International Trade as ‘Footloose’ and Firm-Organized:

The Fragmentation of Production in China and a Transactional Trade Approach to Global Value Chains

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UNDER REVIEW

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Acknowledgements: This research has been supported in part by grants from the National Science Foundation, IIS CPATH Award #0722203, and the Chiang-Ching Kuo Foundation. Participants and commentators at Harvard Business School, the Fairbank Center for Chinese Studies at Harvard, and the Society for Advancement of Socio-Economics annual meeting in Chicago have helped to shape these ideas. A special thanks to Tim Sturgeon for his valuable insight, and Valerie Barr and Tom Yanuklis for computer assistance with the database. Generous funding was made available by Union College and able research assistance was provided by Justin Bogardus, Justin Dempsey and MarcAnthony Parrino.
Abstract

The fragmentation of international production through outsourcing and offshoring raises a host of problems in our ability to conceptualize and measure international trade. Standard trade theory, newer firm heterogeneity literatures and a heterodox literature on global value chains (GVC) offer contending conceptualizations and methodologies. Utilizing a unique Chinese transactional trade database, which records every import and export transaction of every firm in China, this paper finds substantial empirical support for GVC theories that international trade is “driven” by powerful lead firms that coordinate networks of suppliers into distinct trade channels. However, since GVC theories have grown out of firm-level case studies and fieldwork methodologies, they suffer from a micro-macro aggregation problem. This paper helps in overcoming these empirical limitations, builds bridges to other trade theories, estimates the aggregate shares of GVC-organized trade, and raises questions about the foundations of China’s manufacturing and export prowess.

**SER Keywords:** International Trade, Outsourcing, Production Networks, Multinational Firms (MNEs), Globalization, China

**JEL:** F10 International Trade, L20 Firm Organization, F60 Globalization
The international economy is complex and poorly measured. Unlike national statistical agencies, there is no encompassing government with the authority or interest to customize its data collection. International organizations that publish data, largely stitch together information originally collected by national statistical agencies. Compared to very detailed data collected on national economies, including comprehensive surveys of a country’s firms, we have relatively limited capacity to probe deeply into the organization, structure, actors and evolution of the international economy.

In addition to a dearth of data, over the past decades, the international fragmentation of production (IFP) has made accurate measurement far more challenging. IFP is the phenomenon of firms de-verticalizing, de-agglomerating and internationalizing finer slices of their production processes by offshoring and outsourcing intermediate inputs and business services. Paradoxically, our understanding of the international economy may have deteriorated, even as the quantity of data has grown. The phenomenon has been studied across many academic disciplines and goes by a variety of names, including “vertical specialization,” “fragmentation” and “trade in tasks” in economics; and among geographers and sociologists, it is variably referred to as “global commodity chains” (GCCs), “global production networks” (GPNs), and “global value chains” (GVCs). Unsurprisingly, the interdisciplinary interest has engendered diverse and incommensurate interpretations. For instance, Park, Nayyar and Low (2013), in the only book-length overview of these diverse literatures, declare that the multi-disciplinary nature of the topic “result[s] in a plethora of terms fundamentally pointing to the same reality” (p.41-42), with an outcome that “a prevailing consensus on meanings has not emerged in the literature” (p.12).
As discussed below, data, measurement and theory are circular in their co-dependency, such that in each discipline, theory is closely sculpted to data and data collection is driven by theory, thus mutually determining the limits of our understanding of IFP. For instance, many economists apply standard trade theory to IFP and utilize widely available inter-country gross trade data or newly created “value-added” databases. However, even with new value-added measures, standard trade theory poorly conceptualizes IFP because it ignores the role of firms. By contrast, utilizing case study and fieldwork methodologies and broadly inspired from world-systems and dependencies theories, GVC scholarship has developed alternative perspectives of IFP which focus on the role of powerful “lead” firms often from core countries in orchestrating supplier networks. A third literature on “firm heterogeneity” exists somewhere in between. It was pioneered by trade economists and hence is in direct dialogue with trade theory; however, utilizing firm-level and transactional trade databases, it also places large and productive firms at the center of international trade theory, because they are seen as the primary drivers of a country’s gains from trade.

This paper adapts comprehensive transactional trade data used by firm heterogeneity literatures to evaluate GVC scholarship, which primarily relies on case study methodologies. Although they both adopt firm-centric approaches, the literatures differ on two interrelated points. With the exception of distinguishing between large and small firms, firm heterogeneity literatures largely understand firms as undifferentiated actors in that the characteristics of firms remain epiphenomenal to powerful international market forces; furthermore, much like standard trade theory, atomistic firms face an actor-less, and highly competitive, “perfect” international markets. By contrast, GVC scholars understand international trade as substantially organized by powerful lead firms which differ categorically in their roles in coordinating trade. For them,
international trade is “governed” by powerful firms, even in non-oligopolistic perfect markets. To elucidate these differences between literatures and for reasons of measurement (discussed below), the empirical scope of the paper consists of a single, technologically simple but highly globalized industry – footwear – which as a light industry closely mimics a perfect or “footloose” market with thousands of trading firms in China alone. However, the paper is able to drill very deeply into the footwear sector because unlike conventional trade data, transactional trade data offer a *complete census* of every import and export transaction conducted by every firm in China. Thus, although the empirical analysis is narrow, it is also deep and comprehensive at the firm-level – a feature that is valuable for GVC theory-building.

However, due to its case study methodologies and its focus on powerful lead firms, GVC scholarship suffers from a micro-macro “aggregation problem,” which concerns the difficulty of making valid descriptive and causal inferences about the international economy and national development through firm-level case studies and data. Although transactional trade data have been almost exclusively applied by firm heterogeneity literatures to traditional trade theories, this paper shows that they can very profitably be applied to GVC theory, most prominently because they help resolve the literature’s aggregation problem by combining firm-level detail with comprehensive trade data. The paper finds substantial support for a GVC conceptualization of IFP in which suppliers are “governed” by powerful lead firms that construct distinct trade “channels” populated by different types of suppliers. This is true even in the highly commoditized footwear trade, which should exhibit traits of a “perfect” market. For instance, economic theory assumes that in perfect markets, firm behavior should *converge* onto best practices, such that firm ownership, organization and strategy are epiphenomenal to powerful
international market forces (Dunning and Lundan 2008, p.531-32, see also Caves 2007, Kindleberger 1969, Chapter 1).

To evaluate GVC scholarship, the paper utilizes a transactional trade database from China to develop a range of novel firm-level and transaction-level measurements of China’s production and commercial networks. The paper’s measurements make important advances to GVC literatures by developing new quantitative indicators, based on GVC theory. The empirical work differentiates distinct “channels” of supplier firms that vary according to their internal operations, transactional linkages and final market niches governed by international buyers. Also, for the first time, the paper’s methodologies roughly estimate that between 29% and 47% of total trade is governed or “driven” by transnational enterprises (TNE) like international buyers, at least in a light industry like footwear. This empirical estimation has eluded GVC research given the rarity of comprehensive trade data.

Finally, the paper finds that foreign-invested enterprises (FIEs) and domestic-invested enterprises (DIEs) differ dramatically in their operations and linkages with international buyers. While a handful of Chinese DIEs have been able to upgrade into the most “elite” trade channels governed by advanced country buyers, FIEs are overwhelmingly dominant in these channels, even in the simplest light industries which are commonly believed to have the lowest entry barriers. This suggests that the rhetoric of China’s manufacturing and export prowess may be overstated, and that China’s industrial transformation will differ from its East Asian neighbors as its labor costs rise and currency appreciates.

