al. (2010)

5 Cheng and Potlogea (2018) and Erten and Leight (2021) study the impact of WTO accession on China's labour markets. See also papers by Erten et al. (2019), McCaig and S. McMillan (2019), and Costa et al. (2016) for impacts of trade on labour markets in South Africa, Botswana, and Brazil, respectively.

propose a model where wage inequality can increase across firms within worker groups when trade costs change. Helpman et al. (2016) estimate such a model and target some of these salient patterns in the Brazilian data. Using their model, they estimate that 25% of the 1986-1995 increase in wage inequality in Brazil is explained by the tariff declines triggered by the 1990s trade liberalisation.[6]

In related work, Coşar et al. (2016) observe that many economies that opened to trade in the 1970s through the 1990s experienced large increases in the volume of trade relative to GDP, and, at the same time, increases in unemployment, job turnover and wage inequality. However, a key challenge to isolate the effect of liberalisation is that trade costs were declining worldwide and many of these economies implemented a variety of concomitant reforms. For example, Colombia reduced tariffs in the 1980s and 1990s, but also reduced the costs firms faced to dismiss their workers. To understand and quantify the relative contributions of the labour and trade reforms and of globalisation, more broadly, on various labour market outcomes, Coşar et al. (2016) develop a model of trade with heterogeneous firms, firm dynamics, search frictions and firing costs. They find that globalisation forces, beyond the tariff reform, were the main drivers of the rapid reduction of job security and increasing inequality in Colombia. This latter result parallels conclusions by Helpman et al. (2016) in the Brazilian data. Relatedly, Ruggieri (2021) investigates how labour market regulations shape the dynamic responses to trade reforms. He fits a model similar to Coşar et al. (2016) to Colombian and Mexican data and finds that minimum wages and firing costs can significantly modulate how unemployment responds to trade shocks in the short run. In particular, the presence of minimum wages can lead to a large short-run response of unemployment to trade liberalisation.

Finally, recent papers have also shown that shifts into informality and non-employment constitute important margins of adjustment to trade. We return to these interactions between trade and informality when discussing firm-level distortions in Section 4.1.

3.1.1 Beyond employment and wages

There is also evidence that trade affects the labour market beyond employment and wages. First, trade shocks can impact skill acquisition, particularly of adolescents who are not yet in the labour market. Second, local economic shocks induced by trade liberalisation have been associated with changes in the provision of public goods and crime. Finally, trade liberalisation has also been shown to have affected labour market institutions and regulations. Since human capital, crime, and regulation may all involve some spillovers, all three may be ex-ante inefficiently chosen, and whether trade worsens or improves any particular inefficiency is an empirical question.

Several papers document that opening to trade affects educational attainment, though the direction of the effect depends on the skill level of jobs required. Atkin (2016) shows that cohorts of teenagers in Mexican commuting zones that were exposed to new export opportunities created by maquiladora assembly plants experienced slower growth in educational attainment. Importantly, tasks conducted in the maquiladoras do not require very sophisticated skills yet pay relatively high wages to workers straight out of school. In contrast, Oster and Steinberg (2013) find that IT centres in India – a form of high-skilled service exports – raise enrollment in English-language schools. Finally, Blanchard and Olney (2017) use panel data on 102 countries over 45 years to document that export growth is associated with greater (fewer) years of schooling when the exports are high (low) skill-intensive. Though it is not obvious whether this investment is efficient (especially once we account for human capital externalities or credit constraints in education), the evidence does suggest that trade exposure is a quantitatively important determinant of education levels.

Criminal activity may also respond to trade shocks. Dix-Carneiro et al. (2018) show that the regional shocks induced by the Brazilian trade liberalisation episode were associated with: (a) lower government

6 In another line of work, Adao (2016) estimates a flexible Roy model with heterogeneity in worker's comparative and absolute advantage and concludes that the commodity boom of the 2000s was responsible for up to 10% of the decline in wage inequality in the country between 1990 and 2010.

revenue and spending; (b) increases in high school dropouts; (c) declines in public safety personnel; and (d) increases in crime. These results show that trade shocks can lead to substantial adjustment costs beyond those directly affecting displaced workers, creating important externalities in various communities. In particular, the paper exploits variation in dynamic responses across variables to argue that most of the crime effects of liberalisation were mediated by the labour market. Dell et al. (2019) draw similar conclusions when examining the impacts of local labour market disruptions caused by the Chinese export growth on cocaine trafficking and violence in Mexico. These effects on crime are concerning as previous work has shown that crime and violence can also lead to reduced education attainment (see Monteiro and Rocha 2017).

Finally, Tian (2022) shows that trade liberalisation can also influence labour market regulations. China has traditionally regulated rural to urban mobility to a significant extent through the Hukou system. However, regions facing larger export expansions, and in great need of migrant labour, enacted more migrant-friendly regulations.

The body of work discussed in this section points toward rich and nuanced labour market impacts of trade. One fruitful area for research involves incorporating agglomeration economies and frictions for the mobility of both workers and capital into our models of trade (e.g. see recent work by Artuc et al. 2022, using Argentinian data). Finally, given the overwhelming evidence that trade shocks disrupt labour markets and lead to diverging outcomes across workers, it is necessary to better understand the optimal policy response for developing countries.[7] More evidence on active labour market policies in developing countries is very much needed as well as work understanding and quantifying the general equilibrium consequences of scaling up these policies.

3.2 Capital markets

A major theme in development economics is that financial market failures limit firms' access to scarce capital (e.g. Djankov et al. 2007). This has particular impacts on trade flows for two reasons. First, credit is a vital lubricant to trade since inputs must be purchased and goods dispatched long before final payment is received by the producer. Second, the trade literature has highlighted that importing and exporting products requires paying substantial fixed costs up front. For example, Das et al. (2007) estimate that the fixed costs for a Colombian chemical factory to enter a new market exceeds $1 million. Recent work explores how credit constraints interact with international trade through these fixed costs (see Foley and Manova 2015 for a more comprehensive review).

