

Credit Constraints and The Adjustment to Trade Reform

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Abstract. A growing literature on trade and finance has established that credit constraints are an important determinant of global trade patterns. This paper surveys the recent theoretical and empirical developments, and discusses their implications for the role of credit constraints in the adjustment to trade reform. It also identifies promising directions for future research in this area.

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1 Introduction

In standard trade theory, gains from international trade result from countries exploring their comparative advantage as shaped by consumer preferences, factor endowments and production technologies. The more recent trade literature emphasizes the role of firm heterogeneity, and suggests that reallocations across sectors and across firms within a sector are equally important for the aggregate gains from trade. As powerful as these frameworks are, they abstract from market frictions that may arise from agency problems, and presume that entrepreneurs can freely enter any industry or expand production. In practice, however, firms require external financing for their operations, and frequently face borrowing constraints.

A growing literature on trade and finance has established that credit constraints are an important determinant of global trade patterns. This literature has largely examined the effects of financial frictions on countries' trade flows in steady state, without studying the response to changes in trade policy. This article surveys these recent theoretical and empirical developments, and discusses their implications for the role of credit constraints in the adjustment to trade reform. It also identifies promising directions for future research in this area.

Why should credit constraints matter for international trade flows? Firms often incur substantial up-front costs which they can profitably recover only after realizing sales revenues. These costs may be either sunk, in the sense that they need to be paid only once upon entry into an industry, market or product line, or recurrent fixed per-period costs. For example, firms may have to engage in R&D and product development, marketing research, advertising, or investment in fixed capital equipment. Although some variable costs such as employment compensation and equipment repairs/depreciation are typically paid at the end of a production cycle, other variable expenses may also be up-front, such as intermediate input purchases, advance payments to salaried workers, and land or equipment rental fees.

Exporting is associated with additional sunk, fixed and variable costs that make production for foreign markets more costly than manufacturing for the home country. Sunk and fixed trade costs include learning about the profitability of potential export markets; making market-specific investments in capacity, product customization and regulatory compliance; and setting up and maintaining foreign distribution networks. The additional variable costs of trade

comprise shipping, freight insurance, and applicable trade duties. As with production costs, most of these trade expenses may have to be incurred before export revenues are realized.

Firms are not always able to meet their liquidity needs with retained earnings or cash flows from operations, and routinely rely on external financing for their production and export expenditures. This financing often comes in the form of bank loans or bank-provided trade credit. In addition, private parties on two sides of a transaction may also offer trade credit to each other. For instance, final-good purchasers (importers) may secure trade financing for their suppliers (exporters), and final-good producers (exporters) may extend trade credit to their intermediate input suppliers. In practice, these types of buyer- or supplier trade credit require bank guarantees and ultimately also depend on firms' access to bank financing.

In the presence of financial frictions - because of imperfect contractibility or a limited pool of available financial capital in an economy - credit constrained firms may not be able to become exporters or to export to their full potential. Evidence suggests that sectors differ greatly in their requirement for external finance and their availability of collateralizable assets that can be used to secure credit. For these reasons, borrowing constraints can reduce a country's aggregate exports and affect their sectoral composition by limiting the investment opportunities open to producers with insufficient private capital.

The trade and finance literature has indeed documented large economic effects of credit constraints on trade. The main finding in this literature is that financially developed countries export greater volumes and a wider range of products to more destinations. Moreover, these patterns are especially pronounced in financially vulnerable sectors. Section 2 below reviews this country-level evidence and some recent firm-level studies. It also presents a useful theoretical framework for thinking about the role of credit constraints in the context of international trade.

Most papers on the link between trade and finance have focused on the exporting country's domestic financial development. New evidence suggests that foreign capital flows can compensate for an underdeveloped domestic financial system, though this topic remains underexplored. Section 3 discusses recent work on the role of equity market liberalization and foreign direct investment in alleviating credit constraints and stimulating trade flows.