The next section compares three theoretical approaches to IFP – standard trade theory, firm heterogeneity and GVC. After this, the paper introduces China’s transactional trade data and adapts them to GVC theory to reveal distinct “channels” of firms based on exporter
attributes, transactional linkages and final markets. Finally, the implications of these findings for our understanding of the international economy and China are addressed.

**International Fragmented Production and Conceptual Limitations:**

**The Co-Dependency of Data, Measurement and Theory**

Although production networks have been studied for a long time, especially in East Asia, analysis is only as good as data and measurements. Given the increasing complexity of IFP, accurate measurement has proven to be perhaps the biggest challenge. This is because traditional trade data are recorded in ways appropriate to an un-fragmented world, in which “Made in Japan” used to be a meaningful signifier of a product’s country of origin. Although new sources of value-added trade data are being developed, the state-centricity of most international data have compelled scholars to seek alternative *firm-level* data sources, both qualitative and quantitative. The following sections examine various theoretical approaches to trade and IFP.

**(a) Standard Trade Theory, Firm Heterogeneity and IFP**

The intertwining of data, measurement and theory is evident in trade economics. Consider how international trade has traditionally been measured. Standard trade statistics measure *gross* imports and exports *between countries*. However, IFP means that many intermediate inputs (Taiwanese-made semiconductors or Indian software services) are exported to another country where they are assembled into final products (Chinese-assembled computers) before being exported worldwide. This raises serious measurement problems because the semiconductor, as an intermediate input, has been *double counted* – once when it is exported
from Taiwan to China, and once when it is exported from China to its final market. By some estimates, 28% of total world trade is double counted in this way, and other estimates suggest that China’s bilateral trade surplus with the US reduces by 30-50% if measured through value-added methods (IDE-JETRO & WTO 2011, p.104, Johnson and Noguera 2012, UNCTAD 2013, p.125). Thus, IFP is making conventional trade data increasingly obsolete, raising questions about trade theory.

These statistical deficiencies have prompted international organizations to compile new databases based on trade in value added. This has been spearheaded by ground-breaking initiatives like the WTO’s “Made in the World,” and the OECD-WTO “Trade in Value-Added” (TiVA) databases, among others (UNCTAD 2013, p.124). While these initiatives are vast improvements over gross trade, they still offer only rough estimates of IFP. Apart from well-known problems, they restrict analysis only to the country-industry level, with a delimited number of industry categories. More importantly, they lack firm-level data, and hence have limited use for new firm-centric theories of international trade, such as firm heterogeneity and GVC literatures.

Unsurprisingly, measurement is intimately tied to conceptualization. Most economists apply standard trade models and utilize gross or value-added inter-country trade statistics to study IFP – an approach to IFP which two prominent trade economists classify as “fragmentation in otherwise neoclassical models” (Antras and Rossi-Hansberg 2009). For instance, Bhagwati, Panagariya and Srinivasan (2004) conclude that “outsourcing is fundamentally just a trade phenomenon; that is, subject to the usual theoretical caveats and practical responses, outsourcing leads to gains from trade, and its effects on jobs and wages are not qualitatively different from those of conventional trade in goods” (p.94). While these authors were specifically concerned
with service sector outsourcing, they articulate a common view among economists, that fragmented production is “just trade,” and hence can be subsumed under and poses few challenges to trade theory (Arndt and Kierskowski 2001, Markusen 2005, Mankiw and Swagel 2006).

Over the past decade, however, new research has incorporated the role of firms into trade theory. This originally began as empirical insights using detailed US-compiled firm-level data (Bernard and Jensen 1995). Research found that US trade is extremely skewed at the firm-level in that enormous shares of the country’s exports and imports are: concentrated in the largest 1% of firms, which are also the most productive firms, pay higher wages, and are more skill- and capital-intensive (Bernard, Jensen, Redding and Schott 2007).

These insights have inspired an enormous and revolutionary “firm heterogeneity” literature which has been formalized into important new trade theories. These literatures find that the traditional gains from trade derived through comparative advantage, economies of scale and agglomeration, are less important than gains from trade at the firm-level. Observed at the firm-level, gains from trade derive from the largest and most productive firms, which are most able to enter international trade and grow, while the smallest and least efficient firms exit trade, never enter into it or die out. Thus, gains from trade are achieved through a process of inter-firm resource reallocations (Melitz 2003).

The firm heterogeneity literature is in direct dialogue with traditional trade theories, while also departing from it by taking large, productive firms seriously. It is through its appreciation of the role of firms in trade that the literature can serve as a bridge between general trade theory and GVC scholarship. However, despite the ripe potential for synergy, firm
heterogeneity research has not been applied to IFP, since its primary theoretical focus is general trade theory, which considers IFP as “just trade.”

(b) Global Value Chains and Transactional Trade Data

In contrast to trade economics, which views firms as largely epiphenomenal to international market forces, GVC research focuses on large TNEs. While refuting trade theory has never been its goal, GVC literature differs from it by investigating the role of TNEs as strategic actors and primary organizers or “drivers” of international trade and production. Inter-firm trade linking large, powerful buyers and their suppliers is often differentiated into categories according to a firm’s distinct role within IFP, such as global buyers, contract manufacturers, service outsourcers, among others. As such, in contrast to economic approaches, most GVC researchers would “resist modeling the corporate decision to offshore aspects of the production process as short-run profit maximization or even as transaction cost minimization…[and instead] locate the logic of offshoring in the broader context of corporate strategies since the 1980s” (Milberg and Winkler 2013, p.24).

Empirical work is usually qualitative, consisting of case studies of specific industries and large TNEs, ideally grounded in specific territorial and institutional contexts (Henderson, et al. 2002). This has produced a wealth of new empirical studies which reveal the diverse ecologies of global capitalism. A leading scholar of the field justifies the methodology, stating that “international and industry-based field research is a requisite in the study of global production networks because publicly available and detailed information at the level of firms is generally lacking” (Gereffi 2005, p.169). While fieldwork is important, this paper finds that transactional trade statistics offer new opportunities to study GVCs using data that are simultaneously firm-
level and comprehensive, thus offering a *macroscopic* view of a country’s international trade networks.

Although firms constitute the principal starting point, GVC scholars nevertheless have long held out the promise to “bridge the micro-macro gap” in development research (Gereffi 1996,p.75-81, Gereffi, Korzeniewicz & Korzeniewicz 1994,p.2, 9-10, Henderson, et. al, 2002,p.436-38). There is a foundational belief that inter-firm linkages “affect not only the fortunes of firms and the structure of industries, but also how and why *countries* advance – or fail to advance – in the global economy” (Gereffi, Humphrey and Sturgeon 2005,p.79, emphasis added). Thus, the task is to make valid inferences from micro-level actors (firms) to broad development outcomes.6

However, the literature’s heavy reliance on case studies and fieldwork raises methodological concerns. First, scholars have argued that the GVC “case study literature may suffer from selection bias whereby researchers take up success stories rather than a random sample of value chains” (Milberg and Winkler 2013,p.23). Second, others have warned that “extrapolations from specific case studies and instance must be treated with caution” because the lack of generalizability makes valid descriptive and causal inferences very difficult (Dickens, et al. 2001,p.89). Thus, unlike most economic approaches in which firms are epiphenomenal to the fundamental market forces, GVC scholars are burdened with a difficult *aggregation problem*, in which inferences about national development or the global economy must be made from observations of firm-level behavior.

