Finance, Comparative Advantage, and Resource Allocation*

Melise Jaud† Madina Kukenova‡ Martin Strieborny§

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Abstract

The paper examines the interplay between financial development and comparative advantage in shaping the survival of exporting firms on foreign markets. Exports suffering from comparative disadvantage (labour-intensive products from capital-abundant countries) survive shorter on the competitive US market. Crucially, the pattern is stronger if the exporting country has a well-developed banking system. This suggests a positive role for finance in pushing the manufacturing sector towards export composition congruent with the comparative advantage of a given country. A strong financial sector can thus mitigate misallocation of resources arising from inefficient exporting patterns.

Keywords: financial development, resource misallocation, comparative advantage

JEL classification: G21, O16, F11

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†Paris School of Economics and World Bank, mjaud@worldbank.org

‡University of Lausanne, madina.kukenova@unil.ch

§University of Michigan - Ann Arbor, mstriebo@umich.edu

1 Introduction

One of the most distinguishing features of economies or economic systems is their differing ability to allocate the available resources in an efficient way. Maybe surprisingly, the sources and consequences of resource misallocation have only recently come to the fore of the macroeconomic and development literature.[1] This new line of research usually focuses on the significant heterogeneity of marginal products or rates of returns to production factors within economies. Another important aspect of resource misallocation has so far not caught much attention: export patterns not congruent with the comparative advantage of a given country. The paper tries to fill this gap and examines the role of finance in attenuating such factor misallocation.

According to standard trade theory, specialization in production should be determined by the relative abundance of factors of production. This equalizes factor prices across countries, improving the national and international resource allocation. In practice, producers often export products not compatible with the comparative advantage, sometimes because of subsidies and other distortionary policies of their national governments. This pushes the domestic price of scarce factors even further above the world price, preventing optimal factor allocation. Agricultural policy of the EU would be one example of such subsidies-driven resource misallocation.

In the long run, factor and product markets will eventually force out the inefficient exporters, but this can be a lengthy process and in the meantime social costs occur. This paper provides evidence for disciplining effects of competitive product markets, but primarily examines the role of external debt as an additional check on inefficient exporting. Specifically, we look at the inefficient exporting patterns through the lens of the agency theories from the finance literature. Protracted exporting of a product not corresponding to the comparative advantage is rarely a profitable activity in the long run. However, managers sometimes pursue projects with negative net present value because their perquisites or even their job might depend on them. Debtholders can serve here as an external disciplining device, preventing managers to invest into poor projects (Jensen 1986, Stulz 1990, Hart and Moore 1995). A well-developed domestic financial system would then help to push the country's exports towards products congruent with its comparative advantage.

We empirically test this prediction by examining the export survival of different products from different countries on the US market. We find evidence that exports suffering from comparative disadvantage (e.g. labour-intensive products

[1] Seminal works in this area include Banerjee and Duflo (2005), Restuccia and Rogerson (2008) or Hsieh and Klenow (2009) among others. See also Bernard et al. (2010) and the references therein for a more microeconomic perspective on resource allocation.

from capital-abundant countries) exit the US market earlier than products congruent with the comparative advantage of the exporting country. This confirms the idea that highly competitive product markets in the United States force out exporters who fail to optimally use the resources available in their country. If the exporting country has a high share of bank credits to GDP, its products using the scarce factors exit the US markets even faster compared to products relying on the abundant factors. These results suggest that a strong banking sector can prevent a sub-optimal use of resources by enforcing an efficient export composition before the competitive foreign markets do so.

The paper contributes to two strands of literature. First, it introduces a new channel through which finance improves resource allocation in the real economy. Exports relying on scarce rather than abundant production factors represent an important facet of resource misallocation. The finance literature and the literature on resource misallocation in general have so far not paid much attention to this issue. The finance literature has traditionally focused on capital misallocation and its consequences for economic growth (Lang et al. 1996, Wurgler 2000). Using the trade framework of comparative advantage allows us to examine the role of finance in the broader context of resource allocation.[2]

Second, the paper contributes to the literature on the effects of financial factors on trade (Beck 2002, 2003; Ju and Wei 2005, Greenaway et al. 2007, Muûls 2008, Manova 2008, Manova et al. 2009). This recently growing line of research shows that financial development improves the export performance of a given country. Finance bolsters especially exports of those firms that come from financially vulnerable industries or face credit constraints. These are important results, but their implications for overall allocative efficiency might yet prove elusive. If the financially constrained firms disproportionately use the scarce factors of a given country, financial development could just reinforce inefficient exporting patterns with adverse allocative consequences. In contrast, our results imply that finance helps the firms on the "right side" of the comparative advantage.

The rest of this paper is structured as follows. In the next section we combine the agency approach from the finance literature with the intellectual framework of trade theory. This will provide motivation for our choice of data and estimation strategy presented in sections 3 and 4. Section 5 reports the empirical results. Section 6 briefly discusses some policy implications and concludes.

[2]Bernard et al. (2006, 2007) investigate the resource reallocation alongside the lines of comparative advantage following a trade liberalization. However, they do not examine the role of financial factors in their work.

2 Theoretical Motivation

The perquisites of many managers increase with the level of investment undertaken by their firm or organizational unit. This gives them incentive to invest even in projects with negative net present value projects, if the firm has cash flow exceeding funding needs of positive net present value projects. Jensen (1986) stresses the disciplining role of outside debt in counteracting the internal pressures to divert such "free cash flow" into unprofitable investments. Basically, the threat of possible failure to satisfy debt service payments pushes the managers toward efficient use of available resources. The ultimate insiders like managers can lose both their reputation and the control of "their" firm if the unpaid external debt triggers a bankruptcy procedure. Shareholders not happy with the dividend payments usually do not pose such severe and immediate threat to the entrenched managers.

From a broader perspective, the free cash flow theory is a prominent example of the agency approach in finance literature. Agency theories view managers as rational agents pursuing their own objectives. Consequently, managers' actions can contradict the interests of the owners or society as a whole. Stulz (1990) and Hart and Moore (1995) build upon the insights from Jensen (1986) and develop formal models about the disciplining role of external debt. Lang et al. (1996) and Wurgler (2000) focus on capital misallocation and provide empirical evidence along the lines of Jensen's theory. Our paper utilizes the agency approach to look at another important aspect of resource misallocation: exporting not congruent with the comparative advantage of the domestic economy.