If firms are constrained in their access to finance, it is straightforward to see how capital market distortions raise the barriers to trade. Manova (2013) formalises this argument in a heterogeneous firm model of trade. In her framework, firms require external financing to cover the fixed costs of exporting, and credit constraints raise the productivity cutoff necessary for firms to enter the market. As such, credit constraints impact not only firms' export volumes but also the selection of firms that venture into exporting. Paravisini et al. (2015) extends this line of inquiry by studying the large credit supply shock Peru experienced during the 2008 global financial crisis. They exploit data on firms' relationships with banks to show that firms linked to shocked banks reduced their exports to existing clients. Finlay (2022) examines a policy change in India to expand lending access to smaller firms (those with capital below 1 million dollars). He finds that exporting firms are much more responsive to this policy than non-exporters of similar size. This comparative static implies that credit constraints are more binding for exporters than non-exporters, suggestive of these being high productivity firms who are constrained by a lack of credit. This finding is by no means obvious since we might expect the least credit-constrained firms to be the ones who can afford to pay the fixed costs of exporting. Interestingly, his estimates suggest that providing credit to exporters

7 One of the few studies in this area focuses on the United States experience with the Trade Adjustment Assistance (TAA) program. Hyman (2021) shows that TAA was able to substantially smooth the short-to-medium-run outcomes for trade-displaced workers, increasing their earnings and employability.

is far more effective than subsidising their employment since the constrained firms expand in the former case, raising aggregate productivity, while the unconstrained firms expand in the latter case.

While the literature has focused on credit constraints, which limit firms' investment ability, capital frictions that prevent disinvestment have been less studied. These may be equally pervasive in the developing world due to imperfect secondary markets and lack of scale. Since the ability to downsize is key to trade-induced factor reallocations, this type of friction might have important industry and aggregate implications on how firms and countries respond to trade shocks. For example, using Peruvian apparel data, Medina (2022) shows that when capital is firm-specific (i.e. fixed in the short-run), an import-competition shock leads firms to reallocate idle capital within the firm and undertake costly investments such as quality upgrading and exporting. Moreover, considering the Peruvian manufacturing sector, Lanteri et al. (2021) find that, with partial irreversibility of capital, an import-competition shock induces a temporary aggregate-productivity loss and an increase in misallocation due to investment inaction and exit of some productive firms.

Another less-studied friction related to capital markets occurs in the form of currency invoicing behaviour. Gopinath (2015) reports that the vast majority of developing countries' imports and exports are invoiced in a foreign currency, typically the US dollar. This has implications for the transmission of exchange rate shocks to the border and domestic prices. Imports that are priced in producer currency will exhibit a high exchange rate pass-through in the short run (Gopinath et al. 2010). This implies that the inflation rate will be more sensitive to the exchange rate in countries where imports are invoiced in a foreign currency (and exports less sensitive).

We see future work in this area advancing along several fronts. First, assessing the impacts of credit constraints is challenging because credit-constrained firms differ from unconstrained firms along many dimensions. The most direct way to assess potential biases would be through randomised trials that provide a subset of firms with liquidity to assess the impacts on those firms' exports. Second, there is very limited work on trade credit, despite its potentially central role in facilitating trade and anecdotal evidence that suggests great difficulties and cost to obtain such credit in the developing world. Third, much of the recent work on credit constraints in trade treats the distortion at the market level, rather than as a size-dependent distortion. The latter introduces the possibility that capital is misallocated across firms; see further discussion in Section 4. For example, Bau and Matray (2021) use a natural experiment in India to show that foreign capital liberalisation reduces capital misallocation and increases aggregate productivity. Fourth, the motivations for and implications of currency invoicing, financial and operational hedging strategies, and foreign currency borrowing have largely remained outside the purview of the trade and development literatures. Finally, there is much more to learn about how capital frictions and international trade interact in general equilibrium. One recent push on this front comes from Leibovici (2021), who, using Chilean data, shows that while financial frictions have a significant impact on international trade at the industry level, they have a minor impact in the aggregate.

3.3 Material markets

Between the 1950s and 1980s, many, if not most, developing countries pursued import substitution policies that placed onerous restrictions, high tariffs or outright prohibitions on importing key intermediate inputs that were seen as stepping stones to industrialisation (Krueger 1984, Irwin 2019). Given the failures and later abandonment of these policies, it is likely that they induced substantial distortions to input markets by raising the cost of key intermediates and in many cases cutting off the supply of high-quality intermediates to the domestic market. A large body of work explores the impacts of major liberalizations in the 1990s and 2000s that removed these barriers and prohibitions on input trade. For example, Goldberg et al. (2009) note that India's much-studied unilateral trade reforms in the 1990s primarily reduced tariffs on imported inputs, and that the vast majority of imported inputs were products and varieties not previously imported.

Amiti and Konings (2007) and Topalova and Khandelwal (2011) show productivity improvements from input tariff cuts by constructing firm-level exposure to input tariffs using input-output tables in Indonesia and India, respectively. Using Hungarian data, Halpern et al. (2015) document that imported inputs are imperfect substitutes for domestic inputs and are of higher quality. Imported varieties raise firms' revenue productivity, and they attribute one-quarter of Hungarian productivity growth during the 1993-2002 period to the increased use of imported inputs.

Subsequent work has explored the link between intermediates and directly observable measures of firm performance. Kugler and Verhoogen (2012) provide a theoretical foundation and empirical evidence supporting the key role of input quality in producing output quality. Goldberg et al. (2009) provide evidence that lower input tariffs expanded the range of domestic products manufactured by Indian firms. Their evidence shows that access to new imported varieties, rather than price declines of existing inputs, were key, and De Loecker et al. (2016) demonstrate that these lower input tariffs reduced output prices. Gopinath and Neiman (2014) exploit the 2000-02 Argentine peso depreciation to demonstrate that worsening terms of trade can generate large productivity losses, as higher import costs raise output prices and reduce firms' scale. There is also mounting evidence that high-quality inputs from developed countries spur exports from developing countries.[8]

Researchers have recently gained access to firm-to-firm transaction data, often originating from value-added tax records, allowing a deeper understanding of how buyers and suppliers interact within production networks. To date, most of the research has been on developed countries (e.g. see the survey by Bernard and Moxnes 2018) where frictions and distortions in input markets are likely smaller than for developing countries.[9] One exception is Huneeus (2019), who shows strong propagation of trade shocks through the Chilean production networks due to frictions in finding new buyers.

As more developing countries provide researchers with access to such datasets, our understanding about how input market distortions affect firm productivity in developing countries will further improve. (An important caveat is that these data almost always miss transactions with and among the informal sector, with the Indian example studied in Gadenne et al. 2019 an exception.) A recent and complementary theoretical literature explores the possibility that input market distortions, which could include trade barriers but also contractual frictions and imperfect competition, can compound over input-output linkages (e.g. see Liu 2019). This implies that targeting distortions with high "distortion centrality", which are typically those in upstream sectors, can deliver large improvements in aggregate productivity. Bringing this literature together with the firm-to-firm transaction data described above as well as customs data is a promising area of future research.

Finally, while recent work by Morlacco (2019) shows that French manufacturing firms (buyers) have market power in input markets, which decreases the gains from input trade, we are unaware of similar analyses in the developing world. Granular datasets documenting detailed use of inputs per product as well as firm-to-firm data will likely allow fruitful research on this area.