The micro-macro aggregation problem has been voiced by many GVC contributors (Bair 2005, 2009; Bair and Peters 2006; Feenstra and Hamilton 2006; Peters 2008; Muhutga 2014). As one contributor succinctly asks, there is still no clear answer to the question “how does the
nature of a firm’s insertion into a particular commodity chain map on to a country’s incorporation into the global economy?” (Bair 2005,p.166). Another worries about the “methodological challenge…when statistics on both development and economic behavior are compiled cross-nationally and ‘development’ is by definition a concept that must go beyond the performance of any single firm” (Mahutga 2014,p.164).

The heavy reliance on case studies also means that some basic measurement questions remain unanswered. For instance, while researchers posit that certain, powerful TNEs “drive” or coordinate trade within GVCs, there still are no estimates of the share of total global trade that is “driven” by these firms. This is partly because there is no clear-cut empirical definition of what constitutes TNE-driven trade, and second because an unknown share of purchases made by these TNEs are simple arm’s-length transactions of commoditized products. And yet, the theoretical significance of these literatures partly rests on the shares of total trade conducted through these different “channels.” If the aggregate share of TNE-governed trade is small, then the importance of the literature is more delimited. By contrast, if TNE-organized trade and pure market trade constitute their own substantial international trade “channels,” then each channel may require its own theoretical approach and a method for empirically differentiating the two worlds of trade. Furthermore, the policy relevance of TNE-led exports would differ from more generic export-led development. Using transactional trade data, this paper offers a methodology and estimates the size of TNE-governed trade to be 29%-47% of China’s final footwear exports – a substantial channel indeed.

In summary, data, measurement and theory are mutually re-enforcing and determine the limits of each literature’s perspective on IFP. The remainder of this paper adapts a firm- and transaction-level perspective pioneered by firm heterogeneity literatures, to GVC theory. It
introduces novel measurements geared towards GVC scholarship and proffers a precise, comprehensive analysis of the footwear sector – a highly internationalized and competitive perfect market.

**Transactional Trade Data**

Transactional trade data are unique because they record *individual transactions of each firm*, which are aggregated into a country’s national trade statistics. The data used in this paper derive from China’s General Administration of Customs (*Zhongguo haiguan zongshu*), and they are perfectly comprehensive in that they record every import and export transaction by every firm located in China, even those with meaningless export quantities of under US$100. For instance, in the case of China’s total final footwear exports for 2006, its export transactions (365,574 total transactions) sum to $21,806,264,755, which differs by only 0.03% from publicly available UN Comtrade data ($21,813,377,000). Table 1 summarizes the information included for each transaction.

[Table 1]

The paper drills deep into China’s transactional trade data in a single light industry – footwear (HS64) – to examine the organization of trade across a complete census of China’s exporters in 2006, the latest year for which a complete dataset are available to me. The footwear industry offers several advantages. First, as a light industry composed of thousands of Chinese exporters, it most closely mimics a perfect market, in which firm behavior and attributes should converge onto best practices. Furthermore, by examining a single industry, most major
economic factors important in trade theory can be controlled for, such as factor endowments and economies of scale (China, light industry) and the size of firms (large firms and SMEs). Furthermore, in perfect markets, entry barriers should be lowest, which means that there should be fewer differences between domestic and foreign firms in China. Finally, unlike more complex light industries (like garments and knitwear), there is a simple and consistent unit of measurement – pairs of shoes – by which the physical quantity of Chinese trade is recorded, which allows for calculations of unit prices.

Because of the fragmentation and internationalization of production, measurement of IFP can be very complex, incorporating both imports and exports of both intermediate and final goods, which cross over multiple countries. Ideally, comprehensive transactional data would be gathered from multiple countries. However, these data are very difficult to acquire and so the paper can only offer a partial lens of the entire global footwear product category. In particular, the paper examines only China’s role, and it focuses on a single pathway – namely, the “export processing” path, consisting of intermediate footwear imports through to final footwear exports.

Nevertheless, this snapshot constitutes an enormous share of the global footwear sector. For instance, by 2006, China was the source country of 73%, 71% and 46% of total footwear imports for the US, Japan and European Union, respectively (UN Comtrade). Second, the vast majority of China’s footwear trade consists of final footwear exports. Out of China’s $22,421,560,000 in total footwear trade in 2006 (intermediate and final, imports and exports), 93.7% consisted of final exports (UNComtrade). Thus, the “export processing” pathway alone overwhelmingly dominates China’s trade, and is the primary subject of investigation below.

Measuring Global Value Chains – Inductively and Comprehensively
How can raw transactional data be turned into meaningful firm-level measurements of GVC-governed trade? This paper develops several novel measurements derived from the theoretical literature, which are grouped into three broad categories, summarized in Table 2 – firm attributes, transactional attributes and final market attributes. Firm attributes concern the size, internal operations and ownership form of each footwear exporter in China. Transactional attributes concern features of the transactions themselves which measure buyer-supplier linkages. The final market attributes concern both the country characteristics of the buyers’ purchases and the buyers’ product niches, roughly approximated by unit prices. Thus, the three categories can be thought of as indicators of a continuous inter-firm linkage: Chinese supplier – transaction – foreign buyer.

[Table 2]

(a) Firm Attributes

Firm size is an important attribute in both firm heterogeneity and GVC literatures. As discussed, in research on firm heterogeneity, a country’s largest and most productive exporters are the catalysts for gains from trade because they trigger a more efficient reallocation of resources. Thus, the largest exporters hold a unique position in a country’s trade portfolio.

Large firms are also commonly the focus of study in GVC research, including both large buyers and “giant” suppliers, even in light industries and from developing countries (Dolan and Humphrey 2000, Appelbaum 2008, Ivarsson and Alvstam 2010). Out of thousands of firms, it is easier to acquire information on large firms because they make prominent public footprints. Second, there has been growing consolidation among developing country suppliers that service
major buyers and manufacturers, such that “the new suppliers are expected to be bigger, more capable and strategically located to access large markets” (Gereffi 2014, p.15).

Following the literature, this paper distinguishes China’s largest footwear exporters, examining the largest 100 firms separately from the remainder. These largest firms are selected from a total of 13,544 footwear exporters in China and 2,417 “major” exporters, with exports exceeding US$1 million. However, despite the prominence of firm size in the two literatures, the paper finds that it is only weakly correlated with most of the other firm, transactional and final market attributes (Table 2). By contrast, other firm attributes, like export specialization and ownership form, are much more highly correlated with transactional and final market attributes, creating distinct groupings of firm types.

Export specialization measures the share of a firm’s total exports which derive from the export of final footwear. Higher levels of export specialization indicate that the firm possesses greater expertise in footwear exporting, while low levels of specialization in footwear indicates less specialized expertise. Firm specialization is a central feature of IFP literatures. First, to remain competitive, firms have externalized non-essential functions or ones in which they are not competitive, in order to specialize on their primary capabilities. Second, an important condition among suppliers for firm upgrading is direct contact with their transnational buyers. For instance, even in light industries, large buyers, such as Nike, Liz Claiborne or IKEA, are intensely engaged with their most important suppliers by cooperating on design and product development, through which much knowledge is transferred (Appelbaum, 2008; Ivarsson & Alvstam, 2010). In order to deeply integrate with international buyers, suppliers must possess highly specialized product expertise. These relational ties are so important because “a GVC that
involves too many intermediaries limits the potential for local firms to learn from lead firms...[because] knowledge transfer effects tend to be more positive when TNCs act directly as lead firms within the value chain” (UNCTAD 2013,p.160,p.167).

