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The value of face-to-face: Search and contracting problems in Nigerian trade*

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Abstract

Distance between buyers and sellers can create search and contracting problems: how to find out what goods are available in far away places, and ensure they are actually delivered? I estimate the magnitude of these frictions by exploiting the fact that travel is a common and easily observable strategy for coping with them. I collect transaction-level panel data from Nigerian importers of consumer goods, and build and estimate a model that embeds a search problem and a repeated game with moral hazard into a trade framework. Welfare would be 29% higher in the absence of both frictions, suggesting that greater attention to market integration policies beyond transportation and tariffs could be particularly important in developing countries.
Executive Summary

Search and contracting problems can arise when buyers and sellers are in different locations. Consider a shoe wholesaler in Lagos, Nigeria. If he sources shoes in Lagos, he can see what is currently available with his own eyes, and exchange goods and money on the spot. But in China, an immense variety of shoes are produced at low cost. How can the Nigerian wholesaler—who cares about characteristics such as style, material, and fit—find out what varieties of shoes are currently available in Guangzhou? How can he be sure that a supplier in Guangzhou will actually deliver the shoes after taking his money? Even if he solves these problems once, he will face them again the next time he buys, because the set of available shoes will have changed and sellers will still be opportunistic.

One solution is to simply travel to China to do business in person. Travel solves these problems by eliminating the distance between the buyer and seller, effectively transforming a remote transaction into the type that would be conducted at home in Lagos. However, travel is not obligatory. Lagos wholesalers can search for products using phones, internet, and word-of-mouth, and opportunistic trade partners can be motivated to behave well through repeated interaction. The insight of this paper is that heterogeneity in the observable choice to travel can be used to quantify distance-related information problems, and to identify the underlying mechanisms relating them to firm and product characteristics. Although I make use of data that captures international trade and travel, the situation is analogous to transactions over distance within a country.

As the example suggests, distance between potential transaction partners creates both a search problem (the difficulty of finding out what goods are available) and a moral hazard problem (the difficulty of ensuring that goods or money actually get sent), which I refer to together as “information costs”. This may help explain a persistent empirical puzzle: the estimated trade costs implied by flows of
goods are consistently much higher than directly observable costs such as transportation and tariffs (Anderson et al. (2004)). Information costs may help account for this gap. Without a clear understanding of the underlying sources of trade costs, it is difficult to design appropriate market integration policies. This is particularly important in developing countries, where trade costs are high and information costs may be especially relevant due to weak contract enforcement institutions, limited access to information technology, and small firm size. However, neither the empirical size of information costs in trade nor the underlying mechanisms are well-understood. What we do know is mostly confined to homogenous goods traded under perfect competition and perfect contract enforcement, a special case in which a search friction can be inferred from spatial price dispersion (Jensen (2007); Aker (2010); Allen (2014); Steinwender (2014)).

I show that search and contracting frictions in differentiated goods trade are large, and can have a substantial impact on welfare in developing countries. My approach is to quantify information problems that are not directly observable by focusing on the easily observable strategies that importers use to cope with those problems, particularly travel. Unique panel data I collected from Nigerian importers allows me to do this by connecting traditional trade data (e.g. the type and value of goods traded) to variables describing the actual process of firm-to-firm trade (e.g. travel and payment terms) on a transaction level. The data cover 620 importers of differentiated non-food consumer goods such as clothing, electronics, and furniture, who were randomly sampled from a census I conducted of over 50,000 shops in commercial districts of Lagos. I capture every import transaction over a two year period, totaling 3,907 purchases from 34 source countries and over a thousand foreign suppliers.

I document four empirical patterns that motivate the structure of a model relating travel and importing. First, travel is common but not universal – used by 62% of traders and in 32% of all shipments – and is
less likely when importing from countries that are costly to reach. Second, travel expenditures are large, at nine percent of the value of imported goods—equivalent to amounts spent on transportation and regulatory costs of importing combined. Third, travel is persistent over time, and does not decline significantly in experience with particular countries or suppliers, suggesting motives beyond initial matching or learning. Finally, transactions that involve travel look different from those that don’t. In purchases conducted in-person, traders pay lower unit costs, charge higher markups, and are more likely to buy new product varieties and to buy from new suppliers. These patterns are difficult to account for in a world without quantitatively important information frictions.