3.4 Land, energy and other factor market distortions

A large literature has established that developing countries are plagued by unenforceable or customary property rights, expropriation risk, and poorly-functioning land-titling systems, all of which impede land transactions (Besley and Ghatak 2010). There are additional bureaucratic hurdles and red tape that prevent converting the usage of land (e.g. from agriculture to manufacturing). Electricity is an equally important

8 For example, see Manova and Zhang (2012) and Kugler and Verhoogen (2012).

9 As evidence for such frictions being larger in developing countries where contract enforcement is poorer, Boehm and Oberfield (2020) find that Indian manufacturing firms' production and sourcing decisions appear systematically distorted in Indian states with weaker contract enforcement. In the same context, Boehm et al. (forthcoming) show how input-based comparative advantage determines product diversification.

input into production that is unreliable and either expensive or rationed due to a combination of poor regulation, transmission losses, and political failures that allow nonpayment or outright theft (e.g. Allcott et al. 2016). These issues, as well as other factors such as access to water, constrain the ability of firms in the developing world to achieve scale economies and compete successfully on international markets (see Abeberese et al. 2021 for evidence in India). However, we are not aware of work that specifically explores how these constraints interact with trade.

One policy response to overcome these factor market distortions has been to create special economic zones (SEZs). Despite their costs and uncertain benefits, SEZs have become a prominent policy used by governments to attract foreign investment and to spur exports (Duranton and Venables, 2019). In developing countries, SEZs serve to address multiple market distortions by lowering trade and regulatory costs (through one-stop shops that reduce bureaucratic red tape or special tariff regimes), by facilitating access to land and reliable electricity, and, in some cases, by allowing for more flexible labour regulations (Khandelwal and Teachout, 2016). Yet, despite their widespread use, SEZs have not been extensively studied in the international trade literature. Two exceptions are Wang (2013), who finds positive impacts of SEZs on Chinese municipality exports, FDI, and wages, and Alkon (2018) who finds that India's SEZs have largely failed to trigger improvements in socio-economic outcomes. Although SEZs are the subject of intense interest among policymakers (e.g. World Bank 2017 and UNCTAD 2019), more academic attention systematically evaluating their costs, benefits and overall impacts is warranted.[10]

3.5 Imperfect competition and markups

Rodrik (1988) and Tybout (2000) argue that too much trade policy analysis is based on insights derived from models of perfect competition. The resulting advice may be inappropriate for developing countries where many markets are imperfectly competitive and antitrust is typically nonexistent.

A long-standing view is that trade liberalisations increase domestic competition and reduce markups, and pioneering work by Levinsohn (1993) and Harrison (1994) found support for this hypothesis in Turkey and Cote d'Ivoire, respectively. More recently, Edmond et al. (2015) develop – and test on Taiwanese data – a model in which the pro-competitive effects of trade both lower markups and reduce markup dispersion by exposing the previously-dominant producers to greater competition. Trade reforms also lower prices of inputs, as noted above, and De Loecker et al. (2016) examine how prices, markups and marginal costs adjusted in response to India's dramatic reductions in input tariffs. Recovering markups from production data via first-order conditions, they estimate a median markup across all sectors in India of 34% of costs. While prices declined relatively more in sectors that experienced larger tariff cuts, consistent with the pro-competitive effects of trade, costs fell even further because of declines in input tariffs. As a result, markups actually increased in response to India's trade liberalisation.

Atkin et al. (2015) take a direct approach to measuring markups in a sample of soccer ball exporters in Pakistan. They ask firms for their markups and find that high-quality balls command higher markups and that the median is low at 8.6% of cost. However, the dispersion in markups across firms is large – with the standard deviation of markups approximately equal to the median. In fact, this markup dispersion exceeds dispersion in manufacturing costs and is more strongly correlated with firm size. Their results suggest that marketing efforts play a key role in export success.

To shed further light on the relationship between trade, markups and the degree of imperfect competition, we see high value in future studies focusing on specific industries. Such a focus allows for a deeper understanding of industry costs and the appropriate shape of the production function, as well as potentially more accurate collection of cost and price data, and even the firm's perceived markup (which

10 Grant (2020) makes progress on this question using US data, noting that many SEZs give selective exemptions to tariffs and other regulations for certain firms and industries, which may have distributional consequences as well as ambiguous aggregate welfare implications at both the national and international levels.

is presumably the object they adjust in response to economic conditions). Faccio and Zingales (2021), Beirne and Kirchberger (2020) and Leone et al. (2021) provide nice recent examples of industry studies of competition in developing countries with the former exploring the mobile telecoms industry and the latter two the cement industry. Finally, the finding that trade affects not just levels but the dispersion of markups has implications for misallocation, a topic we focus more directly on in Section 4.

3.6 Domestic trade frictions

Another feature typical of developing countries is the high cost of moving goods within the country, both due to poor infrastructure and to chains of (often imperfectly competitive) middlemen. These high costs directly distort production and supply-chain decisions, reduce the ability to produce at scale, and have distributional ramifications for the gains from trade that are absent from trade models that abstract away from domestic geography, distribution and retail.

As evidence for these high costs, Atkin and Donaldson (2016) use variation in price quotes across Ethiopia and Nigeria (purged of intermediary markups) to document that the marginal costs of distance are 3-5 times higher in Sub-Saharan Africa than the US. Donaldson (2015) reviews the literature on the gains from market integration via improved infrastructure.

Coşar and Fajgelbaum (2016) explore how high internal trade costs affect the gains from trade. Export-oriented firms locate by the coast to access foreign markets and draw mobile factors from the autarkic interior. The gains from (external) trade liberalisation are reduced in this model, with absolute losses to immobile factors in the interior. Fajgelbaum and Redding (2022) further show that internal trade costs can retard the process of export-induced structural development by keeping land cheap relative to labour in remote locations. In contrast, Allen and Atkin (forthcoming) highlight that high trade costs provide a form of insurance to farmers in the sense that local prices rise when local yields are low. Thus, expansions in India's highway system led farmers to reallocate their land to less volatile crops to mitigate the increased risk they were exposed to, particularly in locations without good access to banks (an alternative risk mitigation technology).