The export specialization of firms is also important in the firm heterogeneity literature on “multiproduct firms,” though it comes to a very different conclusion than this paper. Economists have observed that the largest and most productive exporters are also more likely to export many products to many countries. In one study, the largest 12% of US exporters export five or more products to five or more different countries, and they collectively employ 69% of the workers among exporters. By contrast 42% of exporters export no more than one product, and employ only 7% (Bernard, Jensen, Redding and Schott 2007). The literature argues that the largest exporters are also highly export-diversified. By contrast, this paper finds the relationship between firm size and product diversification (low export specialization) to be weak.

While export specialization concerns a supplier’s forward linkages with its buyers, import specialization concerns a supplier’s backward linkages to international suppliers of intermediate inputs. The theoretical importance of import specialization is the same as for export specialization, only with the roles of supplier and buyer reversed. Using an inductive methodology, import specialization calculates the share of a firm’s total imports which consist of major imported intermediate goods used in the production of footwear. In addition to footwear parts (HS6406), these include various dyes (HS3203, 3204), adhesives (HS3506), plastic sheets/fabrics (HS3920, 3921), rubber sheets (HS4002), processed leathers (HS41), imitation leather (HS5903), footwear machinery (HS8453), and injection molds (HS8477).
The final important firm attribute is *company ownership* – FIEs and DIEs. In this, different literatures predict different outcomes. As a technologically simple, highly competitive light industry, footwear has very low barriers to entry, and hence DIEs should be highly competitive since FIEs possess fewer ownership advantages. In fact, some argue that because “MNEs are logically incompatible with purely competitive organization of an industry,” there should be little FDI in highly competitive industries like footwear (Caves 2007, p.30-31). By contrast, we already saw that international buyers have become deeply integrated with their most important and capable suppliers and these intimate relationships endure over time and across production locations (Appelbaum 2008, Ivarsson & Alvstam, 2010, Gereffi 2014). Since China’s opening up in the 1980s, China’s DIEs were faced with the challenge of gaining access to these “elite” trade channels, which were originally dominated by East Asian FIEs since the 1960s (Feenstra and Hamilton 2006). This paper finds that DIEs have been overwhelmingly unable to enter into these elite channels – an important finding that supports GVC theory.

*(b) Transactional Attributes*

*Transactional stability* concerns the nature of supplier-buyer linkages and is measured as the coefficient of variation of an exporter’s monthly footwear exports to its buyers from 2000-2006 – indicative of how consistently buyers contract with a supplier in China. This measure also derives from the same case study literatures that find that large buyers develop stable and deeply integrated ties with a handful of elite suppliers, which endure over time, across countries and remain stable (Appelbaum 2008, Ivarsson & Alvstam, 2010, Gereffi 2014). Of course, in a light industry like footwear, the norm is that transactions are unstable given economic cycles, annual purchasing patterns (including the global Christmas season), changing trends and fads,
and the capacity of buyers to switch suppliers. Thus, it is impossible to define transactional
stability in any absolute sense; rather, relative transactional stability between different firms is
informative. The coefficient of variation is used because it is not sensitive to the absolute size of
a firm’s monthly exports, allowing for valid comparisons across firms of different sizes.

(c) Final Market Attributes

Finally, with the rise of emerging economies and the shift this entails in global
consumption, a new growing literature examines how international buyers vary according to
their final markets and product niches (Navas-Aleman 2011, Murphy and Schindler 2011,
Kaplinsky, Terheggen and Tijaja 2011). The paper first differentiates final markets according to
advanced and developing countries. Second, within these two broad categories, it calculates the
average unit prices, which serve as approximations of different product niches.

Apart from offering new measurements of GVCs, the paper also identifies associations
between these various attributes, which when taken together, reveal distinct “channels” of firms
that share common attributes. These trade channels are indicative of substantial and consistent
divergence in firm behavior, which contrasts with the notion of perfect markets in which firm
behavior should converge.

Firm Attributes: Size, Specialization and Ownership

Figure 1 is an overview of the cumulative distribution by firm size, from the largest to
smallest firms according to the export value of all 13,544 footwear exporters in 2006. The
largest 50 and largest 400 firms took 24% and 59% of China’s total footwear exports,
respectively. If counting only exporters with a minimum threshold of US$1 million of exports,
these 2,417 firms took nearly 94% of exports, meaning that the majority of footwear exporters (the remaining 11,126 firms) are very minor and unrepresentative, together sharing only 6% of China’s total exports. Analysis will be conducted first on the 2,417 firms and then replicated on the 100 largest firms, given the special place of large firms in both firm heterogeneity and GVC literatures.

[Figure 1]

As discussed, one of the critical attributes highlighted in this paper is the degree to which firms differ in their specialization in footwear. Figures 2 and 3 categorize the 2,417 exporters, into six classifications of increasing export specialization. The figures give the aggregate amount of footwear exports (Figure 2) and footwear imports (Figure 3) conducted by the firms in each category, along with the number of firms and their ownership form.

The figures illustrate some extraordinarily stark results. Most prominently, domestic and foreign firms differ dramatically in their specialization in footwear exports and imports. On the one hand, FIEs are overwhelmingly specialized in the business of footwear. Out of all 797 FIEs and their $8.1 billion in exports, 574 of them and $6.3 billion are conducted by firms which are perfectly export-specialized (100%) in footwear. By contrast, DIEs are bimodal, with $3.6 billion of footwear exports conducted by relatively high-specialized firms (80% or greater) and $5.5 billion conducted by firms that operate like general trading companies (40% or less).

[Figure 2]
Imports of intermediate goods are even more starkly differentiated. Despite the fact that aggregate imports are remarkably similar between domestic and foreign firms ($1.9 and $1.7 billion, respectively), the types of firms which conducted the imports are polar opposites. For FIEs, the vast majority of footwear imports ($1.5 billion) were conducted by the same 574 firms that are 100% export-specialized. This contrasts sharply with very small amounts of footwear imports (only $64 million), conducted by DIEs with equivalently high levels of export specialization. The gap is extraordinary even after considering that FIEs export more in aggregate.

By contrast, the vast majority of footwear imports by DIEs were conducted by low-specialized trading companies. It is quite likely that these domestic trading companies do not produce shoes in-house, and hence a large share of their intermediate imports are likely re-sold to other direct producers in China, perhaps through a type of “putting out” system of sub-contracting. Furthermore, the import specialization percentages (in parenthesis in Figure 3) vary between foreign and domestic firms, in that as a share of the firms’ total imports, FIEs import a far higher percentage of footwear intermediate goods, whereas DIEs import goods unrelated to footwear production.

[Figure 3]

In summary, FIEs are overwhelmingly specialized in footwear operations – both exports and imports – indicating that they are intensely focused on their core competency, as addressed in the theoretical literature. By contrast, DIEs are split between general trading companies and
specialized exporters, that likely utilize domestic and international “putting out” channels for their intermediate inputs.

Although Beijing’s older system of export processing and state-owned foreign trade companies treated FIEs and DIEs differently (Fu 2000), by 2006, this system had been dismantled as China created a substantially even policy playing field as required by WTO accession in 2001, including changes in tariffs, import/export restrictions, national treatment of firms, taxation and more (Lardy 2002).