I build a model that accounts for these patterns by embedding a search problem and a repeated game with moral hazard into a Melitz (2003) style framework. Differentiated goods are produced in a source market and improve stochastically over time, as in the quality ladders model of Grossman et al. (1991). Traders source these goods from foreign suppliers, and resell them to consumers at home. They make forward-looking choices about how frequently to restock, and when doing so, whether or not to pay a fixed cost to travel to the source country. Traveling allows importers to search more effectively for new vintages and avoid a contract enforcement problem by conducting a spot transaction. Ordering remotely has a lower fixed cost but yields less up-to-date products as a result of the search friction and incurs higher unit costs as a result of the contracting friction. I model the contracting problem as a repeated game of moral hazard with an endogenous period of time between stages. Consistent with my data, which show that post-payment and non-delivery are both rare, I focus on sub-game perfect equilibria that feature full pre-payment by traders and honest behavior by suppliers along the equilibrium path. The solution is analogous to an efficiency wage: the trader pays a cost premium to satisfy the supplier’s incentive compatibility constraint, so that the supplier prefers to behave honestly and continue to earn the associated profits than to cheat once and never do business with the trader again.
Traders choose whether to travel or order and how frequently to trade based on underlying heterogeneity in how quickly the products they sell evolve over time and how popular they are. A key departure from most trade models is that the frequency of trade matters for welfare; it determines both the vintage of goods available to consumers and the unit cost (because smaller, more frequent purchases reduce the temptation for suppliers to renge), and therefore mediates the effect of search and contracting problems on consumers. Strategies are not symmetric across products (e.g. faster-changing products are more likely to be traded frequently and via travel), but can be aggregated into a stationary equilibrium with a constant price index. Barriers remain even when an importer has extensive experience with a particular source country or supplier. Compared to a world without information frictions, consumers face higher prices, less product variety, and (sometimes) less up-to-date goods, and firms earn lower profits.

Selection into travel reflects the value of solving both search and contracting problems. In order to separately identify the role of each channel, I make use of additional observables with distinct relationships to search and contracting: the probability of switching suppliers, the probability of switching products, the frequency of purchases, and variable profits. The size of the contracting cost premium is pinned down by the observed probability that the trader buys from the same supplier again. In contrast, the search friction is related to the observed probability of finding new product styles and the difference in variable profits from traveling versus ordering. If we observe a large fraction of traders finding new products but never switching suppliers, all else equal, travel must be driven more by search motives than contracting. If finding new products is rare, but supplier switching is common, we infer that contracting motives are strong relative to search.

I estimate the model using the Nigerian data to uncover the size of search and contracting frictions, and allow the parameters to vary freely across 11 different source country-sector. On average, importing without traveling yields goods that are 2.5 months behind the frontier available in the source country
(the search friction) and requires paying an 11.9% price premium to induce good behavior from suppliers (the contracting friction). Removing both frictions increases welfare in the traded consumer goods sector by 29.2% – roughly half of the gains from eliminating physical and regulatory trade costs. This estimate is large, but plausible considering that it represents the complete elimination of a barrier in a context in which trade costs are high compared to most rich countries, and applies only to traded goods in a sector that accounts for roughly 17% of consumer spending. The welfare gains from eliminating the search problem alone would be 16.3%, and the gains from contracting alone would be 9.0% – the whole is greater than the sum of the parts due to an interaction through the discrete choice to travel. These totals reflect sensible underlying variation across countries and sectors – for instance, consumer welfare losses due to information frictions are larger when importing apparel from China than hardware (because apparel changes more often), and than apparel from Benin (because Benin is cheaper to travel to than China).

Information frictions also distort market structure. In the presence of search and contracting problems, average firm profits are lower than in a frictionless world, but average firm size is actually larger because the smallest firms are pushed out of the market. The set of varieties available to consumers is reduced, and the varieties that are lost are those that change rapidly or for which total demand is small. Surprisingly, the effect of information problems on the average vintage of goods available is ambiguous—the search problem always makes available goods more out-of-date, but this is in some cases offset by the fact that the contracting game induces traders to buy more frequently than is efficient in order to keep the unit cost premium down.

By fully specifying the relationship between information frictions and underlying product and firm characteristics, this model is useful for understanding when information costs are likely to pose a substantial barrier to trade in other contexts. When firms are large or travel costs are low, information problems will have little effect on welfare. Similarly, the effects should be smaller in slow-changing types
of goods, and in markets in which trade partners are able to establish longstanding relationships or reputational forces are strong, driving the solution to the repeated game toward what would be achieved under perfect enforcement. In the first of three counterfactual scenarios, I increase consumer spending to match that in the United States, and show that when revenue is higher, the same fundamental search and contracting frictions yield much smaller welfare costs. Intuitively, fixed cost strategies for addressing information problems in trade with China are inconsequential relative to revenue for Walmart; not so for small traders in Lagos.