A substantial literature highlights the prevalence and importance of middlemen in the developing world. Ahn et al. (2011b) hypothesise that small exporters use intermediaries to save on trade costs or access more difficult markets and provide supportive evidence from Chinese firm-level data. If the trading sector is perfectly competitive, many layers of intermediaries act as a price wedge between domestic markets, raising internal trade costs. However, Atkin and Donaldson (2016) also find imperfect competition in the trading sector to be pervasive, particularly in remote locations. This combination of high trade costs and a lack of competition in trading and distribution alters the distributional impacts of trade to the detriment of remote locations, which experience smaller gains from reductions in port prices than less-remote places and whose consumers receive a smaller share of the pie vis-a-vis intermediaries. This echoes McMillan et al. (2003) who show that farmers saw little benefit to removing export restrictions in Mozambique's cashew sector, as middlemen passed through little of the price rise (alongside urban unemployment generated by the closing of cashew processing plants). Fafchamps and Hill (2008) document low pass-through from international prices to Ugandan coffee farmers although they conjecture this comes in part from excess entry of small traders increasing search costs for traders. Bergquist and Dinerstein (2020) shows only one-fifth of an experimentally-induced cost reduction is passed through to Kenyan consumers, and experimentally-induced entry of additional traders has little benefit as the new traders quickly collude with incumbents. Finally, Dhingra and Tenreyro (2017) argue that pass-through of world prices to farmers depends on the degree of monopsony power of large agri-businesses that are becoming increasingly common in developing countries. They find that when world prices rise, Kenyan farmers selling to these large buyers see incomes rise by a third less than those selling through small traders.

Turning to theoretical advances, Antras and Costinot (2011) show that international trade can generate absolute losses for the developing world if developed-country traders with strong bargaining positions come to dominate developing country markets. Bardhan et al. (2013) explore a setting where consumers

are uncertain of product quality and so producers rely on middlemen with reputations to sell their products. Thus, middlemen obtain reputational rents, and these rents can skew the distribution of the gains from trade in favour of middlemen. In recent work, Grant and Startz (2021) show that even when intermediation is imperfectly competitive, cutting middlemen out can either help or harm consumers. If multiple layers of intermediation arise in response to economies of scale in transportation, search, or other trade costs, then longer chains involve both higher costs and more competition, and the net welfare effect of these two forces is ambiguous.

One solution to intermediary market power takes the form of programmes such as Fair Trade certification that guarantee minimum prices to producers and may help organise and provide public goods to groups of farmers. The effectiveness of such programmes is still in question, with Dragusanu et al. (2014) reviewing this nascent literature (also see Dragusanu et al. 2022 and Macchiavello and Miquel-Florensa 2019).

The role of the final link in the distribution chain – the retail sector – has received less attention despite retail appearing to be highly inefficient and uncompetitive in developing countries. Notable exceptions are Javorcik and Li (2013) and Iacovone et al. (2015) who document that entry of foreign retailers into Romania and Mexico, respectively, induced domestic suppliers to raise productivity and improve logistics. Lagakos (2016) suggests that rather than frictions impeding the adoption of modern retail technology, the lack of cars among the poor impedes "supermarket-style" retail. Atkin et al. (2018) show substantial improvements in welfare with the entry of foreign retail into a middle-income country, Mexico. These gains are primarily driven by 30% of consumers switching their purchases to foreign stores as well as pro-competitive reductions in prices by domestic competitors. Suggestive of the lack of competition in the retail sector in developing countries, these two effects are more than twice as large as comparable estimates of Walmart's impacts when entering U.S. towns.[11]

Finally, high internal trade costs coupled with poverty lead to small and segmented markets. Similar to infant industry arguments, these segmented markets reduce the ability of developing country firms to exploit economies of scale that may be necessary to be internationally competitive. Bigsten et al. (2004) touch upon this point while exploring learning-by-exporting in African manufacturing and Leone et al. (2021) point to small market size as a cause of high cement prices in Africa. We believe that the difficulty firms in small and poor African countries face in achieving sufficient scale deserves more attention.

In summary, there is strong evidence of large internal trade costs in the developing world coupled with imperfect pass-through due to imperfectly competitive trading and retail sectors. This should certainly make us cautious when interpreting welfare and distributional impacts of reforms from border price changes (i.e., by assuming perfect pass-through from border to consumer). However, further research is needed to establish more reasonable assumptions. At the same time, we know little about effective policy remedies for the lack of competition in the trading and distribution sectors.

3.7 Information and knowledge frictions

Recent research has documented that information frictions in developing countries may impede trade as much or more than textbook trade barriers such as transportation costs and tariffs. These frictions reflect the costs of gathering information from distant markets, including prices, products, trade partners, consumer preferences, and production techniques. While information frictions exist everywhere, they may be especially severe in trade within or across borders in developing countries due to the high costs of information technologies, interactions with other market failures, and the weakness of regulations and institutions that facilitate information disclosure and collection.

11 Beyond foreign entry, e-commerce may be a partial solution to high retail prices, as shown by Couture et al. (2021).

3.7.1 Search and matching

A number of papers show that costly price discovery contributes to a lack of market integration in developing countries, and that the introduction of new information technologies can reduce these costs and improve arbitrage. Jensen (2007) studies the expansion of mobile phone access to fishing villages along the coast of Kerala in India. He finds that, as fishing boats and wholesale traders adopted newly available phones, they were able to communicate and better match supply to demand across villages, reducing price dispersion and waste. Aker (2010) documents a similar phenomenon in Niger, where the introduction of mobile phones led to a 10–16% reduction in price dispersion across grain markets, and an even larger reduction between market pairs separated by high transport costs. Goyal (2010) finds that the introduction of village internet kiosks that farmers in India could use to learn about wholesale soybean prices led to reduced price dispersion and an increase in soybean cultivation.

While price data is more commonly available and used to study search and matching frictions, data on actual flows of goods are important for understanding the form that these frictions take and their relative contribution to total trade barriers. Allen (2014) uses an unusual dataset that captures intranational trade in agricultural goods between ports within the Philippines, which shows that freight costs cannot fully explain the extent to which trade flows decline with distance. This and other empirical patterns can be explained if producers must pay a fixed cost to learn about the price in another location. Structural estimates suggest that information frictions account for half of the observed spatial price dispersion. In a historical context, Steinwender (2018) analyzes the effect of the transatlantic telegraph linking the United States and Great Britain on the cotton trade. The arrival of the telegraph reduced the time lag for news from 1–2 weeks to a single day, which decreased price gaps and price volatility, and increased trade flows and their volatility, with estimates of the efficiency gains from this improved integration equivalent to 8% of export value.