Building on the intuition and results developed for the effects of credit constraints on trade in steady state, Section 4 explores the role of financial frictions in the adjustment to trade

reforms. The goal of this section is to provide informed priors and outline an agenda for future research. Since trade policy changes are most relevant for developing and emerging economies where credit constraints are most acute, the discussion focuses on the response of financially underdeveloped countries to trade liberalization. The last section concludes and considers the merits of concurrent and sequential trade and financial sector reforms.

2 The Effects of Credit Constraints on Trade

2.1 Theoretical framework

The literature on trade and finance has offered a number of theoretical frameworks to rationalize the effects of credit constraints on trade. A common prediction of these models is that financially developed countries have a comparative advantage in financially vulnerable sectors.¹ This subsection closely follows Manova (2007), who incorporates credit constraints in a heterogeneous-firm model of trade à la Melitz (2003).

In the model, credit constraints affect firms in different countries and sectors differentially. For technological reasons, firms in some sectors have greater liquidity needs and must finance a bigger share of their export costs externally. Industries also differ in their endowment of tangible assets that can serve as collateral. Thus, entrepreneurs find it more difficult to start exporting in financially vulnerable sectors since they need to raise more outside finance or potential investors expect a lower return in case of default. In addition, credit constraints vary across countries because contracts between firms and investors are more likely to be enforced at higher levels of financial development. When a financial contract is enforced, the borrowing firm makes a payment to the investor; otherwise, the firm defaults and the creditor claims the collateral. Firms thus enjoy easier access to external finance in countries with stronger financial contractibility.

In the absence of credit constraints, all firms with productivity above a certain cut-off level would become exporters, as in Melitz (2003). Credit constraints, however, interact with firm heterogeneity and reinforce the selection of only the most productive firms into exporting: Because more productive firms earn bigger revenues, they can offer creditors a higher return in

¹ See Kletzer and Bardhan (1987), Beck (2002), Matsuyama (2004), Ju and Wei (2005), and Becker and Greenberg (2007) among others. The Ricardian, representative-firm nature of these models delivers the counterfactual prediction that either all or no producers in a given sector will become exporters.

case of repayment, and are thus more likely to secure the outside capital necessary for exporting. This pattern is consistent with evidence in the corporate finance literature that smaller firms tend to be more credit constrained.²

The model implies that the productivity cut-off for exporting will vary systematically across countries and sectors. It will be higher in financially vulnerable industries which require a lot of external finance or have few collateralizable assets, and lower in countries with high levels of financial contractibility. Importantly, the effect of financial development will be more pronounced in financially vulnerable sectors. Credit constraints thus preclude potentially profitable firms from exporting and result in inefficiently low levels of trade participation.

Note that, for a given distribution of productivity across firms, the lower the productivity cut-off for exporting, the more firms can sell in foreign markets. If the productivity cut-off for exporting to a particular destination is too high, no firms will be able to enter that market and there will be zero exports at the country level. Therefore, countries will be more likely to export to any given destination in a financially vulnerable sector if they are more financially developed. Given positive exports, in financially vulnerable sectors more firms will participate in trade when located in financially advanced economies. If firms produce differentiated goods, this will also be reflected in greater product variety in country exports.

When firms need to raise outside funds to finance their variable production and trade costs, credit constraints will affect not only firms' decision to export, but also their scale of operations. While the most productive (and least constrained) exporters will be able to trade at first-best levels, less productive firms will only be able to export if they ship lower volumes than would be optimal in the absence of financial frictions. Such firms are able to secure less outside credit than would be necessary to trade at first-best levels, and use it to support lower export quantities which entail lower variable costs. The extent of this distortion will vary systematically across countries and sectors. In particular, firms located in financially developed countries will be able to export greater volumes, especially if they are active in a financially vulnerable sector.

To summarize, credit constraints affect both the extensive (number of firms exporting; number of export destinations) and the intensive (firm-level exports) margin of trade. In the

² See, for example, Beck, Demirgüç-Kunt, Laeven and Levine (2008), Beck, Demirgüç-Kunt and Maksimovic (2005), and Forbes (2007).

aggregate data, this will manifest itself in financially developed countries having a comparative advantage in financially vulnerable industries. Countries with strong financial contractibility will ship greater exports to more destinations, especially in sectors with high external finance dependence and sectors with few tangible assets.