**Firm-led Organization in Trade: Suppliers, Trade Channels and Buyers**

As discussed, firm size has been a commonly used attribute by firm heterogeneity and GVC literatures alike. However, this paper does not find firm size to be an important differentiating factor between firms, compared to other attributes, like firm specialization. For instance, the Pearson correlations in Table 3 show that firm size (the first column) is only weakly correlated with the other indicators, while export and import specialization (bottom two rows) are substantially more strongly correlated with transactional stability, final markets and unit prices. While the near perfect correlations between unit prices are theoretically uninteresting, the remaining, strong correlations point to the possibility that firms are grouped into distinct trade “channels” that share common attributes.

[Table 3]

To further explore this possibility, I create an index composed of four key variables: unit prices, share of exports to advanced industrialized countries, and export and import specialization. A fifth variable on transactional stability is not incorporated into the index.
because of the difficulty of measuring it across all 2,417 firms; but it is measured among the largest 400 firms and incorporated into the analysis below.

For each of the four variables, firms were classified into ten classes and given a score of one to ten, using a Jenks natural breaks optimization method. A Jenks optimization creates groupings by minimizing the variance between the units within a class, while also maximizing the variance between classes, thus finding the natural “break points” in a data series. For each of the four variables, lower Jenks scores indicate lower unit prices, smaller shares of exports to advanced countries and lower import and export specialization, while higher scores indicate the opposite. After each firm was scored on all four variables, the four scores were added together un-weighted to create the index. Thus, a firm could end up with a score of between 4 and 40 points.

Figure 4 is a histogram of all 2,417 firms using this indexing method. It shows that firms broadly agglomerate into three trade channels. Channel 1 contains firms with the lowest index scores and is by far the largest group, containing 1,345 out of the 2,417 total firms. Channel 3 is the most exclusive or “elite” group with 511 firms which are privileged by sharing the highest unit prices, exporting to advanced countries and being the most highly import and export-specialized.

[Figure 4]

Although Figure 4 is suggestive that firms “channelize” into distinct categories, it is still possible that there is little consistency between firms in their scoring on all four variables of our index if, for instance, firms within a channel score high on some measures and low on others. As
such, Table 4 utilizes the three broad channels of firms and records the details of all four indexed variables, as well as the fifth un-indexed variable (CoV). Furthermore, it offers more specifics by breaking down final market and unit prices into their advanced country and developing country sub-groups, and finally it differentiates domestic and foreign firm sub-categories.

Table 4 indeed indicates that exporters strongly share common attributes across all measurements and hence consistently differentiate into trade channels. Earlier, it was mentioned that a firm’s export and import specialization was indicative of different types of exporters which ranged along a continuum from general trading company to highly-specialized firms. Table 4 indicates that the most highly specialized firms (Channel 3) are also overwhelmingly concentrated in particular niches in China’s international export trade. Specifically, over 90% of their exports go to advanced countries, and among advanced countries, they occupy the highest-end niche with average unit prices (per pair of shoes) between $8 and $10, which is two and three times higher than Channel 2 and Channel 1’s average prices, respectively. Furthermore, Channel 3 firms enjoy the most stable transactional relationships with their global buyers (low 0.50’s).

[Table 4]

At the other end of the spectrum, Channel 1 is composed of low specialized firms. These firms service both advanced and developing countries, in nearly equal quantities. In addition to sharing a low level of import and export specialization in footwear, these firms occupy the lowest-end footwear niches in both advanced and developing countries, characterized by the
lowest unit prices. In addition, their contracting relationships with buyers are much more unstable than the other two groups (high CoV).

Altogether, this means that contrary to common belief, not all trade in light industry goods operate according to the same footloose or perfect market forces. Rather, only certain firms (Channel 1) occupy trade channels that operate like unstable and footloose markets, while other firms (Channel 3) enjoy substantially greater stability each month in their transactions with buyers. Furthermore, although Channel 1 firms export in nearly identical quantities to both advanced and developing countries, their unit prices are nearly identical. Thus, the substantial coherence across all measurements indicates that these firms compose their own distinct channel of exporters.

Finally, while it is tempting to say that Channel 2 firms are simply intermediate between Channels 1 and 3, it is more accurate to say that they occupy a third and distinct channels. On the one hand, similar to only Channel 3, they overwhelmingly sell into advanced countries. However, they occupy different market niches within advanced countries, with unit prices only half of Channel 3. Finally, they are distinctive in that they are quite export specialized (much like Channel 3 firms), but on the import side, they rely much more heavily on domestic Chinese suppliers for their production inputs compared to Channel 3 firms, even though both groups of firms largely supply only advanced countries. This indicates that China’s intermediate goods supply base in footwear is not competitive enough to feed into the highest-end value chains occupied by Channel 3 firms. Although it would require additional transactional trade data from major supplier countries, this potentially indicates that the foreign production and trade of intermediate goods may also be TNE-governed within distinct channels of firms. If so, this would imply that the ties between intermediate suppliers and final footwear exporters in Channel
3 are also stable, cooperative and exclusive, thus creating distinct footwear network “teams,” running from suppliers to final assemblers to international buyers. Although this was the case in footwear in the 1980s and early 1990s in China (Hsing 1998), the data suggest that after two more decades, China’s domestic supply base may still not have sufficiently upgraded, even in light industries.

As examined earlier, there is also a clear hierarchy that differentiates domestic and foreign firms. In terms of both the number of firms and total export value, FIEs dominate in Channel 3 in which 440 foreign firms export $5.7 billion in exports, compared to 71 DIEs exporting only $559 million. By contrast, DIEs overwhelmingly populate Channel 1 with $8.6 billion in exports, while FIEs only conduct $360 million.

However, despite the stark differences in ownership between the channels, domestic and foreign firms which occupy the same channel are remarkably similar – further indication of the empirical robustness of the three trade channels. For instance, although Channel 3 is dominated by FIEs, the 71 DIEs that have managed to upgrade into these elite trade channels do not noticeably differ from their 440 FIE rivals in terms of specialization, quality, stability and linkages with advanced country buyers. The same is true for Channels 1 and 2.

In summary, there are distinct trade channels of firms which share a host of attributes, including some that are indicative of a firm’s internal operations (specialization), some that are indicative of its linkages with buyers (transactional stability) and some that are indirectly indicative of the buyers themselves (final markets and unit prices). This last feature is most evident for advanced country markets which are highly diversified and utilize suppliers that occupy all three trade channels.
**TNE-governed Trade: Aggregate Estimations and “Giant” Suppliers**

These distinct channels can also be used to estimate the share of global trade that is conducted through TNE-governed trade channels, as opposed to “pure” market trade channels. As discussed, this is a simple empirical estimation which GVC scholarship has been unable to answer. The distinction between pure market trade and TNE-governed trade (such as relational, captive and modular) is an explicit feature of GVC theory (Gereffi, Humphrey and Sturgeon 2005). However, it is also implicit in the older GCC literature, in that powerful lead firms are considered primary “drivers” of commodity chains; presumably, the remainder of trade that is not driven by lead firms is composed of ordinary, market-based trade (Gereffi and Korzeniewicz 1994).

The lacuna for both literatures is estimating the share of trade exchanged through “governed” channels versus “pure market” channels. Because transactional trade data are comprehensive, a rough estimation is possible, at least for China – the world’s largest footwear exporter. The channels offer an inductive definition of the most likely suppliers to TNE-governed trade, in particular the elite Channel 3 firms, but possibly also including Channel 2 firms. While other possible estimation methods would require their own assumptions, the primary assumption of this method is that all of the exports of suppliers occupying a particular channel and exported to particular countries (advanced or developing) are consistently part of either TNE-governed or pure market trade.