When goods are differentiated, information about the existence and characteristics of products may be as important as their price. Startz (2021) studies Nigerian traders who import differentiated products that change along with fashion and technology trends. Transaction-level survey data documents that these traders frequently pay large costs to travel to source markets when purchasing. When they do so, they are more likely to find new products and pay lower prices to suppliers, consistent with the idea that travel is a way to search and overcome information asymmetries. Willingness to pay for travel suggests that these search and contracting frictions are about two thirds the size of physical and regulatory trade barriers combined. Juhasz and Steinwender (2018) show that the impact of an improvement in information technology depends on how it affects the ability to communicate about product characteristics. They study how the textile trade responded to historical expansions of the telegraph network, which increased the speed of communication across countries. They find that trade increased the most in products for which characteristics could be easily codified in words and therefore communicated by telegraph, such as yarn, and the least for finished cotton cloth, for which it was difficult to fully describe the product without seeing or touching a sample.

Search and matching frictions also arise when looking for buyers or suppliers. There is a substantial literature in international trade that considers these frictions as part of the cost of entering a new market or expanding access within a market; see reviews by Bernard and Moxnes (2018) and Alessandria et al. (2021). Information frictions generate trade dynamics if search builds on existing relationships and experience (Chaney 2014, Eaton et al. 2022), or if potential partners learn about each others' characteristics over time. The latter may be particularly interesting in developing country contexts, where quality regulation, contract enforcement, and formal financing opportunities may be less available to substitute for relationship-specific knowledge. As discussed in Section 2.2, Macchiavello (2011) studies Chilean wineries exporting to the United Kingdom, and shows that they initially match with high cost distributors but move on to better matches over time as they develop a reputation for quality and reliability. Antras and Foley (2015) find that a large United States poultry exporter requires buyers in locations with weak contract enforcement to pay in advance, but offers better financing terms over time as they gain experience with a particular buyer and learn about their reliability.

Reductions in the cost of learning about potential trade partners can increase the number and quality of matches, therefore increasing trade. For instance, Aker et al. (2020) conduct a two-sided RCT in Tanzania in which some enterprises are listed in a phone directory that is made available to some households. Listed enterprises have increased sales, while households with access increase their search activities and purchasing outside their village. The same reasoning has motivated recent policy efforts to link firms in developing countries with international partners via export promotion platforms. For instance, Carballo et al. (2022b) study an online business-to-business platform supported by the Inter-American Development Bank for the purpose of promoting international trade, and find that listing on the platform increased firms' exports by 16% via increased visibility to new buyers.

Reductions in information frictions can also reallocate matches and shift bargaining power within existing ones. Jensen and Miller (2018) study the effect of the expansion of mobile phone access in Kerala on boat-builders, and find that as market integration increased, buyers learned about the quality of sellers in other markets. Buyers shifted toward higher quality builders, whose market share expanded, while lower quality builders shrank or exited. Rudder (2020) investigates the impact of randomising access to the Tanzanian digital phonebook on business-to-business transactions, and finds that neither trade nor the number of matches increased, but that the intervention did affect the extent of relational contracting, suggesting that firms' outside option had changed. This is consistent with McMillan and Woodruff (1999)'s earlier finding that learning about partners over time and the costs of locating alternative partners both influence the terms of relational contracting within a relationship.

Technology that improves information about potential trade partners may also not be neutral with respect to who has access to matches. Cheng et al. (2020) document "lexicographic biases" in international trade, in which Chinese firms whose romanised names come earlier in the English alphabet export more to countries with language proximity to English, which they attribute to listing order in catalogues or databases for homogenous goods. Bai et al. (2020) document large search frictions on the huge e-commerce platform AliExpress, and show that these can slow quality revelation and lead to misallocation of demand with respect to seller price and quality. They find that sales and visibility on the platform are mutually reinforcing, and that an experimental intervention to increase visibility reduces misallocation.

3.7.2 Knowledge and production

Information frictions may also affect the dissemination of knowledge about preferences or production techniques from elsewhere in the world. Atkin et al. (2017b) conducted a field experiment in Egypt, in which they obtained export orders for handmade rugs from high-income countries, and allocated these to a random sample of small-scale rug manufacturers via an intermediary. Detailed surveys showed large impacts of exporting in the treatment group relative to control firms: profits increased 15–25%, and quality-levels rose dramatically when making identical rugs in a lab setting. Records of meetings between buyers, intermediaries and firms suggest knowledge flows drive these quality changes. In particular, firms learn about preferences of foreign buyers and how to manufacture high quality.

The effects documented in Atkin et al. (2017b) are an example of the elusive learning-by-exporting phenomenon. The survey by Wagner (2007) offers mixed evidence supporting a causal relationship between exporting and productivity. Supporters argue that this phenomenon is most relevant for developing countries that have more to learn (e.g. De Loecker 2007, Fernandes and Tang 2014).

Why learning-by-exporting occurs is a separate question.[12] Atkin et al. (2017b) find suggestive evidence for the mechanism in the classic learning-by-exporting literature (e.g. Clerides et al. 1998): flows of information that are not priced. The fact that the value to the firm of this knowledge on the domestic market exceeds the intermediaries' cost of provision suggests failures in the market for knowledge in this setting. Similar mechanisms are at play in studies that explore knowledge flows to domestic firms as a result of FDI (e.g. Javorcik 2004) in the context of vertical supply linkages or more recent work by

12 Of course, exporting may incentivize investment in new technologies, the hiring of skilled workers, and so on, but accurately measured productivity conditions on these changes.

Alfaro-Ureña et al. (2022) exploiting firm-to-firm transaction data – see Section 4.4 for further discussion) although the evidence here is mixed (see Harrison and Rodriguez-Clare 2010). Alternatively, exporting may lead firms to improve efficiency by cutting slack. Here the puzzle is why they operated inside the efficiency frontier prior to exporting. Perhaps behavioural economics may be useful in answering this question (e.g. see Kremer et al. 2019).

A related line of work explores information frictions in the adoption of modern management practices. Bloom et al. (2013) conducted a randomised control trial among Indian textile firms to test the hypothesis that adopting modern management practices can improve productivity. Firms offered free management consultancy experienced a 17% improvement in productivity. The authors conclude that information frictions are the most plausible explanation for why poor management practices persist: many firms in their sample were either unaware of the impacts or existence of these improved management practices. As above, the absence of low-cost consulting providers is puzzling in this context and suggestive of market failures, potentially due to worries regarding blackmail, corporate espionage, or reputation issues.

Bloom et al. (forthcoming) study the long-term impacts of their management experiment. Interestingly, treated firms had 41.6% higher export volumes and were 18.9% more likely to export relative to control firms. A related paper by Bloom et al. (2018) examines the relationship between management practices and export patterns in the U.S. and China. They find that management practices matter more for Chinese export outcomes, particularly with regard to production efficiency and product quality.