This theoretical framework abstracts from sunk costs as well as cost or demand shocks associated with exporting. There is, however, evidence of hysteresis in countries' and firms' participation in international trade, which has been ascribed to substantial sunk costs of entry into foreign markets. At the same time, recent product- and firm-level studies find frequent exit and re-entry into exporting. This churning suggests that either sunk costs are not as large as previously believed, or shocks to profitability are very volatile.

A dynamic model with sunk costs, idiosyncratic shocks and credit constraints remains a fruitful area for future research. A priori, easier access to external financing should help firms cover their sunk costs and enter into exporting. The effects of credit constraints on firm survival and continued exporting in a given market, however, would likely be ambiguous. On the one hand, as Manova (2007) shows, firms in financially developed countries would be able to more easily overcome cost shocks and continue selling in a foreign market. On the other hand, greater availability of credit would reduce the option value of continuation since it would be easier to finance the sunk cost of entry, should the firm exit and decide to re-enter in the future. The net effect of financial frictions on firm dynamics could thus be theoretically ambiguous. Finally, a richer dynamic model of exporting would also allow credit-constrained firms to retain earnings and accumulate resources until they enter into exporting at the optimum time.

2.2 Country-level evidence

There is by now strong and robust empirical evidence that credit constraints are an important determinant of global trade patterns. Most of this evidence comes from the analysis of country-level trade flows that exploits the variation in financial development across countries and the variation in financial vulnerability across sectors.³ In particular, a number of studies have found that financially advanced economies export relatively more, especially in sectors with greater requirements for external capital and sectors with few collateralizable assets (Beck, 2002, 2003; Svaleryd and Vlachos, 2005; Hur et al., 2006; Becker and Greenberg, 2007; Manova, 2007).

³ This approach was introduced in the finance and growth literature (see Rajan and Zingales, 1998 among others).

Moreover, Manova (2007) shows that financial frictions have a sizable effect on trade above and beyond their direct impact on domestic production. This is important given the results in the finance and growth literature that financially vulnerable sectors are larger and grow faster in financially developed countries. In the data, the distortion to domestic production is responsible for only 20%-25% of the total effect of credit constraints on trade.

A number of different indicators of financial development have been used in the literature. Two common proxies are stock market capitalization and the amount of credit extended by banks and other financial institutions to the private sector, both as a share of GDP. These outcome-based measures reflect the actual availability of external financing in a country but may be subject to certain endogeneity concerns. Reassuringly, authors frequently present robust results using institutional indices for accounting standards, creditor rights protection, and contract enforcement. These indices reflect the potential of an economy to maintain financial contracts, and capture the notion of financial contractibility in the theoretical framework above.

The empirical proxies for sectors' financial vulnerability also stay close to the model. External finance dependence is typically measured by the fraction of capital expenditures not financed with internal cash flows from operations. Asset tangibility is similarly defined as the share of net plant, property and equipment in book value assets. Both variables are usually constructed from U.S. firm-level data. Researchers point to the much larger variation in these measures across sectors than among firms in an industry as an argument that the indices capture technologically determined sector characteristics exogenous to individual firms. Empirically, all that is required for identification is that the relative rank ordering of industries be preserved across countries, even if the exact measures deviate from those for the United States.

Using these standard country and industry indicators, Manova (2007) has confirmed that credit constraints reduce countries' total exports by affecting all margins of trade. Financially developed countries are more likely to export to any given destination, and thus transact with more trade partners. Conditional on entry into a given export market, financially advanced economies also export more to that country. All of these effects are more pronounced in financially vulnerable sectors. These results are consistent with the idea that firms incur trade costs in each market they enter and face credit constraints in their financing. Analyzing bilateral trade flows also provides more convincing evidence for the importance of external credit because

it permits the inclusion of destination or destination-sector specific fixed effects which control for differences in demand and trade costs.