Trade literature identifies two sources of comparative advantage. According to Heckscher-Ohlin theory countries should specialize in goods that use their abundant factors of production. In the Ricardian model countries export the products in which they possess relative advantage in total factor productivity. This paper focuses on the factor abundance as the main source of comparative advantage. This is a pragmatic choice motivated both by data availability and some recent results in trade literature. Morrow (forthcoming) finds some evidence that ignoring Heckscher-Ohlin forces can lead to biased tests of the Ricardian model. At the same time, Morrow documents that omitting Ricardian forces does not bias tests of Heckscher-Ohlin model, at least in his data.

Independently from a specific driving force behind the trade patterns, exporting activities are in our view particularly prone to the free-cash problem of managerial discretion. Business related to foreign markets involves both high level of additional spending and strong incentives for managers to overinvest. A long-term success in exporting requires considerable investment. It is not enough to build and maintain distribution channels in a foreign country. A firm often needs to adapt its whole production routine and marketing strategy to a different market, regulatory and cultural environment. Such investments will be efficiency-enhancing if

they lead to more trade and international division of labour in compliance with the principle of comparative advantage. However, rational managers might have an incentive to push also for exports that use the country's scarce factors and are therefore suboptimal from social point of view. A product manager can surely expect some additional perks if the firm sells "his" product also on foreign markets. Similarly, export status of a firm would be certainly not harmful for the status and benefits enjoyed by the firm's top management. The export-driven perquisites for managers can range from travelling abroad and spending time at luxury hotels to gaining a better access to domestic politicians who are eager to create national export champions.

Export subsidies might further skew the incentives towards inefficient exporting. Such subsidies could be (and often are) justified by the adverse effects of financial frictions on potential exporters. In the presence of capital market imperfections even promising firms might fail to secure up-front financing necessary for successful expansion into foreign markets. However, looking at the export promotion through the lenses of agency approach highlights possible costs of such government intervention. Export subsidies represent additional funds at managers' disposal that can worsen the problem of free cash flow.[3] Management can for example spend the government's funds to build up general export infrastructure (distribution networks, public relations activities on foreign markets) and then use it to sell also products using the scarce factors of domestic economy.

The example of export subsidies shows how combining the idea of comparative advantage with the insights from agency literature allows a more precise inference for allocative efficiency than in the standard finance-trade literature. We do not ask whether finance promotes exports of all credit-constrained or financially vulnerable firms. Our focus is rather on the allocative and selective role of external debtholders: Do they mitigate the resource misallocation by pushing the manufacturing sector towards exports congruent with the comparative advantage of a given country? To our knowledge so far only Berman and Héricourt (forthcoming) examine the selection role of finance with respect to exporting. They show that firm's productivity is an important determinant of export decision only after some threshold of financial development is reached.

Another benefit of our approach relates to endogeneity prevalent in the relationship between financial factors and export performance. Greenaway et al. (2007) find no evidence that firms with better ex-ante financial health are more likely to enter foreign markets. They do, however, find strong evidence that firms' financial health improves once they start exporting. This result poses serious chal-

[3]Blanchard et al. (1994) already showed that additional cash coming from won or settled lawsuits often lead to inefficient investment in accordance with agency models from finance literature.

lenge for studies examining whether financial development promotes exports of financially vulnerable firms. Looking at firm's productivity rather than its financial health solves the problem only partially. Subsidies or political connections can affect both productivity and export performance of a firm. By contrast the product's congruence with the comparative advantage of the exporting country is a technological characteristic. It measures the extent to which the product's manufacturing process uses up abundant versus scarce factors of a given economy. Presumably, neither the various political factors affecting export performance nor the export performance itself will alter the capital or labour intensity of a product.

The remaining conceptual issues concern the choice of appropriate proxies for the prominence of external debtholders in a given country and for the product's export performance. The original paper of Jensen describes the US reality and focuses therefore on the disciplining effects coming from the holders of corporate bonds. However, the argument goes through for all debtholders. The main source of debt financing in the most countries are financial intermediaries like banks. This is especially true for firms in developing countries where the risk of resource misallocation is the most severe. The disciplining role of financial intermediaries might be especially important in those developing countries that suffer from insufficient judicial quality. Banks rely in pursuing their rights on comparatively simple legal interventions that can be implemented even by mediocre courts. In contrast, minority investors put usually much heavier burden on the legal system when trying to enforce their rights (Shleifer and Vishny 1997). In this paper we therefore focus on banks and use the terms external debtholders and financial intermediaries interchangeably.

Regarding the suitable measure of export performance, we opted for products' survival on the US market. In our opinion a proper analysis of resource (mis)allocation requires a structural, long-term perspective rather than short-term, mercantilist point of view. Specifically, this paper uses the concept of comparative advantage and examines whether a well-developed financial system promotes products with good long-term prospects at the costs of the products whose exports are not sustainable in the long run. The product's survival on foreign markets is a natural measure of such sustainability. Our focus on the long-term optimality of resource allocation leads also here to a departure from the previous literature. The existing literature on finance and trade usually does not address the issue of export survival. When it does, the focus is on the short-term year-to-year changes in the export status of products or firms (Manova 2008, Berman and Héricourt forthcoming).

The formal survival analysis used in this paper also enables a closer look at the interplay between the disciplining forces of product markets and financial intermediaries. External debt is not the only way how to bridge a gap between

managers' decisions and the social optimum. It is the product markets that impose the ultimate constraint on managers using scarce resources in an inefficient way. Answering the question whether external debtholders improve upon the disciplining forces of product markets requires an export proxy shaped by such forces in the first place. Long-lasting competitive pressures will arguably have a significant impact on the long-term survival of products on foreign markets. In contrast, government interventions in exporting countries can increase the product entry to foreign markets. Volpe Martincus and Carballo (2008) show that export promotion works mostly via such extensive margin. This is also in accordance with the stated objective of export agencies.[4] However, most countries do not have enough resources to subsidize exports of non-competitive products indefinitely. At some point the competition on foreign markets will set in, making the products' export survival the most appropriate proxy in this context. This line of argument also dictates the choice of the United States as destination market. The product market in the USA is arguably the freest and the most competitive among the rich large economies.