To summarise, an emergent literature shows that information frictions, either through high costs of search and matching or through direct knowledge barriers, are important constraints that inhibit trading opportunities for firms in developing countries. Yet, given their potential importance, we still know very little about their nature. Understanding the type of costs firms incur in overcoming these frictions will be key to understanding their relationship to development. For instance, fixed costs of search are likely to interact with the firm-size distribution, learning dynamics with credit market imperfections, and so on. We know even less about what types of policy interventions may alleviate these information frictions. The main body of research on this topic has focused on changes in technology, but very little work has been done on the potential impact of institutions that facilitate information aggregation or reduce the need for it via regulation, such as credit bureaus, commodity exchanges, product quality standards, disclosure requirements, and industry associations.

4 Firm-level distortions

The previous discussion focuses on market-level distortions. We now turn our attention to distortions that affect firms (or possibly sectors) to differing degrees and how such distortions interact with international trade. An implicit assumption in standard models of trade is that resources are efficiently allocated across firms and sectors, at least conditional on trade costs. Yet, a large body of work has argued that firm-specific frictions or taxes are particularly prevalent in developing countries, resulting in the misallocation of factors of production (e.g. Banerjee and Duflo 2005, Hsieh and Klenow 2009).

A robust prediction from a broad class of trade models is that trade leads to the expansion of larger firms relative to smaller ones (Mrazova and Neary 2019). If we believe that small and unproductive firms are abundant in developing countries because they have preferential access to capital, benefit from barriers to entry, or receive favourable tax treatment, then trade reforms will tend to be efficiency enhancing. If, instead, we think that red tape, crony capitalism and lobbying results in small firms facing larger frictions, trade will tend to increase misallocation. A similar logic applies across sectors – i.e. sets of firms that potentially face similar distortions – depending on whether comparative advantage sectors are more or less distorted.

We summarise the literature that focuses on this interaction between trade reforms and firm- and sector-dependent distortions. In a recent review, Atkin and Donaldson (2022) cover this literature in more detail. In addition, they recover firm-specific distortion measures from hundreds of World Bank Enterprise Survey samples across the world that they use to quantify whether reductions in trade barriers are likely to improve or worsen misallocation on net, with the analysis finding improvements for the typical low-income country.

4.1 Small and informal firms

The vast majority of firms in developing countries are small and informal. For example, Hsieh and Olken (2014) document that nearly all firms in India and Indonesia have fewer than 10 workers, and Nataraj (2011) shows that the median manufacturing firm in India is informal, has two employees and $235 in capital. Small firms have low value-added per worker and typically operate informally, avoiding both taxes and regulatory barriers.

Despite the overwhelming dominance of small firms and their perceived drag on aggregate productivity, there is little research on how trade affects the firm-size distribution in developing countries. On the one hand, since informal firms do not face labour-market regulations or other regulatory barriers, the increased import competition resulting from trade reforms may expand the informal sector, as it can quickly absorb workers shed by the formal sector. On the other hand, informal firms may contract if they are particularly prominent in importing competing products or if they compete in factor markets with (formal) exporting firms.

Nataraj (2011) examines how India's major trade reforms affected informal firms. She finds that declines in tariffs on final goods raised productivity among informal firms and that the smallest and least productive firms exited the market. However, the inability to follow firms over time or to see them switch in and out of formality makes isolating mechanisms difficult. McCaig and Pavcnik (2018) provide a more comprehensive analysis. The Vietnam-US Bilateral Trade Agreement expanded market access for Vietnamese firms by lowering the U.S. tariffs on their exports. Since informal firms are typically too small to cover the fixed costs of exporting (and typically need to be formal to navigate export procedures), the removal of trade barriers primarily benefits larger firms. These formal-sector firms expanded, pulling workers from informal firms, mainly in the same industry (the second mechanism above). Since formal firms are substantially more productive, this movement raised aggregate productivity. There is also suggestive evidence of reduced misallocation since formal firms have higher average-revenue-products of labour, and thus potentially higher marginal revenue products (which would imply that these firms faced larger distortions).

Using a similar approach of focusing on employment in informal firms, the aforementioned Erten et al. (2019) find that domestic trade liberalisation in South Africa was associated with a decrease in the prevalence of employment in informal firms (and an increase in non-employment). In contrast, Dix-Carneiro and Kovak (2019) and Ponczek and Ulyssea (2022) find an increase in self-employment, a proxy to working in informal firms in the Brazilian context, among low-skilled workers in regions most exposed to domestic tariff reductions; and the latter paper shows this effect varies with labour regulation enforcement, as discussed above. The difference across the two studies suggests the local context is important given both studies use episodes of domestic trade liberalisation and a similar empirical methodology.

The link between trade, informality and firm size distribution remains very much an open area of research. Dix-Carneiro et al. (2021) make progress by developing a model of trade with heterogeneous firms, unemployment, and regulations. Crucially, regulations cannot be perfectly enforced, leading to size-dependent costs of informality. Intuitively, larger firms are more visible and therefore face larger expected fines for not complying with regulations. The model is estimated using Brazilian data. They find that trade openness has sector-specific effects, unambiguously decreasing informality in the tradable sector but having ambiguous effects on aggregate informality. Second, the productivity gains from trade can be severely understated when the informal sector is omitted. Third, trade openness leads to increases in

wage inequality in the formal sector – consistent with Helpman et al. (2016) – but reduces overall wage inequality once the informal sector is incorporated into the analysis. Fourth, the informal sector operates as an unemployment buffer, but not a welfare buffer from negative economic shocks as resources are reallocated to less productive firms.

Further studies providing well-structured evidence on the link between trade and the complete firm size distribution are much needed, as is evidence for whether small informal firms are more or less distorted than larger ones. Studies tracking informal firms over time are also needed to help understand the mechanisms (entry, exit, expansion, and contraction) behind previous empirical studies. Readers interested in a more extensive review of the literature on informality beyond its links with international trade should consult the VoxDevLit review by Ulyssea (forthcoming).

4.2 Politically-connected firms

Many industries in developing countries are dominated by politically-connected firms, often in the form of state-owned enterprises (SOEs). Political influence also stems from large business groups owned by political parties, through state-owned banks that dominate lending to the private sector, and through crony capitalism. The result is that resource allocation decisions may be made to advance objectives beyond firm-level profit maximisation and thus potentially result in misallocation.

A handful of recent papers explore how international trade affects misallocation through its impacts on state-owned firms. These state-run firms are well-capitalised and large but often extremely inefficient and so do not map easily into standard models of firm heterogeneity in which the most productive firms grow the largest. Ex ante, it is unclear whether these firms will expand or contract with trade liberalizations. The former Premier of China, Zhu Rongji, used the phrase “rapid waters should wash away dirty sands” to describe the potential impacts of China’s WTO Accession on its SOEs. In this view, lower trade barriers can drive out inefficient SOEs. However, SOEs may be some of the only firms with sufficient capital to take advantage of improved export opportunities or respond to competitive pressures from imports, or they may receive additional aid or protection to remain sizable despite becoming increasingly uncompetitive.