The effect of financial frictions on bilateral trade flows can be further decomposed into an extensive margin (number of exporting firms) and an intensive margin (firm-level exports). Ultimately, analyzing firms' participation in international trade will reveal the exact mechanism through which credit constraints affect exporting and allow more specific policy recommendations. In the absence of systematic firm-level data across countries and sectors, Manova (2007) examines the number of products that countries export as an imperfect proxy for the extensive margin of trade. She finds that financially advanced countries ship a broader range of goods to any given market, and this pattern is stronger in financially vulnerable sectors.

Manova (2007) also adopts the two-stage estimation procedure developed by Helpman, Melitz and Rubinstein (2008). This approach exploits the information contained in the data on both zero and positive bilateral exports to infer what fraction of domestically active firms export to each destination. The results suggest that a third of the effect of financial development on trade values is attributable to firm selection into exporting, while two-thirds are due to reductions in firm-level exports. This indicates that firms face binding credit constraints in the financing of both fixed and variable export costs. By contrast, if firms required outside capital to cover only the fixed costs of trade, financial market imperfections would have distorted only the extensive margin of exports.

What is the economic magnitude of these effects? Recall that financial frictions both reduce countries' aggregate exports and alter their sectoral composition. Evaluating the former effect has been difficult because it requires the estimation of cross-country regressions of trade on a country-level measure of financial development. The high correlation between financial development and other country characteristics, however, presents a challenge for estimating the causal impact of credit constraints. On the other hand, using interaction terms makes it possible to establish causality by showing that financial development has a differential effect on trade flows across sectors.

Comparative statics based on this difference-in-difference approach indicate that the effect of credit constraints is substantial and comparable to that of traditional sources of comparative advantage, such as cross-country differences in factor endowments. For example, if the Philippines, a country at the first quartile in the distribution of financial development, were to

improve to the level of the third quartile (Italy), the Philippines could increase its textile exports (highly dependent on external finance, 3rd quartile) by 19 percentage points more than its mineral products exports (intensive in internal funding, 1st quartile). Similarly, exports of low tangibility sectors (other chemicals, 1st quartile) would grow 17 percentage points faster relative to sectors with harder assets (wood products, 3rd quartile). These effects are equally important for the extensive and intensive margins of trade. A one-standard-deviation increase in financial development, for example, would raise export product variety by 10 percentage points more in a financially vulnerable sector (3rd quartile) relative to a less dependent industry (1st quartile).⁴

In this context, Chor (2009) develops a methodology for quantifying the importance of different sources of comparative advantage for country welfare. He estimates mean welfare losses of -2.1% if cross-country differences in financial development were not allowed to generate comparative advantage and gains from trade. By comparison, the corresponding numbers for physical and human capital are -2.8% and -3.1%, respectively. While these calculations do not reflect the welfare loss from the overall reduction in trade due to credit constraints, but capture only the resulting distortions to the sectoral composition of countries' exports, they do suggest far from negligible effects.

In addition, Manova (2007) shows that credit constraints affect not only the number of countries' trade partners, but also their characteristics. An implication of the theoretical model in section 2.1 is that export markets can be ranked by their profitability, which increases with market size and falls with transportation costs (distance). To maximize export profits, firms will therefore first export to the most profitable destination and enter additional markets in decreasing order of profitability, until they hit their credit constraint. This pattern is also predicted to hold in the aggregate data. Indeed, results suggest that the size of the largest export destination does not vary systematically across exporting countries and sectors. In other words, all countries export to the biggest markets in the world, such as the United States, Germany and Japan. On the other hand, the smallest destination that financially advanced economies trade with has lower GDP, and this pattern is particularly pronounced for financially vulnerable sectors.

The welfare implications of this pecking order of trade have yet to be examined. If economies experience unsynchronized business cycles, exporting to more markets may provide

⁴ Comparative statics from Manova (2007).

hedging opportunities and smooth firms' export profits over time. Understanding the importance of credit constraints in this context is a topic for future research.