To sum up, combining the agency approach with the concept of comparative advantage allows examining whether finance promotes exports in a way that improves the resource allocation. It also mitigates some endogeneity concerns when compared to the existing literature on finance and trade. Moreover, focusing on the export survival in a highly competitive US market permits a closer look at the interplay between disciplinary forces of domestic financial intermediaries and foreign product markets. We consider such interplay an issue of utmost importance. Competitive pressures on product markets represent namely a rather slow disciplining tool. Significant social costs associated with inefficient use of resources occur in the meantime (Jensen 1993). Showing that financial factors can improve upon this standard disciplining device would be therefore a novel and important result from the allocative point of view.

The next two sections presents in more detail our choice of data and estimation strategy.

3 Data

3.1 Distance to Comparative Advantage

From the data point of view the main challenge is to identify products that do not correspond to the comparative advantage of the exporting country. Our measure of the extent to which products use the scarce factors of exporting country is the

[4] Görg et al. (2008) provide some evidence that general government subsidies like R&D grants promote also the intensive margin of exports.

distance to comparative advantage ($distance_{ck}$), computed at the 6-digit level of the HS classification. Following Cadot et al. (forthcoming), the index compares the revealed factor intensity of a product with the factor endowment of the exporting country using an Euclidean distance formula. Omitting the time index, the formula for the distance of product k to the comparative advantage of country c for any given year writes:

$$distance_{ck} = \sqrt{std(\kappa_c - \hat{\kappa}_k)^2 + std(h_c - \hat{h}_k)^2}$$

where κ_c and h_c are endowments of physical and human capital of country c, and $\hat{\kappa}_k$, $\hat{h}_k$, are the corresponding revealed factor intensities of product k. We use the standardized absolute differences between the product factor intensities and the country factor endowments, with mean 0 and standard deviation 1. The data on national factor endowments are from Cadot et al. (2009). The stock of physical capital per capita is constructed according to the perpetual inventory method. Human capital per worker is calculated from the average years of schooling in a country using attainment data.

The product revealed factor intensities of product k are from Cadot et al. (2009). They are calculated as weighted averages of the factor endowments of the countries exporting this product. That is, the revealed physical capital intensity of good k is calculated as:

$$\hat{\kappa}_k = \sum\nolimits_c \omega_{ck} \ \kappa_c$$

where κ_c is country c's capital/labor endowment, and the weights are given by $\omega_{ck}=\frac{X_k^c/X^c}{\sum_c X_k^c/X^c}$ with X denoting exports. That is, ω_{ck}, is a variant of the Balassa index of revealed comparative advantage. The revealed human capital intensity of product k is calculated in a similar way, with h_c being the human-capital endowment of country c:

$$\hat{h}_k = \sum\nolimits_c \omega_{ck} h_c$$

3.2 Other variables

As our theoretical motivation stresses the disciplining role of external debtholders, we use the private credit to GDP as a proxy for country's financial development (FD_c). The data are from the widely used database by Beck et al. (2000), which contains various indicators of financial development across countries and over time. The annual data for GDP per capita is taken from the World Development Indicator report 2006, and is reported in constant 2000 US dollars. Financial development and GDP per capita are correlated at 61%.

In our analysis we control for the fact that financial development may facili-

tate export survival by reducing the costs of external finance to exporters. We use the interaction between financial development and external finance dependence. Industry-level measures of external capital dependence for ISIC 4-digit sectors come from Raddatz (2006) and are based on U.S. firms financial data from Compustat. The indicator of a sector's reliance on outside finance is defined as the ratio of capital expenditures minus cash flow from operations to capital expenditures for the median firm in each industry taking the average across years.

Similarly, we interact exporting countries' endowments of physical and human capital with corresponding factor intensities at industry level. The sector ISIC 4-digit factor intensities come from Romalis (2004). The human capital intensity is computed as the ratio of non-production workers to the total employment in each industry. Intensity in physical capital is measured as 1 less the share of total compensation in value added. Both factor intensities are then adjusted to reflect the share of raw materials.

We compute the export survival in the US market and the remaining product-related variables from the BACI[5] dataset developed by the CEPII and described in Gaulier and Zignago (2009). The dataset provides harmonized bilateral trade flows for more than 5,000 HS 6-digit products and 143 countries, over the 1988-2005 period. In the following, we focus on the 1995-2005 period due to the high number of missing values before 1994, and consider only exports of manufactured products and tobacco to the USA.[6] Export flows are reported annually in values (US dollars) and quantities. This highly detailed level of information is particularly suitable for survival analysis as aggregation may introduce considerable bias, essentially hiding failures.

The product-related variables include the value of export in US dollars in the initial year of the trade relationship in logs ($initial\_export_{ck}$). This reflects the level of confidence US importers have in the profitability of their trading partner. Additionally, we include the total export value of product k from country c in the initial year of the trade relationship, $total\_export_{ck}$, in log terms. This allows to control for the experience the exporting country has in supplying the world market with product k. We control for the degree of competition for a given product on the US market, incorporating the number of countries exporting product k to the USA in the initial year of the trade relationship, $NSuppliers_k$. Finally we account for trade relationships with multiple spells, including a multiple spell dummy that take value one if the spell is a higher order spell, $multiple\_spell_{ck}$.

Our final database contains 71 countries exporting to the USA (see Appendix

[5]BACI is the French acronym for "Base pour l'Analyse du Commerce International": Database for International Trade Analysis. See http://www.cepii.fr/anglaisgraph/bdd/baci.htm.

[6]We are using BACI in HS from 1992 that covers the period 1994-2005. As the survival analysis relies on the length of export spells, we cannot use the data from the initial year. This leaves us with the data for 1995-2005 available for survival analysis.

A).