This evidence on information frictions directs attention to a range of trade facilitation policies and services beyond infrastructure investment and tariff reduction. It suggests, for instance, that people's ability to move freely within and between countries is relevant to the efficient movement of goods. Many developing countries suffer from heavy visa restrictions and costly and poorly managed travel options. In a second counterfactual scenario, I show that if China and Nigeria liberalized air travel between the two countries, the fraction of traders who travel would increase substantially, and the resulting gain in surplus would be equivalent to increasing Nigerian consumer spending by $645 million. In a third counterfactual, I show why existing financial services have not gone further in ameliorating the contracting problem: they are too expensive. I add to the model the option for traders to purchase an escrow service similar to that currently offered by Alibaba.com, and find that demand is low at actual prices and plausible expectations about the effectiveness of dispute resolution. Agents and financial services simply transfer the contracting problem onto another party; they will be used only when they offer access to some technology or relationship that allows the contracting problem to be solved at lower cost than the other options available.¹

¹ Financial services with better enforcement technology or lower prices could have substantial welfare effects. In ongoing work in Lagos, I am conducting a field experiment involving an escrow service based on reputation and default rules. By combining the theoretical framework in this paper with experimental data, I will be able to further
The idea that information problems contribute to trade costs is an old one. Estimates of gravity models often include proxies for information problems between countries, such as shared language or the quality of legal institutions (summarized in Anderson et al. (2004)). Empirical evidence on the source of information costs comes from studies on incomplete information about the prices of homogenous goods in distant locations, often in developing countries, and typically shows that the introduction of better information technology (e.g. cell phones) reduces geographic price dispersion (e.g. fish in India in Jensen (2007), grain in Niger in Aker (2010), agricultural products in the Philippines in Allen (2014), cotton in the mid-19th century UK in Steinwender (2014)).

I go beyond this work by microfounding and quantifying both imperfect contract enforcement and search over products with differentiated characteristics. I build on ideas introduced in Rauch et al. (2002), who find that trade flows are larger between countries with larger ethnic Chinese populations, particularly for differentiated goods. They argue ethnic networks make matching easier (search) and deter opportunistic behavior through community sanctions (contracting), but do not model the mechanisms or empirically distinguish the two channels. A small related literature shows relationships between observable communication and aggregate trade flows (particularly for differentiated goods), including air travel in Cristea (2011) and Poole (2010), and telephone calls in Portes et al. (2005). I observe communication and outcomes at the transaction level, allowing me to build a fully-specified model of firm behavior with underlying heterogeneity.

I contribute to a literature on the role of imperfect contract enforcement in firm relationships. While a large theoretical literature (summarized in MacLeod (2007)) suggests a variety of mechanisms, microempirical evidence is limited, and has mostly focused on learning about types and the evolution of transaction terms over time within relationships (Antras et al. (2015); Macchiavello et al. (2015); explore the potential for financial services to address contracting problems, as well as tracing out the mechanisms through which reputation may substitute for formal enforcement.
Macchiavello (2010); Banerjee et al. (2000); McMillan et al. (1999)). I provide evidence that firms often opt out of this relational contracting mode, choosing to use costly monitoring strategies like travel instead (as in the model of Taylor et al. (1997)), and that contracting frictions can have persistent effects even in the context of long relationships. I also link microempirical evidence on the contracting mechanism to a model of trade that allows for an analysis of welfare and interactions with other frictions in equilibrium.

Finally, I provide new evidence on the role of intermediaries and middlemen. A large theoretical literature speculates about what middlemen do, and most of the proposed mechanisms have to do with solving matching or contracting problems (Biglaiser (1993); Antras et al. (2011); Dasgupta et al. (2012); Bardhan et al. (2013); Krishna et al. (2016)). The limited empirical evidence available supports the idea that intermediaries' role involves economies of scale in paying fixed costs (Ahn et al. (2011); Crozet et al. (2013)), and recent work by Atkin et al. (2015) shows that they are important in determining the actual prices received by consumers. While I do not endogenize market structure or pass-through by traders in this paper, modeling and providing empirical evidence on the production function of intermediaries themselves is an important step toward understanding their influence on prices and welfare.