Finally, Manova (2007) examines the effects of credit constraints on countries' export dynamics. Over time, countries are more likely to continue exporting a given product to a specific trade partner if they are more financially developed. This effect is more pronounced for goods in sectors with greater reliance on external finance or fewer tangible assets. These results indicate that credit constraints matter in the presence of stochastic costs or other disturbances to export profitability, and are an important determinant of export dynamics. Further research could explore whether, in addition to stimulating overall trade flows, financial development improves aggregate welfare by reducing product churning and the volatility of exports.

2.3 Firm-level evidence

A few recent studies have used firm data to provide micro-level evidence for the importance of credit constraints in trade. These studies shed more light on the ways in which financial frictions restrict firms' export participation, and indicate that firm-level analysis is a prominent avenue for future research.

Muûls (2008) exploits firm data for Belgium, which provides information on both bilateral exports and firms' access to external financing. In particular, she uses an annual firm indicator of credit worthiness developed by a large French credit insurance company, Coface International. The Coface score is based on firm size, profitability, leverage and liquidity, as well as industry and macroeconomic characteristics. While this score is not directly affected by firm export behavior, it is clearly endogenous to a firm's overall performance. Thus, the results capture the correlation between firm credit constraints and exporting instead of a causal effect, although the regression analysis conditions on firm size and productivity.

Muûls (2008) finds that liquidity-constrained firms are less likely to become exporters and export to fewer destinations. Conditional on participating in international trade, firms also earn greater export revenues and export more products when they have easier access to financing. Finally, less constrained firms go further down the pecking order of destinations, and the size of the smallest market they enter is systematically lower. These results are consistent with the theoretical framework above and with the idea that firms require external funds to overcome both fixed and variable costs of exporting. They also speak to the growing literature on

multi-product firms. In fact, the model in section 2.1 could be extended to firms that manage multiple product lines with varying profitability. Firms would then also follow a pecking order of products and add new goods to their export mix until they exhaust their available credit.

Berman and Héricourt (2008) find similar results using data for 5,000 firms in 9 developing and emerging economies. They examine three proxies for the extent to which firms face financial constraints: the ratio of total assets to total debt, the ratio of cash flows to total assets, and the share of tangible assets in total assets. The most robust result is that credit constrained firms are less likely to become exporters, even controlling for firm size and productivity. While less consistent across specifications, there is also some evidence that, conditional on exporting, liquidity-strapped firms ship lower values and are more likely to stop exporting from one year to the next. These findings suggest that overcoming the sunk costs of trade may be the greatest challenge credit-constrained firms face. By contrast, the recurrent fixed and variable costs of trade appear to cause smaller distortions.

A challenge for these firm-level studies is obtaining firm measures of financial constraints that are exogenous to the exporting decision. One concern is that banks may be more willing to provide loans and trade credit to firms which export, because exporting is associated with a higher revenue stream and signals high levels of unobserved firm productivity. Indeed, Greenaway et al. (2007) find that the financial health of UK firms improves after they start exporting. At the time of entry into exporting, however, future exporters do not appear financially healthier than firms serving only the domestic market. By contrast, the two studies described above show that lagged credit constraints affect current firm export participation.

Further work is needed to better understand the interdependencies between financial frictions and trade at the firm level, and will likely require analyzing firms' export dynamics with panel data. Alternatively, one could examine the causal effect of credit constraints on firm export performance by exploring the variation in financial vulnerability across sectors, or by exploiting shocks to the availability of external finance that have a differential impact across firms.

Berman and Héricourt (2008) go in this direction and show that country financial development may have a differential effect across firms. In particular, it allows the most productive of the financially constrained firms to become exporters. This speaks to the allocative efficiency of well-functioning financial markets and the distributional effects of policies aimed at improving the availability of external finance. While this topic warrants further research,

addressing it will require firm measures of credit constraints that are exogenous to the export decision.

