



How firms export: Processing vs. ordinary trade with financial frictions[☆]



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ABSTRACT

The fragmentation of production across borders allows firms to make and export final goods, or to perform only intermediate stages of production by processing imported inputs for re-exporting. We examine how financial frictions affect companies' choice between processing and ordinary trade – implicitly a choice of production technology and position in global supply chains – and how this decision affects performance. We exploit matched customs and balance sheet data from China, where exports are classified as ordinary trade, import-and-assembly processing trade (processing firm sources and pays for imported inputs), and pure assembly processing trade (processing firm receives foreign inputs for free). Value added, profits, and profitability rise from pure assembly to processing with imports to ordinary trade. However, more profitable trade regimes require more working capital because they entail higher up-front costs. As a result, credit constraints induce firms to conduct more processing trade and pure assembly in particular and preclude them from pursuing higher value-added, more profitable activities. Financial market imperfections thus impact the organization of production across firms and countries and inform optimal trade and development policy in the presence of global production networks.

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1. Introduction

The decline in transportation costs and policy barriers over the last few decades has revolutionized global trade by enabling the splicing

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of production across borders. Firms today can choose to perform only intermediate segments of the supply chain by processing and assembling imported inputs, before re-exporting to final producers and retailers abroad. According to the International Labor Organization, 60 million workers worldwide are employed in 3500 export processing zones spanning 130 mostly developing countries (Boyenge, 2007). This phenomenon raises important policy-relevant questions. How should trade policy be designed when different manufacturing stages occur in different nations? What are the welfare and distributional effects of processing trade and the policies that govern it? Does it shape technology transfer to emerging economies and the transmission of shocks between countries?

To shed light on these questions, we study how firms choose between processing and ordinary trade – implicitly a choice of production technology and position in global supply chains – and how this decision affects company performance. We show that spanning more production stages via ordinary trade increases value added and profitability. However, it also requires more working capital because it entails higher up-front costs. As a result, financial frictions induce firms to conduct more

processing trade and preclude them from pursuing higher value-added, more profitable activities. At the same time, processing trade enables constrained firms that could not undertake ordinary exports to share in the gains from trade. Financial market imperfections thus affect the organization of production across firms and countries and inform the design of trade and development policy in the presence of global value chains.

We use matched customs and balance sheet data at the firm level for China, an economy ideally suited to this analysis because of its major role in international production networks. To boost exports, in the mid-1980s China formally introduced a processing trade regime (PT) that exempts materials imported for further processing and re-exporting from import duties. By 2005, 32.7% of Chinese exporters pursued processing trade and contributed 54.6% of total exports. In addition, Chinese firms choose between two operating modes within the processing regime. Under pure assembly (PA), they receive foreign inputs at no cost from the trade partner abroad to whom they also send the final product. Under processing with imports (PI), also known as import-and-assembly, the Chinese firm instead independently sources and pays for imported parts. These institutional features introduce wedges between the costs and returns associated with ordinary trade (OT), PI, and PA. Finally, China's financial system is underdeveloped and segmented across provinces. It thus provides a perfect setting for exploring the link between credit constraints and firms' choice of export mode.

We establish two main results. First, profitability varies systematically across trade strategies. Profits, profit-to-sales ratios, and value added are higher for companies that undertake more ordinary relative to processing trade and more import-and-assembly relative to pure assembly. Producers settling for PA or PI must therefore face some constraint that prevents them from doing OT.

Second, limited access to capital poses such a constraint and determines exporters' choice of trade regime. We first demonstrate that (i) in the cross-section of firms within finely disaggregated industries, financially healthier enterprises with more liquid assets and less leverage pursue more ordinary trade relative to processing trade and more import-and-assembly relative to pure assembly. Moreover, (ii) within continuing exporters over time, improvements in financial health are followed by reallocations of trade activity towards regimes with higher working capital needs. Similarly, new exporters' financial health prior to export entry strongly predicts their trade regime upon entry.

Since (i) and to a lesser degree (ii) may arise endogenously, we exploit a series of exogenous sources of variation to establish a causal effect of credit constraints. We show that (iii) following the removal of MFA quotas on textiles and apparel in 2005, new exporters of such products choose different trade modes depending on their financial status before 2005. (iv) Across sectors within firms, exporters conduct more OT than PT and more PI than PA in financially less vulnerable sectors, i.e., sectors that rely less on external capital markets for exogenous reasons. (v) The impact of firms' financial health and sectors' financial vulnerability is bigger in Chinese provinces with weaker financial systems, where liquidity constraints are more likely to bind for the Chinese exporter. By contrast, this impact is stronger for financially more developed export destinations, where the foreign partner is less constrained and can more easily bear the costs that the Chinese seller cannot.