4 Empirical Strategy

This paper investigates the disciplining forces of external debtholders and product markets with regard to the long-term misallocation of resources. For this reason we have opted for the empirical framework of survival analysis. This allows us to focus on the long-term sustainability of trade relationships, rather than examining the short-term year-to-year changes in export flows. In our case the duration of a trade relationship represents the number of years during which country c exports product k to the USA without interruption. In other words, it captures how long such a product survives on the highly competitive US market. Ordinary Least Squares (OLS) estimation is not suitable for duration data, as the survival-times are restricted to be positive and thus have a skewed distribution. Survival analysis allows to examine the relationship between the survival-times distribution and some covariates of interest. The survival function gives the probability that a trade relationship will survive past time t. Conversely, the hazard function $h(t)$ assesses the instantaneous risk of demise at time t, conditional on survival till that time. Formally, let $T \geq 0$, denote the survival-time (length) of a trade relationship, with covariates X, then the hazard rate $h(t)$, is given by:

$$h(t|X) = \lim_{\Delta t \to 0} \frac{\Pr[(t \leq T < t + \Delta t)|T \geq t, X]}{\Delta t}$$

Alternatively, in discrete time:

$$h(t|X) = \Pr(T = t|T \geq t, X), t = 1, 2, ...$$

4.1 The Cox Proportional Hazard Model

We estimate the hazard rate for our trade relationships data using a Cox Proportional Hazard (PH) model (Cox 1972). The Cox PH model is broadly applicable and the most widely used method for survival analysis. The hazard function for a given product k exported from country c with covariates $X = \{x_1, x_2, ...x_j, ..x_n\}$:

$$h(t \mid X) = h_0(t) \exp(X.\beta)$$

is defined as the product of a baseline hazard function, $h_0(t)$, common to all observations and a parametrized function $\exp(X.\beta)$ with a vector of parameters β. The form of the baseline hazard function characterizes how the hazard changes as a function of time. The covariates X affect the hazard rate independently of time.

The model offers some convenient features. It makes no assumptions about the form of the underlying baseline function. Additionally, the relationship between the covariates and the hazard rate is log-linear, allowing for a straightforward interpretation of the parameters. Increasing x_j by 1, all other covariates held constant, affects the hazard function by a factor of $exp(\beta_j)$ at all points in time. It shifts all points of the baseline hazard function by the same factor. Parameter estimates in the Cox PH model are obtained by maximizing the partial likelihood as opposed to the likelihood for an entirely specified parametric hazard model (Cox, 1972). Resulting estimates are not as efficient as maximum-likelihood estimates, however no arbitrary, and possibly incorrect, assumptions about the form of the baseline hazard are made.

4.2 Empirical Specifications

We use the Cox proportional hazard model to analyze the export duration of product k from country c to the USA. This enables us to investigate whether competitive US market and financial development in exporting countries shape export survival according to the idea of comparative advantage. The empirical model we estimate writes:

$$\begin{aligned} h(t|X_{ckt_0}, \eta_k \;\; &= \;\; j) = h_j(t) \exp[\beta_1 distance_{ckt_0} + \beta_2 FD_{ct_0} * distance_{ckt_0} + \\ &+ \gamma Controls_{ckt_0} + \delta_c \; + \delta_{t_0} + \varepsilon_{ckt_0}] \end{aligned} \tag{1}$$

where FD_{ct_0} is the level of financial development in country c and $distance_{ckt_0}$ is the Euclidean distance of product k from comparative advantage of country c. A positive estimated coefficient β_1 would indicate that products not congruent with the comparative advantage of the exporting country face a higher hazard rate in the competitive US market. A positive coefficient β_2 would suggest that strong financial intermediaries can push the export composition towards the comparative advantage of a given country before the competition in a foreign market sets in. $Controls_{ckt_0}$ represents a vector of control variables and ε_{ckt_0} is the error term. All time-varying explanatory variables are measured in the initial year of the trade relationship t_0.

In the Cox PH model, the inclusion of fixed effects results in a shift of the baseline hazard function. The country fixed effects δ_c control for a wide array of observable and unobservable characteristics of the exporting countries that might affect the chances of their products to survive in the US market. These include factors like physical and cultural proximity to the USA, common border, common language etc. The time fixed effects δ_{t_0} control for the possibility that the initial conditions in the first year of exports might influence the products' chances for

subsequent survival in the US market.

Furthermore, we allow the shape of the baseline hazard function $h_j(t)$ to vary across industries by fitting a stratified Cox PH model. Stratification according to the industry indicator variable η_k adds more flexibility to the model and allows to estimate the effect of the regressors on the hazard rate within-industry. In equation (1) strata variable is industry j, allowing the baseline hazard function $h_j(t)$ to vary across 118 industries according to the ISIC 4-digit classification.

Alternatively, one can stratify the Cox PH model according to the product indicator variable:

$$\begin{aligned} h(t|X_{ckt_0}, \eta_k \;\; &= \;\; k) = h_k(t) \exp[\beta_1 distance_{ckt_0} + \beta_2 FD_{ct_0} * distance_{ckt_0} + \\ &+ \gamma Controls_{ckt_0} + \delta_c \; + \delta_{t_0} + \varepsilon_{ckt_0}] \end{aligned} \tag{2}$$

This stringent specification allows for a different baseline hazard function $h_k(t)$ for every of the 4562 analyzed products from the HS 6-digit classification.

Because our measure of financial development varies at the country.time level[7], we report in all tables robust standard errors clustered at the country.time level as well, in order to avoid biasing the standard errors downwards.[8] The coefficients can be interpreted as semi-elasticities, as they measure the effect of a change in the right-hand side variables on the log of the hazard rate. As in standard OLS, the identification of our main coefficient relies on the assumption of orthogonality between the interaction term and the residual. Available credit in the economy expands in anticipation of future growth opportunities. Thus, using the level of credit to GDP as a proxy for financial development may introduce a potential endogeneity bias. However, the bias should not be significant, given our variable on the left-hand side is the length of the trade relationships and not the annual volume of export. Additionally, we take all explanatory variables, including the level of financial development, at the initiation of the trade relationship.

Finally, if a product k exported by country c appears more than once in the dataset, it exhibits what is referred to as multiple spells of service. Such multiple

[7] Time being the year of the initiation of the export spell.