If this assumption is accepted, then Table 5 indicates that the *most conservative* estimate of the share of TNE-governed trade in buyer-driven chains like footwear is about 29% (Channel 3 exports to advanced countries). A less conservative estimate is 43% which includes all
Channel 3 and Channel 2 exports to advanced countries. And the least conservative estimate is 47%, if developing country exports are included. If approximately 29-47% of trade is most likely TNE-driven, then the remaining exports are likely exchanged through “pure market” channels.

[Table 5]

Finally, we return to the importance of firm size, which is a critical factor in both firm heterogeneity and GVC scholarship. Do large firms differ systematically from SMEs and occupy a distinct class of their own with regards to the measurements of interest in this paper? We already saw that using the full population, firm size correlated only weakly with the other measurements. Figure 5 and Table 6 replicate the same measurements as Figure 4 and Table 4 above, but this time restricted to only the largest 100 firms by total exports.

Although there is a degree of skew in Figure 5 towards Channel 3 (45 firms) compared to Channel 1 (31 firms), the index scores are still widely distributed across the full spectrum of the index and there is evidence of groupings at the high and low ends of the spectrum, even though the sample is restricted to the largest firms.

[Figure 5]

Again, however, the devil is in the details as to whether there is consistency across measurements that constitute the channels. Indeed, the results of Table 6 are very similar to Table 4. For instance, Channels 2 and 3 overwhelmingly service only advanced countries, while
Channel 1 equally services both developing and advanced country markets. Furthermore, just like the full population, as one moves from the low-end Channel 1 to the elite Channel 3, import and export specialization both increase dramatically, unit prices rise precipitously, transactions with buyers become increasingly stable, and both domestic and foreign firms within the same channel are similar across measurements. Finally, the distribution of foreign and domestic firms is very similar to the full population in that only two FIEs populate Channel 1 and only three DIEs have successfully upgraded into Channel 3, meaning that China’s largest DIEs appear to be no better at entering into these elite trade channels, *despite their size advantages*. Overall, the only significant anomaly is the high degree of volatility (0.71) of DIEs in Channel 3. However, this is an average of only three firms, so it is highly vulnerable to a single outlier. In summary, the largest exporters are very similarly distributed across the entire spectrum of measurements and they share a common pattern of channelization as the full population of exporters. Although results may differ in capital-intensive industries, this indicates that the size of firms is only a weakly salient feature in the organization of trade channels, at least in a light industry, like footwear. This is an important caveat for both firm heterogeneity research and GVC scholarship that focus on “giant” suppliers.

[Table 6]

**Conclusion**

IFP raises a host of new problems for data collection, measurement and ultimately our understanding of the international economy, which each academic discipline theorizes it differently. Firm-level and transactional trade statistics have been profitably applied by firm
heterogeneity literatures, which challenge trade theories that rely on inter-country trade data. This paper utilizes similar data, but develops novel measurements that are adapted to GVC theory, especially in addressing its micro-macro aggregation problem and in generating estimations of the size of “governed” versus “pure market” trade channels.

It finds strong evidence that suppliers occupy distinct trade channels and diverge markedly and consistently in their internal attributes and their transactional and final market relationships with their buyers, even in a light industry that most closely mimics perfect markets. On the one hand, an elite group of highly-specialized firms enjoys privileged access to particular market niches in advanced countries, with more stable transactional relationships with buyers and a substantial price premium. Furthermore, while a handful of Chinese DIEs have been able to upgrade into these privileged channels, FIEs overwhelmingly dominate, and all of these characteristics are irrespective of firm size.

At the other end, a very large number of firms, mostly DIEs, are forced to survive in trade channels that are more “pure markets” in that they are characterized by very low prices and great transactional volatility, in which the export and import specialization of the firms are very low. These market-based channels are prevalent in both advanced and developing countries. Finally, Channel 2 firms constitute their own unique category of suppliers.

These distinct channels of firms indicate that firm operations and inter-firm organization do not converge and are not epiphenomenal to powerful inter-country market forces in international trade. Rather, there is a clear hierarchy among exporters which is related to how suppliers are organized by buyers into trade channels. In short, TNE organization should be taken more seriously in general trade theory. It also indicates that contrary to much literature, relatively straightforward characterizations like firm size are less salient as differentiating
attributes in how firms engage in international trade, compared to attributes like firm specialization. Although this finding likely differs in capital-intensive sectors, it is an important insight for light industries alone.

Furthermore, through an inductive methodology, the paper roughly estimates the share of total trade that flows through TNE-governed channels to be 29% to 47% in footwear. Given this sizeable share of China’s trade and given that these channels are also where suppliers earn the highest price premiums and enjoy greater stability in transactions, governments should develop policies that assist home-country firms to target *GVC-organized* trade – not just generic export-led development. TNE-led trade channels should be considered *preferred exports* by policy makers.

Finally, the role of FDI is highly salient in this paper. In Taiwan and South Korea, *domestic* firms quickly took over from Japanese foreign affiliates to dominate their light industry export channels during their era of export-oriented development (Feenstra and Hamilton 2006, Chapter 7). By contrast, in China, the elite value chains are overwhelmingly dominated by FIEs and are most likely governed by advanced country lead firms. Furthermore, while the importation of high-quality intermediate footwear inputs might be expected in the 1980s and early 1990s in China (Hsing 1998), this has remained the case through at least 2006, nearly 30 years after China’s opening up and five years after WTO liberalization.

This implies that China’s reputation as a manufacturing and export powerhouse needs some amending. China’s reputation is well deserved if one considers its manufacturing advantages *as a country*, such as a disciplined, well-educated low- and mid-skilled workforce, efficient infrastructure and logistics and policies that are export-friendly. However, if one considers as important *internal firm capabilities*, then China’s reputation is ill-deserved. The
paper shows that only a small handful of DIEs have been able to upgrade into elite, TNE-led export channels. Thus, it is more appropriate to say that China-located firms are the powerhouses, not Chinese-owned firms, even in the least technological industries, like footwear. This implies that as China’s labor costs rise or its currency appreciates, the history of restructuring in East Asian regional production networks may be a poor guide for the future. Much of it will depend on the decisions of FIEs linked into international value chains, whose allegiance and backward linkages to China may be far less secure than was the case for Taiwan or Korea, where domestic firms dominated the export drive.
References


Notes


3 Although GCC, GPN and GVC research have well-known areas of agreement and difference, in this paper, I use “global value chains” as an umbrella rubric.

4 Definitions of FIEs and DIEs are unique to China. Internationally, FDI is defined as long-term investments in which a “lasting interest” is made in a foreign enterprise such that a significant degree of managerial influence is transferred, which international statistical agencies define as a minimum threshold of 10% foreign ownership (OECD 2008, p.48). However, China uses a more conservative 25% investment stake, meaning that this paper under-estimates their role in China, compared to international definitions.

5 Most importantly, they utilize national input-output tables which are not only limited in their level of industry disaggregation, but also they assume that domestic input-output measurements, and a country’s international input-output measurements (such as through export processing) are identical.

6 This differs from the multiscalar territoriality of economic geographers (Dickens, et al. 2001).

7 Final footwear include only HS codes 6401 to 6405. See Table 2 notes.

8 The imports of all 100% export-specialized firms were gathered and ranked by value. The largest categories were selected until 80% of their imports were accounted for. This was to exclude minor imports which have little or no relevance to footwear manufacturing.

9 Since our trade data are comprehensive, if the intermediate goods are not imported, they must come from domestic suppliers (or in-house).