Khandelwal et al. (2013) study the consequences of trade liberalisation in a sector with a large presence of state-owned activity: China’s textile and clothing (T&C) sector. Prior to 2005, some of China’s T&C exports were subject to quotas. Standard heterogeneous-firm models predict that the most productive firms would buy the export licences, and when the quotas were removed, these incumbent firms would expand. Instead, unproductive SOEs obtained a large share of export licences, and upon liberalisation, there were substantial market share reallocations towards new and more productive private-sector enterprises. Their estimates suggest that the welfare gains from alleviating this misallocation are substantially larger than from removing the actual distortion caused by quota itself. The broader implication is that in countries with weak institutions, the harmful distortion may not be trade costs, which are the standard friction of interest in trade models, but the additional distortions that trade costs engender. Customs facilitation, licence allocation, and tariffs and non-tariff barriers may all favour politically-connected firms. Thus, consistent with Premier Zhu’s belief, liberalisation in this setting generated magnified gains because it simultaneously removed deadweight losses and resource misallocation.

However, two recent papers that have examined SOE responses to trade reforms across multiple sectors support the opposite view. Brandt et al. (2017) examines how China’s WTO entry affected the average performance of Chinese firms. They find that trade liberalisation increases exit and raises productivity among private-sector firms, but these effects are muted for SOEs. They suggest that the margin of adjustment comes through CEO turnover, with private-sector firms experiencing more changes in management relative to SOEs in sectors more exposed to trade reforms. Baccini et al. (2019) analyse Vietnam’s entry into the WTO in 2007 and essentially find the same differential response as Brandt et al. (2017) did in China. They conclude that aggregate productivity gains from Vietnam’s WTO entry would

have been substantially higher without the presence of SOEs. Both papers appeal to preferential access to capital and soft-budget constraints as the explanation for why the impacts of trade reforms are muted for SOEs.

Three papers explore how political connections that do not operate through state ownership but through other routes distort the gains from trade reforms in the developing world. Javervall and Khoban (2021) show that connections to politicians in India became substantially less valuable when tariffs on inputs were dramatically reduced in the 1990s, particularly in the most corrupt states. NAIDU et al. (2021) show that networks of elites in Haiti held exclusive import licences that generated substantial rents. These elites supported the 1991 military coup to overthrow the democratically-elected Aristide government which threatened these rents. Mobarak and Purbasari (2006) show that Indonesian firms connected to the Suharto family were three times more likely to receive import licences. Rijkers et al. (2017b) uncover a substantial market share and profitability premium among Tunisian companies connected to the Ben Ali regime (prior to the 2011 Jasmine Revolution). These connected firms were also more likely to operate in highly-regulated sectors, including those with restrictions on FDI, which suggests that they influenced the allocation of FDI inflows.

While firms have substantial influence over economic policy in developed countries, our sense is that international trade is an area where political connections are relatively less important compared to other economic domains. Access to foreign exchange is typically not restricted by government and entry barriers to access foreign markets or restrict foreign imports are usually part of trade agreement negotiations that are infrequent. In contrast, many developing countries have currency controls and trade policies subject to far more discretion than in developing countries, making the value of political connections more substantial. One further ramification is that if political connections drive the selection of firms into international trade, as the papers above suggest, this may substantially alter the distribution of the benefits from trade through mechanisms such as learning-by-exporting (see Section 3.7 for references). Finally, we note that while there has been work exploring the connections of state-owned firms and those owned by the elite, other connections may be equally important, particularly the ownership of business by the military as is common in many countries such as Egypt and Myanmar, or by political parties themselves as in Ethiopia.

4.3 Business groups and family firms

Business groups and family firms are another important feature of the industrial landscape in developing countries. These groups or conglomerates are often (but not always) family-run and family-owned and hold a portfolio of horizontally, and vertically, integrated businesses. Khanna and Yafeh (2007) argue that business groups can be an optimal organisational structure for firms in countries with imperfect capital markets as they can rely on internal capital markets for finance. They may also serve to mitigate contracting issues between suppliers (see Section 2), or to leverage good reputations built in another sector in settings where firms may try to cheat, and reputation is hard to build.

At the same time, business groups have been found to have weak governance structures, for example, expropriating minority shareholders through tunnelling (Bertrand et al. 2002). Feenstra et al. (1999) is an early attempt to examine how business groups affect country trade patterns. Compared to Taiwan, they find that South Korea (an economy dominated by business groups) exports fewer varieties but those they do are higher quality, consistent with the view that business groups serve to reduce product cannibalization and to invest in quality that can raise overall group reputation. We are unaware of more recent efforts to examine how group organisational structures may affect trade performance.

Family firms present a related but distinct challenge in a trade setting. Caliendo and Rossi-Hansberg (2012) theorise that trade liberalisation causes productive firms to expand and this leads them to increase

the number of layers of management.[13] However, family firms in developing countries typically rely only on family members at upper levels of management in their firms, severely restricting the scope to add layers of management. For example, Ilias (2006) reveals a strong relationship between firm size and the number of brothers of the firm's founder using tailored surveys conducted in Pakistan's surgical goods sector. Bloom and Van Reenen (2007) argue that this (potential) distortion in the allocation of management talent arises because of weak rule of law: without the ability to punish outsiders who steal from the firm, owners must delegate management decisions to family who can be trusted (or sanctioned). Akcigit et al. (2021a) show using a calibrated model that such limits to delegation can distort the firm size distribution because they mainly constrain the size of large firms. While the authors do not explicitly model international trade, the fact that large and productive firms typically export suggest that delegation constraints may particularly impact international trade relative to domestic sales.

In summary, despite the emergent literature that studies organisations and international trade, we are aware of little work that explores how the pervasiveness of conglomerates and family ownership structures in developing countries alter the impacts of trade.

4.4 Externalities and spillovers

In the presence of externalities or spillovers, the forces of globalisation such as trade and FDI can generate especially large changes in aggregate productivity and welfare. The presence of such externalities also may justify the active role of governments in pursuing industrial policy; see reviews by Harrison and Rodriguez-Clare (2010) and Lane (2020). Establishing whether such externalities exist and how large they are is a key step in designing such policies. We discuss three main channels through which the forces of globalisation may generate or interact with externalities in developing countries.[14]

First, trade may facilitate (unpriced) knowledge flows across and within borders generating performance improvements in recipient firms.[15] While these knowledge flows feature heavily in the theoretical literature and policy discussions, direct empirical evidence on this channel is scarce. This reflects the difficulty in finding appropriate research designs particularly since knowledge is hard to track. In a recent contribution, Aghion et al. (2019) found that when they start exporting to a destination, French firms receive more patent citations in those markets, suggestive of knowledge flowing to firms in the destination. More research on this topic, particularly from developing countries, is needed.