[8] Failure to account for multi-way clustering may lead to massive underestimation of standard errors and consequent over-rejection of null hypothesis. In our case, the possibility of clustered standard errors may remain even after controlling for fixed effects (Bertrand et al. 2004). We have also experimented with the two-way clustering following the procedure by Cameron et al. (2006). The idea there is based on three variance matrices: the first one is computed using clustering according to country, the second one is based on clustering according to time and the third one uses clustering alongside country.time dimension. The final variance matrix is the sum of first and second matrix, minus the third one. In our case the resulting matrix is negative, suggesting that there might actually be no need to cluster in more than one dimension (Cameron et al. 2006, p. 9).

spells within a given trade relationship represent 52% of our observations and may not be independent. The first exit can make the second one more likely to occur. Inversely, an exporter might learn from the initial failure and manages to survive longer in a subsequent trade relationship. We therefore include a dummy variable to account for higher order spells.

5 Empirical Results

In Table 1 we take a first look at the interplay between disciplinary pressures from product markets and external debtholders towards exporting patterns congruent with the idea of comparative advantage. The dependent variable is the probability of exiting the US market (hazard rate, in the terminology of survival analysis) for product k exported from country c. All regressions control for country and time fixed effects. The estimations in Table 1 allow for different baseline hazard across industries by defining industry as strata variable.

[Table 1 about here]

The first column focuses on the disciplining impact of competitive product markets. Here the variable of interest is the distance of exported product from the comparative advantage of the country of origin ($distance_{ck}$). The positive and significant impact of this variable on the hazard rate confirms the importance of competitive foreign markets in enforcing an optimal allocation of resources. Products excessively using the scarce factors of the exporting country face a significantly higher probability of failure in the US market. Moving to our control variables, the value of export to the US ($initial\_export_{ck}$) and the total value of exports to all destination markets ($total\_export_{ck}$) in the initial year of export spell both decrease the hazard rate. Intuitively, products survive longer on the US market when the importers are willing to accept a higher initial shipment and when the exporting country has experience with placing the products in other markets as well. The coefficient for the multiple spell dummy ($multiple\_spell_{ck}$) is positive and significant, suggesting a higher risk of failure for products that repeatedly exit and re-enter the US market. The last product-related variable ($NSuppliers_k$) has a negative impact on the hazard rate. This result is rather counter-intuitive, as the number of exporting countries serving the US market with given product should proxy for the strength of foreign competition. The effect of the GDP per capita of the exporting country (GDP_c) has no significant effect in this specification.

The second column of Table 1 is our baseline specification. It examines whether domestic financial intermediaries provide an additional check on inefficient exporting. The regressors now also include the ratio of private credit over GDP in the

exporting country and an interaction term between this measure and the distance of exported product to its country's comparative advantage. Strong financial intermediaries should in general help the exporters to survive on foreign markets. Domestic financial development (FD_c) indeed somewhat lowers the hazard rate, but this direct effect is not statistically significant. By contrast, the interaction term between finance and distance to comparative advantage ($FD_c{*}distance_{ck}$) has a positive and statistically significant impact on the hazard rate. The same applies for the direct effect of distance to comparative advantage ($distance_{ck}$). Interpreting both coefficients together, external debtholders push the exporters to cease exploiting country's scarce factors and to abandon products that are facing an uphill battle on foreign markets. With regard to our control variables, GDP per capita of the exporting country has now a positive and significant effect on the hazard rate. This result might appear counter-intuitive at first sight. However, two features of our estimations strategy provide an explanation. First, we control for country fixed effects in all regressions. The effect of GDP is thus identified solely from variations within countries over time. Such variations emerge both from growth trend and from business cycle fluctuations. Second, we measure all time-varying regressors in the first year of trade relationships. Economically, the positive estimated coefficient for GDP_c would then imply that exports initiated at the peak of a business cycle face higher risk of failure. Possible reasons for such effect include over-confidence of exporters during a boom or difficulties to maintain the costly presence in foreign markets once the business climate at home deteriorates. The next three columns control for additional channels affecting the survival on foreign markets that could be correlated with our mechanism.

In the third column we add interaction terms between exporting countries' factor endowments and the sectors' corresponding factor intensities. This controls for the possibility that products from industries extensively using physical or human capital survive longer on foreign markets if the exporting country is abundant in such capital. When adding these interaction terms we also control for direct effect of countries' factor endowments (κ_c, h_c), while the direct effect of factor intensities ($CapInt_j$, $HumInt_j$) is captured by the industry strata effects. Our main interaction term capturing the disciplining effects of external debtholders ($FD_c{*}distance_{ck}$) maintains positive and statistically significant coefficient. Similarly, the direct effect of distance to comparative advantage ($distance_{ck}$) still translates into a higher hazard rate of exports, confirming the disciplining impact of a competitive foreign market. The human capital interaction term ($h_c{*}HumInt_j$) has the expected negative sign, while the direct effects of factor endowments are insignificant. The physical capital interaction ($\kappa_c{*}CapInt_j$) has a positive sign, suggesting that capital-intensive products from capital-abundant countries face a higher risk of exit from a foreign market. This rather counter-intuitive result is

similar to Manova (2008) who finds a negative effect of this interaction term on export volume.[9]

In the fourth column we control for an alternative channel from finance to export survival. The seminal paper of Rajan and Zingales (1998) emphasizes the beneficial implications of financial development for industries dependent on external finance. Jaud et al. (2009) confirm the relevance of this mechanism in the context of export survival. We therefore include the interaction between industry's dependence on external finance and country's financial development ($ExF_j{*}FD_c$) into our set of regressors. The significant disciplining effects of foreign product markets and domestic debtholders on products not congruent with the comparative advantage of exporting country ($distance_{ck}$, $FD_c{*}distance_{ck}$) are not affected by this additional variable. The estimated coefficient for the control itself ($ExF_j{*}FD_c$) is negative and significant. This confirms the findings of Jaud et al. (2009) who show that financial development promotes export survival for financially vulnerable industries requiring a higher external financing to maintain their operations. The effect of financial development on export survival remains insignificant, while the direct effect of industry's dependence on external finance (ExF_j) is captured by the industry strata effects.

Another bias might arise due to high correlation between countries' financial and overall economic development. Rather than the disciplining effects of external debtholders, our main interaction term ($FD_c{*}distance_{ck}$) can simply represent the impact of some unobservable feature of rich countries that prevents inefficient resource use for unpromising exports. In the fifth column of Table 1 we therefore control for the interaction term of product's distance to comparative advantage with exporting country's GDP per capita ($GDP_c{*}distance_{ck}$). This new variable turns out to be not significant. However, our two main variables capturing the disciplining effects of product markets and external debtholders ($distance_{ck}$, $FD_c{*}distance_{ck}$) lose their significance as well. Our controls in Table 1 are thus not sufficient to enable a clear-cut identification of various disciplining forces affecting the export survival, while controlling for the highly correlated levels of financial and economic development. To address this problem we are going to examine the disciplining effects of foreign product markets and domestic debtholders within a more stringent econometric specification.