10 For instance, whereas in the past, domestic firms had to acquire foreign trading rights to import and export, China’s WTO accession required that by December 2004, all firms were allowed to export and import freely (except for a short list of commodities listed in Annex 2A1 and 2A2 of section 5 of the Protocol). Also, a new
Enterprise Income Tax Law consolidated the two different sets of tax codes that had separately governed domestic and foreign firms. In doing so, the new law eliminated all preferential taxation based on ownership (Articles 4 and 28), including tax advantages afforded to firms registered in China’s many export processing zones, and to firms with 70% or more of their sales exported. On the other hand, Beijing also improved the business environment for foreign firms, including WTO requirements on the ‘national treatment’ of foreign firms, which removed unequal and burdensome requirements.

11 The negative correlations between CoV and export specialization (-.31) or import specialization (-.24) are expected, and mean that firms which are more highly specialized in footwear manufacturing also have *more stable* relationships with their buyers.

12 They were added un-weighted because there was no compelling rationale to judge the variables to be more or less important.

13 The only exception is unit prices to developing countries in which domestic firms sell more expensive products (though conducting only a miniscule $55 million in sales).
### TABLES

#### Table 1. List of Indicators and Measurements in China’s Transactional Trade Data

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Measurement/Data</th>
<th>Chinese Label (pinyin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Transaction</td>
<td>Month/Year</td>
<td>nian/yue</td>
</tr>
<tr>
<td>Trade Direction (of transaction)</td>
<td>Import/Export</td>
<td>jinchu kou</td>
</tr>
<tr>
<td>Product Name</td>
<td>8-digit Harmonized System (HS) code and product description</td>
<td>shangpin mingcheng</td>
</tr>
<tr>
<td>Firm Name</td>
<td>Includes unique company ID, address, city, zip code, contact information</td>
<td>gongsii mingcheng, etc.</td>
</tr>
<tr>
<td>Value (of transaction)</td>
<td>US Dollars</td>
<td>jin a</td>
</tr>
<tr>
<td>Quantity/Units (of transaction)</td>
<td>Differs by HS Code</td>
<td>shuliang danwei</td>
</tr>
<tr>
<td>Origin/Destination Country</td>
<td>Country name</td>
<td>yuanchan guo/mudi guo</td>
</tr>
<tr>
<td>Transshipment/Routing Country</td>
<td>Country name</td>
<td>zhongzhuan guo</td>
</tr>
<tr>
<td>Company Ownership</td>
<td>State-owned, private-owned, wholly foreign-owned, joint venture, etc.</td>
<td>gongsii xingzi</td>
</tr>
<tr>
<td>Mode of Trade</td>
<td>Ordinary trade, processing w/ import material, processing and assembly, entrepot trade by bonded area, etc.</td>
<td>maoyi fangshi</td>
</tr>
<tr>
<td>Mode of Transportation</td>
<td>Water, Road, Rail, Air, etc.</td>
<td>yunshu fangshi</td>
</tr>
<tr>
<td>Chinese Customs Port</td>
<td>Name of City</td>
<td>guan gu</td>
</tr>
</tbody>
</table>

Note: Harmonized System (HS) codes refer to an internationally standardized classification system of products. Footwear is HS64. (See UN Comtrade Commodity List at [http://comtrade.un.org/db/www/CommoditiesList.aspx](http://comtrade.un.org/db/www/CommoditiesList.aspx)). “Company Ownership” and “Mode of Trade” are specific to China. The former refers to the registration of companies in terms of the owners of the assets and in customs data includes three categories for domestic firms (state, collective and privately owned) and three for foreign firms (wholly foreign-owned, joint capital and joint cooperative), with an additional category for “Other.” Mode of trade refers to how the imported or exported good was classified when it entered China’s customhouse.
Table 2. Firm, Transactional and Final Market Attributes of Chinese Exporters

<table>
<thead>
<tr>
<th>Firm Attributes</th>
<th>Calculation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Exporter</td>
<td>Total annual footwear exports</td>
<td>Total export value is indicative of firm size</td>
</tr>
<tr>
<td>Export Specialization</td>
<td>Exports in footwear/Total Exports</td>
<td>Higher percentages indicate a firm is more specialized as a footwear exporter. Lower percentages are indicative of a general trading company.</td>
</tr>
<tr>
<td>Import Specialization</td>
<td>Imports in HS codes/Total Imports</td>
<td>Higher percentages indicate a firm is more specialized as a footwear firm, and they rely more on imported intermediate goods, rather than sourcing locally in China. (see also footnote 9)</td>
</tr>
<tr>
<td>Company Ownership</td>
<td>Not calculated</td>
<td>Indicates whether firm is domestic or foreign owned. (see Table 1).</td>
</tr>
</tbody>
</table>

Transactional Attributes

| Transactional Stability              | Coefficient of variation of monthly footwear exports of a firm (84 months: 2000-2006) | A lower CoV indicates more stable purchase orders from their buyers. A higher CoV indicates volatility in buyer purchase orders. |

Final Market Attributes

<table>
<thead>
<tr>
<th>Country Destination</th>
<th>Percentage of footwear exports to advanced versus developing countries</th>
<th>Share of exports to OECD countries (excluding Mexico, Chile, Turkey, Israel, and Eastern European countries), and share of exports to all other countries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Prices</td>
<td>Average unit prices to final markets</td>
<td>Average unit price of exports to advanced countries and average unit price to all other (developing) countries.</td>
</tr>
</tbody>
</table>

Notes: HS codes have the same definition as in Table 1. With the exception of “Import Specialization,” they refer to HS 6401 through HS 6405, which includes the entire final footwear category. However, it excludes HS 6406, which records footwear parts, such as uppers, in-soles, heels, etc. By contrast, the HS codes used to calculate “Import Specialization” consist of major imported intermediate goods that go into the production of footwear. In addition to HS 6406, these include various dyes (HS 3203, 3204), adhesives (HS 3506), plastic sheets/fabrics (HS 3920, 3921), rubber sheets (HS 4002), all processed leathers (HS 41), imitation leather textiles (HS 5903), tanning and footwear machinery (HS 8453), and injection molds (HS 8477). See footnote 8 for methodology.
Table 3. Correlations of Firm, Transactional and Final Market Attributes

<table>
<thead>
<tr>
<th></th>
<th>Firm Size</th>
<th>CoV</th>
<th>% AIC</th>
<th>Unit Price</th>
<th>Unit Prices (AIC)</th>
<th>Unit Prices (LDC)</th>
<th>Export Specialization</th>
<th>Import Specialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Size</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoV</td>
<td>-.11</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% AIC</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit Prices (All)</td>
<td>.10</td>
<td></td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Unit Prices (AIC)</td>
<td>.11</td>
<td></td>
<td>.29</td>
<td></td>
<td>.99</td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>Unit Prices (LDC)</td>
<td>.14</td>
<td></td>
<td></td>
<td></td>
<td>.96</td>
<td>.92</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Export Specialization</td>
<td>-.12</td>
<td></td>
<td>.36</td>
<td></td>
<td>.30</td>
<td>.36</td>
<td>.29</td>
<td>1.00</td>
</tr>
<tr>
<td>Import Specialization</td>
<td>-.04</td>
<td></td>
<td>.39</td>
<td></td>
<td>.42</td>
<td>.46</td>
<td>.42</td>
<td>.69</td>
</tr>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Notes: See Table 2 for meaning of indicators. “CoV” is coefficient of variation (transactional stability); “AIC” stands for advanced industrialized countries; “LDC” stands for less developed countries; and “% AIC” is the share of a firm’s total footwear exports that go to AIC. Pearson correlations are calculated of 2,417 firms with over $1 million in exports.