3 The Role of Foreign Financial Flows

Most of the literature on trade and finance has focused on the effects of countries' domestic financial development on their export performance. This interest is motivated by the importance of local bank financing for most firms. Companies, however, may also use alternative sources of funding to meet their liquidity needs. Indeed, recent evidence suggests that foreign portfolio and direct investments alleviate firms' credit constraints and stimulate trade flows. These findings not only provide further confirmation for the effects of credit constraints on trade, but also indicate the potential for financially underdeveloped economies to improve their export performance by liberalizing their capital account.

Manova (2008) explores the effects of equity market liberalizations, and finds that they increase countries' exports disproportionately more in sectors intensive in external finance and intangible assets. These results are not driven by cross-country differences in factor endowments and are independent of simultaneous trade policy reforms. They suggest that pre-liberalization, trade was restricted by financial constraints, which foreign portfolio investments relaxed to a certain degree. Conceptually, equity market reform should result in resources flowing from capital-abundant developed countries, where expected returns are low, to capital-scarce emerging countries, where expected returns are high. Opening stock markets has indeed been shown to reduce the cost of capital in liberalizing economies, increase investment and output, and promote an efficient resource allocation. The new evidence indicates that it also boosts trade flows.

The effects of equity market reform on trade appear highly economically significant. Within three years, a liberalizing country's exports of financially vulnerable sectors (75th percentile) increase 13-17 percentage points faster than exports of less financially dependent sectors (25th percentile). These results are comparable to a 20%-40% improvement in domestic financial development, as measured by private credit or equity market capitalization.

Manova (2008) also explores how the effects of financial liberalization vary with the size and activity of the domestic stock market. Conceptually, countries with a well functioning capital market may benefit more from allowing foreign flows since they already have the financial

infrastructure in place to allocate new resources. At the same time, financially underdeveloped countries stand to gain the most on the margin. In the data, equity liberalizations boost exports more in economies with less active stock markets prior to reform, as measured by initial market turnover or value traded as a share of GDP. This suggests that foreign portfolio flows may compensate for a weak domestic financial system.⁵

In addition to international equity flows, foreign direct investment (FDI) may also channel resources into countries with underdeveloped capital markets and help alleviate firms' credit constraints. The literature on the operations of multinational companies (MNCs) has found that foreign affiliates raise finance in the host country when possible. When that financing is not sufficient, however, subsidiaries receive additional funds from their parent company. For this reason, MNC affiliates enjoy easier access to external capital than domestic firms in the same host country.

In work in progress, Manova, Wei and Zhang (2009) show that foreign-owned firms and joint ventures in China have superior export performance relative to private domestic companies. Moreover, this advantage is especially pronounced in financially vulnerable sectors which require more external finance, have few collateralizable assets, or rely more on trade credit. This holds for all export margins at the firm level: total exports, number of export destinations, bilateral exports, number of exported products, and number of products exported to a specific market. These results suggest that firms face credit constraints in the financing of destination-product specific fixed and variable costs. They also provide micro-level evidence that foreign ownership affects firm export performance by relaxing credit constraints.⁶

The policy implications of these results are clear: Financially underdeveloped countries may be able to improve firms' access to external credit by relaxing restrictions on foreign portfolio and direct investment. The fact that domestic financial development remains an empirically important determinant of global trade patterns suggests that international financial flows do not (yet) fully compensate for it. Whether they may do so in the absence of any

⁵ The effects of equity market reform do not appear to vary across countries with different stock market capitalization or private credit as a share of GDP. This is consistent with the idea that active stock markets redistribute resources, and suggests that market activity may be a better indicator of an economy's potential to provide external financing than market size.

⁶ See Antras, Desai and Foley (2008) for a model of multinational activity with relationship-specific investments by local affiliates who face credit constraints. MNCs emerge in equilibrium to monitor the local affiliates and incentivize local investors to finance their investment. The parent company may also partly fund its affiliates.

restrictions on foreign investment remains a topic for future research. In particular, it would be important to establish if the same firms that have easier access to domestic financing are also favored by foreign investors.