Table 2 presents the results of such rigorous specification. The strata variable is not the industry corresponding to exported product any more, but the product itself. This allows for a different baseline hazard function for every of the 4,562 products included in the estimation. In other respects the five columns correspond

[9]The theoretical results in Bernard et al. (2007) might offer an explanation. In their model, creative destruction captured by steady-state firm failure is highest in the comparative advantage industry.

to the estimations from Table 1.

[Table 2 about here]

Concerning our main focus on the interplay between disciplining forces of foreign product markets and domestic debtholders, the first four columns confirm in qualitative terms the results from Table 1. Both distance to the comparative advantage ($distance_{ck}$) and the interaction of this variable with the financial development in the country of origin ($FD_c{*}distance_{ck}$) maintain positive and significant impact on the hazard rate of products exported to the USA. Quantitatively, the point estimate and level of significance for the main interaction term increase after controlling for product strata effects.

The main qualitative difference occurs in the fifth column that controls for the interaction between distance to comparative advantage and economic development in the exporting country ($GDP_c{*}distance_{ck}$). In contrast to Table 1, the main interaction term capturing the disciplining impact of external debtholders ($FD_c{*}distance_{ck}$) has now a positive and significant effect on a product's exit probability in the US market. However, the distance to comparative advantage ($distance_{ck}$) still fails to affect the hazard rate in a significant way. These results provide a strong support for the relevance of Jensen's free cash flow theory in the context of resource misallocation due to inefficient export patterns. Between competitive foreign markets and external debtholders, the latter seem to be the more robust force behind pushing the exporting sector towards an efficient use of available factors of production. The interaction of distance to comparative advantage with the GDP per capita ($GDP_c{*}distance_{ck}$) is also insignificant. This provides additional support for our theoretical channel. It is the disciplining impact of banking system rather than some general feature of rich countries that prevents resource misallocation in form of exports relying on scarce factors of the domestic economy.

The stringent econometric specification underlying Table 2 yields also two changes regarding our control variables. First, the proxy for the strength of foreign competition on the US market ($NSuppliers_k$) has now the right sign, increasing the products' hazard rate. Second, financial development (FD_c) has now a significantly negative direct effect on the hazard rate in the second and third column. However, this significance disappears once we control for an interaction between industries' dependence on external finance and countries' financial development ($ExF_j{*}FD_c$) in the last two columns. This could suggest that the disciplining influence of the external debtholders ($FD_c{*}distance_{ck}$) and their support for financially vulnerable industries ($ExF_j{*}FD_c$) already account for the greater part of financial forces affecting products' survival on foreign markets. However, we

do not want to push too strong for such an interpretation. We identify the direct impact of financial development namely from variations within countries over time due to the presence of country fixed effects in our specifications.

Our theoretical motivation stresses the disciplining influence of debtholders as the channel through which finance prevents misallocation of resources. We have therefore chosen the ratio of private credit over GDP as our measure of financial development. Table 3 further confirms the relevance of our theoretical reasoning. Here we repeat the estimations of columns (2) to (4) of Table 2, but in the main interaction term we replace the private credit over GDP with the ratio of stock-market capitalization over GDP. A positive coefficient for the resulting variable ($StM_c{*}distance_{ck}$) would suggest that shareholders are also able to prevent managers from exports violating the principle of comparative advantage. The results in Table 3 do not support this hypothesis. The interaction term between stock-market capitalization and distance to comparative advantage is never significant and sometimes even enters the regression with the wrong sign. The comparison between Tables 2 and 3 thus confirms the pivotal disciplining role of external debtholders.[10]

[Table 3 about here]

Table 4 provides a series of robustness checks to our main results. The point of departure is the fifth column of Table 2 representing our most stringent specification. In the first column of Table 4 we drop all observations from islands often specializing in exports of only a few products (see Appendix B for details). The reported results are qualitatively the same as in the last column of Table 2. In particular, the debtholders ($FD_c{*}distance_{ck}$) still seem to be the dominant disciplining factor preventing long-term resource misallocation in form of inefficient export patterns. The impacts of both competition on the US product market ($distance_{ck}$) and economic development in the exporting country ($GDP_c{*}distance_{ck}$) are not significant. Our results are thus not driven by small countries in the sample.

Columns (2) to (4) of Table 4 examine the robustness of our results to alternative ways of computing the proxy for distance of product k from comparative advantage of exporting country c. In the second column we replace the Euclidean distance with the absolute distance.[11] The results remain qualitatively the same.

[10] We have also re-run the estimations of columns (2) to (4) from Table 1 with the stock market interaction ($StM_c{*}distance_{ck}$). The results are qualitative the same. The variable never enters the regression significantly.

[11] The formula for distance of product k from comparative advantage of exporting country c thus writes: $distance_{ck} = |std(\kappa_c - \hat{\kappa}_k)| + \left|std(h_c - \hat{h}_k)\right|$

In the third and fourth column we add arable land per worker as a third production factor when computing the distance to comparative advantage. We use Euclidean distance in column (3) and absolute distance in column (4). Adding the third production factor further increases the significance for our main interaction term ($FD_c{*}distance_{ck}$). At the same time the direct effect of distance to comparative advantage on hazard rate of exports ($distance_{ck}$) remains insignificant.

In the fifth column of Table 4 we strengthen our control of omitted variables. Specifically, we stratify the Cox PH model according to product-time indicator variable. The baseline hazard function $h_{kt_0}(t)$ can now differ for every export spell of product k that started at time t_0. This controls for the possibility that the initial conditions in the US product market vary both across products and time. Such initial conditions can affect the products' chances for subsequent survival. A typical example is the degree of competition on the US market in the initial year of trade relationships proxied by $NSuppliers_k$. The product-time strata effects capture the effect of this variable as well as of all other possibly unobservable product-specific initial conditions on the US product market. The results for our two main variables ($FD_c{*}distance_{ck}$, $distance_{ck}$) remain unchanged by this additional stringency of the estimation. The significance for our main interaction term ($FD_c{*}distance_{ck}$) is now even higher compared to the last column of Table 2.