Table 4. Firm, Transactional and Final Market Attributes by Channel and Ownership

<table>
<thead>
<tr>
<th></th>
<th>Channel 1</th>
<th></th>
<th>Channel 2</th>
<th></th>
<th>Channel 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic</td>
<td>Foreign</td>
<td>Domestic</td>
<td>Foreign</td>
<td>Domestic</td>
<td>Foreign</td>
</tr>
<tr>
<td>No. of Firms</td>
<td>1213</td>
<td>132</td>
<td>336</td>
<td>225</td>
<td>71</td>
<td>440</td>
</tr>
<tr>
<td>AIC Exports</td>
<td>$4,071</td>
<td>$415</td>
<td>$2,038</td>
<td>$1,154</td>
<td>$553</td>
<td>$5,710</td>
</tr>
<tr>
<td>(Mil. US$)</td>
<td>(47.2%)</td>
<td>(53.6%)</td>
<td>(87.5%)</td>
<td>(85.8%)</td>
<td>(90.6%)</td>
<td>(94.6%)</td>
</tr>
<tr>
<td>LDC Exports</td>
<td>$4,553</td>
<td>$360</td>
<td>$291</td>
<td>$191</td>
<td>$55</td>
<td>$325</td>
</tr>
<tr>
<td>(Mil. US$)</td>
<td>(52.8%)</td>
<td>(46.4%)</td>
<td>(12.5%)</td>
<td>(14.2%)</td>
<td>(9.4%)</td>
<td>(5.4%)</td>
</tr>
<tr>
<td>Total Exports</td>
<td>$8,624</td>
<td>$775</td>
<td>$2,329</td>
<td>$1,346</td>
<td>$559</td>
<td>$6,035</td>
</tr>
<tr>
<td>(Mil. US$)</td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
</tr>
<tr>
<td>Unit Price, AIC</td>
<td>$2.83</td>
<td>$2.90</td>
<td>$4.31</td>
<td>$4.33</td>
<td>$8.87</td>
<td>$8.61</td>
</tr>
<tr>
<td>(US$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit Price, LDC</td>
<td>$3.31</td>
<td>$2.84</td>
<td>$5.03</td>
<td>$5.45</td>
<td>$10.34</td>
<td>$8.07</td>
</tr>
<tr>
<td>(US$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export Specialization</td>
<td>39.8%</td>
<td>69.5%</td>
<td>79.1%</td>
<td>95.6%</td>
<td>95.8%</td>
<td>99.0%</td>
</tr>
<tr>
<td>Import Specialization</td>
<td>13.5%</td>
<td>24.8%</td>
<td>39.3%</td>
<td>57.1%</td>
<td>84.6%</td>
<td>80.9%</td>
</tr>
<tr>
<td>CoV*</td>
<td>0.81</td>
<td>0.71</td>
<td>0.56</td>
<td>0.61</td>
<td>0.53</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Notes: AIC stands for advanced industrialized countries and consists of OECD countries, excluding Mexico, Turkey, Chile, Israel and Eastern European countries. LDC stands for less developed countries and consists of all remaining countries. CoV is the average coefficient of variation of the firms in the category. The asterisk indicates that the CoV variable only applies to the largest 400 firms, for which a meaningful CoV could be calculated. All other measurements are made on the full sample of 2,417 of the largest firms.
Table 5. Estimation of Lead Firm Trade in Global Value Chains

<table>
<thead>
<tr>
<th></th>
<th>Advanced Countries</th>
<th>Developing Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel 3 (Mil. US$)</td>
<td>$6,263</td>
<td>$380</td>
</tr>
<tr>
<td>Channel 2 (Mil. US$)</td>
<td>$3,192</td>
<td>$482</td>
</tr>
<tr>
<td>Total Trade (Mil. US$)</td>
<td></td>
<td>$21,806</td>
</tr>
<tr>
<td>Channel 3</td>
<td>28.7%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Channel 2</td>
<td>14.6%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Channel 3 + 2</td>
<td>43.4%</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

Notes: Channel totals derive from adding domestic and foreign firm totals from Table 4. Total trade is the aggregate of all transactions that are recorded in the transactional trade database for Harmonized System codes 6401 to 6405, which excludes 6406 because it is an intermediate input (footwear parts).

Table 6. Firm, Transactional and Final Market Attributes by Channel and Ownership Largest 100 Firms

<table>
<thead>
<tr>
<th></th>
<th>Channel 1 Domestic</th>
<th>Channel 1 Foreign</th>
<th>Channel 2 Domestic</th>
<th>Channel 2 Foreign</th>
<th>Channel 3 Domestic</th>
<th>Channel 3 Foreign</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Firms</td>
<td>29</td>
<td>2</td>
<td>15</td>
<td>9</td>
<td>3</td>
<td>42</td>
</tr>
<tr>
<td>AIC Exports (Mil. US$)</td>
<td>$1,252</td>
<td>$133</td>
<td>$1,065</td>
<td>$386</td>
<td>$117</td>
<td>$2,495</td>
</tr>
<tr>
<td>LDC Exports (Mil. US$)</td>
<td>(50.9%)</td>
<td>(96.1%)</td>
<td>(88.9%)</td>
<td>(82.9%)</td>
<td>(98.4%)</td>
<td>(94.9%)</td>
</tr>
<tr>
<td>Total Exports</td>
<td>$2,457</td>
<td>$138</td>
<td>$1,195</td>
<td>$466</td>
<td>$119</td>
<td>$2,629</td>
</tr>
<tr>
<td>(Mil. US$)</td>
<td>(100.0%)</td>
<td>(100.0%)</td>
<td>(100.0%)</td>
<td>(100.0%)</td>
<td>(100.0%)</td>
<td>(100.0%)</td>
</tr>
<tr>
<td>Unit Price, AIC (US$)</td>
<td>$3.75</td>
<td>$2.81</td>
<td>$4.84</td>
<td>$6.56</td>
<td>$11.24</td>
<td>$11.81</td>
</tr>
<tr>
<td>Unit Price, LDC (US$)</td>
<td>$5.54</td>
<td>$2.95</td>
<td>$6.28</td>
<td>$6.76</td>
<td>$11.71</td>
<td>$11.96</td>
</tr>
<tr>
<td>Export Specialization</td>
<td>26.3%</td>
<td>31.5%</td>
<td>61.5%</td>
<td>96.8%</td>
<td>92.8%</td>
<td>99.6%</td>
</tr>
<tr>
<td>Import Specialization</td>
<td>6.3%</td>
<td>2.1%</td>
<td>38.0%</td>
<td>60.7%</td>
<td>85.3%</td>
<td>78.3%</td>
</tr>
<tr>
<td>CoV</td>
<td>0.71</td>
<td>0.76</td>
<td>0.56</td>
<td>0.48</td>
<td>0.71</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Notes: Same as Table 4, except measurements are made on the largest 100 firms.
FIGURES

Figure 1. Distribution of Footwear Exports by Size of Firm

Over US$1 million in exports: 2,417 firms, 93.8% of exports

400 Largest firms
59.3% of exports

50 Largest firms
24.0% of exports

Number of Firms

(Export share)
Figure 2. Domestic and Foreign Firms Categorized by Export Specialization

Figure 3. Domestic and Foreign Firms Categorized by Export Specialization
Figure 4. Distribution of Firms by Index Score

Figure 5. Distribution of Firms by Index Score (Largest 100)