Note that the distributional consequences of FDI policy depend on the relative prevalence of green-field investment and foreign mergers and acquisitions. While both modes may bring new capital into a financially underdeveloped economy, M&A would benefit some existing host firms, possibly at the expense of others. By contrast, green-field FDI would have no direct effect on domestic enterprises but may worsen their credit constraints by increasing competition in the local credit or final goods market. Further research is needed to evaluate the aggregate and distributional implications of capital account reforms for domestic firms' export performance.

4 Credit Constraints and the Adjustment to Trade Reform

4.1 Towards informed priors

The existing literature offers no direct evidence on the role of credit constraints in the adjustment process to trade reform. Ideally, this question would be explored with panel data on firms' export performance for a country that underwent a trade liberalization episode. This approach would be valid even if the liberalization were anticipated, although in that case the effects of financial frictions may be underestimated if firms responded in advance of the reform date. In the absence of direct evidence from trade policy changes, this section provides informed priors based on the results and intuition developed in the trade and finance literature.

When credit constraints are immaterial, a country would increase its aggregate exports if its trade partners removed or relaxed their import restrictions. This may result from more firms being able to export as well as existing exporters expanding their foreign sales. The latter effect can be further decomposed into two components: the number of products firms export and the value of exports per product. Finally, exports may increase faster in some sectors than others, and may even decrease in the country's comparative disadvantage industries.

When firms require external finance to fund their export activities, credit constraints would likely affect all of these margins of adjustment to trade reform. Continuing exporters would not be able to expand exports as quickly or introduce as many new product lines because of the associated fixed and variable costs of production and trade. It would also be more difficult

for new firms to begin exporting or for surviving exporters to enter new markets because such expansion would require substantial sunk costs. All of these distortions would be larger at lower levels of financial development and in financially vulnerable sectors that need more outside capital or have few collateralizable assets. One goal for future work should be to establish the magnitude and welfare implications of these distortions.

It is likely that any short-run response to trade liberalization would result from adjustments on the intensive margin, while the extensive margin would react with a lag. Experienced exporters should find it relatively easier to finance the variable costs of expanding exports of already traded products to tested export destinations. By contrast, introducing new products and entering new markets would entail additional fixed and sunk costs, which should be more difficult to fund. This matters because a delayed extensive-margin response to trade reform may be more costly than slower adjustment on the intensive margin, even holding the level of aggregate exports fixed. There is in fact evidence that, in response to trade liberalization, the reallocations across firms within an industry and across products within a firm are as important for aggregate productivity and welfare gains as reallocations across sectors.

A related concern is that financially underdeveloped countries not only have less external credit available, but also tend to allocate these funds less efficiently. In the framework of Section 2.1, more productive firms are less credit constrained because they are better positioned to incentivize investors and raise outside capital. In practice, firm productivity is imperfectly observed and poor financial contractibility is often associated with corruption and nepotism. These two forces may magnify the distortions caused by financial frictions in the adjustment to trade reform. If resources are sub-optimally directed towards firms with lower export potential, this will further reduce both the extensive and the intensive margins of trade.

The discussion so far ignores the fact that firms may invest in better technology to improve their productivity and export performance. Similarly, there may be market-specific quality standards which firms need to meet, or firms may choose to increase product quality to enhance their competitiveness. Such technological and quality upgrading is associated with sizable sunk costs, which credit constrained firms may not be able to incur. These aspects of the exporting decision and their welfare implications have yet to be explored by the trade and finance literature.

Another avenue for future research concerns the role of retailers and wholesalers. When liquidity-constrained firms are unable to directly export to a foreign market, they may use the services of an intermediary who specializes in international trade without engaging in manufacturing. These intermediaries likely have lower sunk and fixed costs of exporting because they can rely on established distribution networks. Moreover, trading companies may have easier access to external financing from domestic and foreign banks, as well as to trade credit from similar wholesalers in other countries with whom they have a standing trading relationship. This suggests that the (endogenous) presence of wholesalers could partially alleviate the distortions caused by credit constraints.