International trade can also trigger externalities via learning by exporting; see the discussion above in Section 3.7. For example, the experiment conducted by Atkin et al. (2017b) provides clean identification of productivity improvements caused by exporting and evidence that these arose in part through knowledge transferred between foreign buyers, local intermediaries and exporters, but open questions remain. Is the efficiency increase a result of factors external to the exporting firm (or its export intermediary) that the firm did not internalise, or is there some implicit payment through accepting a lower price to produce for an export market than they would have if there were no knowledge flows? Do the findings apply to other manufacturing industries or services? Can firms in developing countries replicate a similarly successful exporting experience without a knowledgeable intermediary?

Second, FDI and the integration of firms into global value chains (GVCs) may also induce spillovers.

13 Although Guadalupe and Wulf (2010) find (empirically) that trade flattens hierarchies (as a result of increased competition in their context).

14 Providing definitive evidence of the size of externalities is exceedingly difficult since one needs to measure the benefits (or costs) stemming from these externalities net of any monetary or non-monetary compensation which often goes unrecorded. This caveat notwithstanding, the literature summarised here provides an important starting point.

15 Theoretical contributions by Sampson (2016), Hsieh et al. (2019), Buera and Oberfield (2020), Perla et al. (2021), Akcigit et al. (2021b) and Atkin et al. (2021) clarify this link between trade and growth.

Before the 2000s, many studies documented positive correlations between the presence of foreign firms and proxies for productivity among nearby local firms. Subsequent work used sector-level input-output matrices and found that part of the productivity gains came through input-output linkages between domestic and foreign firms (e.g. Javorcik 2004, Blalock and Gertler 2004). More recently, backward linkages (where domestic firms supply foreign firms) have emerged as the most plausible mechanism for domestic performance gains from FDI as discussed in Alfaro (2017).[16]

While GVC linkages between foreign and domestic firms in the host country share similarities with international trade, there are notable conceptual differences that justify their separate study. As summarised in a recent World Bank (2020) report, "in contrast to standard trade, GVCs typically involve longer-term firm-to-firm relationships. This relational nature of GVCs makes them a particularly powerful vehicle for technology transfer along the value chain." GVCs present learning opportunities to producers who may not yet have mastered final product imitation as in Sampson (2021), or who may not be physically proximate to foreign firms.

An important recent contribution is Alfaro-Ureña et al. (2022). The paper leverages rich administrative transactions data from Costa Rica to trace the effects of actual linkages between multinationals and their domestic suppliers (as opposed to geographical proximity or being in upstream or downstream industries as in the prior literature). They find that first-time suppliers to multinationals experience large and persistent improvements in total factor productivity (TFP). Moreover, firms establishing supply linkages with multinationals report interrelated changes such as expansions in product scope, better managerial practices and the ability to acquire new buyers. Abebe et al. (2022) also find TFP gains among Ethiopian firms when comparing districts where a large foreign plant opened relative to others where foreign openings were licensed but not yet operational.

There are several open questions in this literature. First, as in the case of learning from exporting, it is not definitive that the performance gains capture an externality. Second, it is difficult to rule out that the estimated TFP gains do not also reflect markups or other confounds discussed in the productivity estimation literature (see De Loecker and Goldberg (2014) for a review). Third, we need to better understand the mechanisms behind learning spillovers. Survey evidence from various countries suggests that disentangling the relative importance of different factors is not straightforward (see Javorcik et al. 2008 and Alfaro-Ureña et al. 2022). Fourth, we need to have a better grasp of the factors that hinder knowledge transfers. For example, Guillouet et al. (2021) show that language barriers are an important friction for transfers of knowledge from MNCs to domestic managers. Finally, we need more evidence on other channels through which FDI can trigger externalities. Foreign firms tend to be better managed and provide more training, which improves worker productivity and may lead to knowledge transfers to the rest of the economy through worker mobility as demonstrated by Poole (2013).[17]

The third channel through which globalisation may interact with externalities is through Marshallian externalities such as external economies of scale. For example, Bartelme et al. (2021) study the gains from trade policy, industrial policy, and the interaction of the two in a model with external economies of scale. Despite finding heterogeneous sector-level scale economies (implying inter-sectoral misallocation), optimal industrial policy leads to only modest gains, and optimal trade and industrial policy are often at odds since high externality sectors tend to have low trade elasticities. Similarly, Lashkaripour and Lugovskyy (2021) also find modest welfare gains from independent industrial and trade policies but more considerable gains from industrial policies complemented by deep trade agreements. More research is needed in this area to understand when coordinated policies are beneficial under real-world

16 However, see Harrison and Rodriguez-Clare (2010) for potential challenges with interpreting the findings in this literature.

17 Also see Alfaro-Ureña et al. (2021b) and Setzler and Tintelnot (2021) for analyses of the effects of FDI on workers.

implementation constraints, particularly those faced by developing countries. Moreover, there is room for evidence leveraging quasi-experimental variation from specific policy changes to study the interaction of industrial and trade policies.

5 Conclusion

Developing countries are characterised by weak institutions, market failures and distortions. While recent decades have seen substantial progress in our understanding of how these frictions interact with international trade, significant and policy-relevant gaps remain. We believe that this intersection of trade and development is a ripe area for future work.

To date, much of the work in trade and development relies on administrative datasets. While these data are valuable for understanding general patterns across a range of sectors, they have two limitations of particular relevance for developing countries. First, data on the type and size of the economic distortions that we argue are key to understanding the impacts of trade in developing countries – e.g. enforcement of regulations, contract structures, credit constraints, or political connections – are either unavailable or challenging to extract from administrative datasets. Second, much economic activity remains in the informal sector that is not easily captured through administrative data making it difficult to know whether the aggregate economy is becoming more or less distorted through trade.

We see two particularly fruitful avenues for progress. The first is to combine multiple sources and types of data – including leveraging advances in digitisation, tracking technologies and text analysis – to provide a more complete understanding of the effects of trade in the developing world. The second and complementary approach is to focus on specific industries where tailored firm surveys and niche datasets can overcome at least some of these important measurement concerns. But as this review argues, crucial to either approach are data that capture the institutional complexities, market failures and distortions of the particular setting.

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