[Table 4 about here]

6 Conclusion

This paper provides evidence for the allocative and disciplining role of finance. Banks do not promote export in a sweeping non-discriminate way. They rather push the exporting sectors towards the use of countries' abundant factors, in compliance with the idea of comparative advantage. A well-developed financial system can thus enforce an efficient export composition before the competitive foreign markets do so. In this way finance prevents inefficient export patterns with positive impact on national and international allocation of scarce resources.

These results entail some interesting policy implications. According to the conventional wisdom export promotion serves as a remedy for the prevailing financial frictions. In the absence of government interventions, the argument goes, capital market imperfections might prevent firms from exploiting potentially good export opportunities. If the aim is to improve the short-run export performance of credit-constrained firms, then traditional export promotion might indeed be a good substitute for financial development. It is less clear whether government can replace the role that finance plays in pushing the country's export composition toward its

comparative advantage. If the financially vulnerable firms disproportionately use scarce factors, export promotion might even reinforce inefficient export patterns and worsen the resource allocation.

Governments eager to promote exports might therefore consider supporting financial development first. A strong domestic financial system will then provide right incentives for the manufacturing sector to focus on exports that are sustainable in the long-run. This approach could dominate both the across-the-board export promotion and the trials to pick up the winners on foreign markets directly by the government.

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Appendix A: Full sample of countries exporting to the USA

Argentina; Australia; Austria; Bangladesh; Benin; Bolivia; Brazil; Cameroon; Canada; Chile; China; Colombia; Congo; Costa Rica; Denmark; Dominican Republic; Ecuador; Egypt; El Salvador; Finland; France; Gambia; Germany; Ghana; Greece; Guatemala; Haiti; Honduras; India; Indonesia; Ireland; Italy; Jamaica; Japan; Jordan; Kenya; Korea; Malawi; Malaysia; Mali; Mauritius; Mexico; Mozambique; Nepal; Netherlands; New Zealand; Nicaragua; Niger; Norway; Pakistan; Panama; Paraguay; Peru; Philippines; Portugal; Rwanda; Senegal; Spain; Sri Lanka; Sweden; Switzerland; Thailand; Togo; Trinidad and Tobago; Tunisia; Turkey; United Kingdom; Uruguay; Venezuela; Zambia; Zimbabwe

Appendix B: Microstate islands dropped in the column (1) of Table 4

Dominican Republic; Haiti; Jamaica; Mauritius; Trinidad and Tobago

Table 1: Debtholders and Comparative Advantage I

The dependent variable is the hazard rate on the US market for a export relationship of product k from country c and industry j. All regressions are estimated using the Cox Proportional Hazard Model (Cox 1972) and control for country and time fixed effects. Estimations also allow for different baseline hazard across industries by defining industry j as strata variable. Our main variables of interest are ($distance_{ck}$): distance of product k from comparative advantage of exporting country c, and (FD_c*$distance_{ck}$): interaction between this variable and financial development in country c proxied by private credit over GDP (FD_c). The control variables include direct and interacted effects of GDP per capita of country c (GDP_c), dependence of industry j on external finance (ExF_j), countries´s endowments of physical (κ_c) and human capital (h_c), corresponding factor intensities at industry level ($CapInt_j$, $HumInt_j$), initial export value to the USA ($initial\_export_{ck}$), total export value to the world market ($total\_export_{ck}$), number of countries exporting product k to the USA ($NSuppliers_k$), and a dummy variable taking value one if the spell is a higher order spell ($multiple\_spell_{ck}$). Robust standard errors clustered at (exporting country)*time level are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
$distance_{ck}$	0.126***	0.102***	0.077***	0.080***	0.062
	(0.007)	(0.013)	(0.012)	(0.012)	(0.071)
FD_c*$distance_{ck}$		0.041**	0.042**	0.035**	0.032
		(0.016)	(0.017)	(0.016)	(0.022)
GDP_c*$distance_{ck}$					0.002
					(0.009)
ExF_j*FD_c				-0.184***	-0.184***
				(0.035)	(0.034)
κ_c*$CapInt_j$			0.794***	0.706***	0.705***
			(0.139)	(0.141)	(0.140)
h_c*$HumInt_j$			-0.084***	-0.076***	-0.076***
			(0.009)	(0.009)	(0.009)
κ_c			-0.040	-0.034	-0.034
			(0.111)	(0.111)	(0.111)
h_c			0.078	0.069	0.069
			(0.065)	(0.065)	(0.065)
FD_c		-0.035	-0.038	0.014	0.017
		(0.036)	(0.040)	(0.039)	(0.043)
GDP_c	0.141	0.235**	0.289**	0.292**	0.289**
	(0.099)	(0.103)	(0.115)	(0.115)	(0.115)
$initial\_export_{ck}$	-0.084***	-0.084***	-0.085***	-0.085***	-0.085***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$total\_export_{ck}$	-0.104***	-0.105***	-0.104***	-0.104***	-0.104***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$NSuppliers_k$	-0.020***	-0.020***	-0.020***	-0.020***	-0.020***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$multiple\_spell_{ck}$	1.024***	1.013***	1.045***	1.045***	1.044***
	(0.090)	(0.091)	(0.094)	(0.094)	(0.094)
Observations	220041	211643	191078	191078	191078