What about the effects of trade reform on a liberalizing country with underdeveloped financial markets? Heterogeneous-firm models predict that the least efficient domestic producers would exit because of increased foreign competition in the local market. While more productive firms would survive, they would face lower demand and reduce output. Credit frictions should be irrelevant for firm exit since they constrain only expansion but not downsizing. If the adjustment on the extensive margin increases the availability of external financing for surviving companies, they may in fact be able to expand production. In addition, if the liberalizing economy has strong financial contractibility, surviving firms may be able to invest in better technology or higher quality that makes them more competitive. Lastly, the removal of import restrictions may give final-good producers access to cheaper imported intermediate inputs. This could lower their production costs, and stimulate their domestic sales and foreign exports.

4.2 Relevant empirical evidence

Although no study has specifically examined the role of credit constraints in the adjustment to trade reform, a few papers offer some indirect evidence.

While Manova (2008) focuses on the effects of equity market liberalization on exports, she also confirms their robustness to controlling for trade reforms using the Wacziarg and Welch (2003) binary indicator.⁷ These sensitivity checks indicate that when countries reduce trade barriers, their exports rise relatively more in financially vulnerable sectors. This highlights a

⁷ A country is labeled effectively closed to trade if average tariff rates are at least 40%; non-tariff barriers cover at least 40% of trade; a black market exchange rate exists and is on average depreciated at least 20% relative to the official exchange rate; the state holds a monopoly on major exports; or there is a socialist economic system.

parallel between trade and financial liberalization: While trade reforms reduce trade costs for a given level of financial frictions, equity market reforms relax credit constraints for a given level of trade costs. In either case, the sectors that benefit most are those intensive in external finance or intangible assets, where credit constraints are more acute. Moreover, it appears that opening stock markets has a greater impact when trade policy is more restrictive. Since the proxy for trade openness is extremely rough, however, these results are only suggestive.

A few studies have also argued that credit constraints restrict firms' and countries' ability to respond to export opportunities arising from exchange rate depreciations. Becker and Greenberg (2007), for example, find that in financially advanced countries total exports are more sensitive to exchange rate movements than in countries at lower levels of financial development. Berman and Berthou (2009) provide similar evidence, and show that these effects are more pronounced in sectors which require more external finance. Desai, Foley and Forbes (2008) instead explore the advantage that foreign affiliates have over domestic firms because the former can access internal financing from the parent company. They confirm that the affiliates of U.S. multinationals abroad increase sales, assets and investment significantly more than local firms during and immediately after sharp depreciations. Unfortunately, data limitations do not allow the authors to directly examine how firm exports respond to currency crises. Further work on the adjustment to exchange rate fluctuations could shed more light on the importance of financial frictions for the response to trade reforms.

5 Conclusion

Credit constraints and underdeveloped financial institutions have been shown to affect aggregate trade flows and to restrict firms' participation in international trade. This suggests that financial frictions would likely also play an important role in firms', sectors' and countries' adjustment to trade reform. Future research is needed to understand these effects and establish their consequences for aggregate welfare.⁸

The results and intuition presented in this paper indicate that the gains from trade liberalization may be larger at higher levels of financial development. This implies that countries would respond more to export opportunities resulting from falling trade barriers if they

⁸ Do and Levchenko (2007) have suggested that financial markets may in fact develop endogenously in response to trade openness.

strengthened their domestic financial institutions and liberalized their equity markets and FDI policies. Trade flows may also be stimulated by government-provided subsidized loans and trade credit to exporting firms. Similarly, countries relaxing their own import restrictions might alleviate the effects of increased competition on local producers by pursuing financial sector reforms and facilitating credit access. In either case, the sooner the availability of external financing improves, the faster the response of aggregate trade and output would likely be, and the smoother the transition. While intuitive and appealing, these policy prescriptions remain tentative and their confirmation requires further research.

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