These empirical findings are consistent with liquidity needs and profitability varying across trade regimes such that financial frictions shape firms' choice of export mode. Conceptually, different trade regimes correspond to a different distribution of production stages, costs, and profits between Chinese suppliers and foreign buyers. From the perspective of the Chinese manufacturer, ordinary trade requires the most working capital because he pays for product design, domestic and foreign inputs, import duties on foreign inputs, final assembly, and distribution abroad. Processing with imports necessitates less financial liquidity since it avoids the costs of product design, import tariffs, and distribution. Financing needs are lowest under pure assembly, when up-front expenses comprise only domestic inputs and product

assembly. When the costs borne by each party represent relationship-specific investments and contracts are incomplete, hold-up problems arise, and trade partners split revenues according to Nash bargaining with their contribution to the relationship as bargaining weight. Chinese firms thus sort into trade modes based on their access to capital, and this in turn pins down their profitability.

Our analysis uncovers an important and previously unexplored determinant of firms' export mode: credit constraints. The recent literature has proposed other factors that govern the choice between processing and ordinary trade in China. These include firm productivity (Brandt and Morrow, 2015; Dai et al., 2011; Defever and Riaño, 2012), space-based industrial policies (Defever and Riaño, 2012), import tariffs (Brandt and Morrow, 2015), and incentives for foreign firms to vertically integrate their Chinese supplier (Feenstra and Hanson, 2005; Fernandes and Tang, 2012). We use a variety of estimation strategies in order to account for these alternative factors, as well as for other observable and unobservable firm and sector characteristics. We control for the variation in aggregate supply and demand conditions with a stringent combination of firms' province, industry, and destination fixed effects, and for unobserved company characteristics with firm fixed effects. We establish that the role of firms' financial health is independent from that of firm size, age, productivity, ownership structure (private vs. state, domestic vs. foreign), production technology (capital-, skill-, material intensity), and tariffs on imported inputs. Of note, its effect is economically large relative to that of firm productivity, which is weakly correlated with access to capital due to frictions in Chinese financial markets. We ensure that our results for sectors' financial vulnerability are not driven by the variation in physical capital intensity, human capital intensity, relationship specificity, and upstream import tariffs across sectors.

Our findings suggest that financial frictions influence the organization of global production networks across firm and country boundaries. The three trade regimes correspond to the integration of different segments of the value chain (product design, input sourcing, input processing, final assembly, distribution) under the control of the Chinese exporter. Hence, credit-constrained firms, and presumably financially underdeveloped countries as a whole, might be stuck in low value-added stages of the supply chain and unable to pursue more profitable opportunities. Strengthening capital markets might thus be an important prerequisite for moving into higher value-added, more profitable activities.

Our study provides a bridge between two active literatures on trade and finance and on global value chains. There is growing evidence that credit constraints impede firms' export activity and distort aggregate trade flows, both in normal times and during crisis episodes (Foley and Manova, 2015; Manova, 2013; Berman and Héricourt, 2010; Bricongne et al., 2012; Amiti and Weinstein, 2011; Minetti and Zhu, 2011; Chor and Manova, 2012; Feenstra et al., 2011). We propose a novel mechanism – choice of trade regime and implicitly global value chain position – through which credit constraints operate. There has also been increased interest in international production networks and their implications for the transmission of shocks across borders during the 2008–2009 crisis (Bems et al., 2011; Levchenko et al., 2010; Baldwin, 2012).¹ An important advance in this area has been the inference of domestic value added and production line position from trade flows and input–output tables at the country level (Johnson and Noguera, 2012; Antràs and Chor, 2013; Fally, 2011) and in China in particular (Brandt and Morrow, 2015; Kee and Tang, 2012; Koopman et al., 2011). To this line of research, we add one of the first micro-level studies of how and why individual firms operate at different stages along the global value chain. We also shift attention to the decisions of

¹ Kim and Shin (2012) model global supply chains with production delays and show that inventories, accounts receivable, and productivity are procyclical and track financial conditions.

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