Table 2: Debtholders and Comparative Advantage II

The dependent variable is the hazard rate on the US market for a export relationship of product k from country c and industry j. All regressions are estimated using the Cox Proportional Hazard Model (Cox 1972) and control for country and time fixed effects. Estimations also allow for different baseline hazard across products by defining product k as strata variable. The variables are defined in Table 1. Robust standard errors clustered at (exporting country)*time level are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
$distance_{ck}$	0.145***	0.109***	0.080***	0.084***	0.048
	(0.008)	(0.014)	(0.013)	(0.013)	(0.081)
FD_c*$distance_{ck}$		0.068***	0.064***	0.052***	0.049**
		(0.018)	(0.019)	(0.018)	(0.022)
GDP_c*$distance_{ck}$					0.004
					(0.010)
ExF_j*FD_c				-0.226***	-0.227***
				(0.036)	(0.036)
κ_c*$CapInt_j$			1.011***	0.887***	0.882***
			(0.167)	(0.170)	(0.170)
h_c*$HumInt_j$			-0.098***	-0.089***	-0.089***
			(0.010)	(0.011)	(0.010)
κ_c			0.035	0.043	0.041
			(0.107)	(0.107)	(0.107)
h_c			0.105	0.096	0.095
			(0.066)	(0.066)	(0.066)
FD_c		-0.081**	-0.082*	-0.015	-0.010
		(0.039)	(0.043)	(0.042)	(0.045)
GDP_c	0.207**	0.312***	0.332***	0.335***	0.331***
	(0.096)	(0.100)	(0.112)	(0.112)	(0.113)
$initial\_export_{ck}$	-0.091***	-0.091***	-0.093***	-0.093***	-0.093***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$total\_export_{ck}$	-0.121***	-0.121***	-0.120***	-0.120***	-0.120***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$NSuppliers_k$	0.007***	0.006***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$multiple\_spell_{ck}$	1.026***	1.014***	1.033***	1.033***	1.033***
	(0.083)	(0.084)	(0.084)	(0.084)	(0.084)
Observations	220041	211643	191078	191078	191078

Table 3: Shareholders and Comparative Advantage

The dependent variable is the hazard rate on the US market for a export relationship of product k from country c and industry j. All regressions are estimated using the Cox Proportional Hazard Model (Cox 1972) and control for country and time fixed effects. Estimations also allow for different baseline hazard across products by defining product k as strata variable. Financial development of country c is captured by the ratio of stock market capitalization over GDP (StM_c) rather than private credit over GDP Other variables are defined in Table 1. Robust standard errors clustered at (exporting country)*time level are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
$distance_{ck}$	0.147***	0.108***	0.113***	0.035
	(0.012)	(0.011)	(0.011)	(0.081)
StM_c*$distance_{ck}$	0.005	0.006	-0.008	-0.012
	(0.014)	(0.013)	(0.013)	(0.013)
GDP_c*$distance_{ck}$				0.009
				(0.009)
ExF_j*StM_c			-0.209***	-0.212***
			(0.031)	(0.031)
κ_c*$CapInt_j$		0.851***	0.737***	0.728***
		(0.195)	(0.194)	(0.194)
h_c*$HumInt_j$		-0.118***	-0.108***	-0.108***
		(0.011)	(0.011)	(0.011)
κ_c		-0.051	-0.036	-0.039
		(0.119)	(0.119)	(0.119)
h_c		0.076	0.068	0.066
		(0.066)	(0.066)	(0.066)
StM_c	0.026	0.024	0.088***	0.093***
	(0.028)	(0.030)	(0.032)	(0.032)
GDP_c	0.193*	0.271**	0.271**	0.262**
	(0.112)	(0.132)	(0.133)	(0.133)
$initial\_export_{ck}$	-0.093***	-0.096***	-0.096***	-0.096***
	(0.005)	(0.005)	(0.005)	(0.005)
$total\_export_{ck}$	-0.126***	-0.124***	-0.124***	-0.124***
	(0.003)	(0.004)	(0.004)	(0.004)
$NSuppliers_k$	0.008***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
$multiple\_spell_{ck}$	1.076***	1.101***	1.101***	1.101***
	(0.091)	(0.092)	(0.092)	(0.092)
Observations	203649	182592	182592	182592

Table 4: Robustness Checks

The dependent variable is the hazard rate on the US market for a export relationship of product k from country c and industry j. All regressions are estimated using the Cox Proportional Hazard Model (Cox 1972). Estimations in columns (1) to (4) control for country and time fixed effects and allow for different baseline hazard across products by defining product k as strata variable. Estimation in column (5) controls for country fixed effects and defines product*time as strata variable. Column (1) drops observations from islands specializing in export of only few products, columns (2) to (4) examine robustness to alternative ways of computing ($distance_{ck}$): distance of product k from comparative advantage of exporting country c. The variables are defined in Table 1. Robust standard errors clustered at (exporting country)*time level are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
$distance_{ck}$	0.028	0.021	0.080	0.025	-0.072
	(0.083)	(0.057)	(0.085)	(0.052)	(0.097)
FD_c*$distance_{ck}$	0.044**	0.034**	0.070***	0.045***	0.067***
	(0.022)	(0.016)	(0.023)	(0.014)	(0.021)
GDP_c*$distance_{ck}$	0.007	0.004	-0.001	0.002	0.019
	(0.010)	(0.007)	(0.010)	(0.006)	(0.012)
ExF_j*FD_c	-0.218***	-0.227***	-0.229***	-0.225***	-0.220***
	(0.036)	(0.036)	(0.035)	(0.035)	(0.039)
κ_c*$CapInt_j$	0.901***	0.885***	0.923***	0.915***	0.830***
	(0.170)	(0.170)	(0.172)	(0.171)	(0.181)
h_c*$HumInt_j$	-0.092***	-0.090***	-0.099***	-0.097***	-0.096***
	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)
κ_c	-0.032	0.037	0.049	0.046	0.022
	(0.107)	(0.107)	(0.108)	(0.108)	(0.113)
h_c	0.085	0.100	0.100	0.100	0.123*
	(0.065)	(0.066)	(0.068)	(0.067)	(0.067)
FD_c	-0.010	-0.007	-0.065	-0.066	-0.023
	(0.046)	(0.045)	(0.053)	(0.052)	(0.053)
GDP_c	0.427***	0.331***	0.333***	0.327***	0.360***
	(0.111)	(0.113)	(0.112)	(0.112)	(0.100)
$initial\_export_{ck}$	-0.095***	-0.093***	-0.093***	-0.093***	-0.104***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$total\_export_{ck}$	-0.124***	-0.120***	-0.120***	-0.120***	-0.130***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
$NSuppliers_k$	0.005***	0.005***	0.005***	0.005***	
	(0.001)	(0.001)	(0.001)	(0.001)	
$multiple\_spell_{ck}$	1.082***	1.032***	1.032***	1.032***	1.166***
	(0.089)	(0.084)	(0.084)	(0.084)	(0.093)
Observations	181612	191078	191078	191078	191078