Time as a Determinant of Comparative Advantage

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Abstract: Time delays for exports dampen trade. But they can also affect the composition of trade as time delays can disproportionately reduce trade in time-sensitive goods. This paper investigates this issue with the *Doing Business* database and *Enterprise Surveys* from 64 developing countries. In countries where there is longer time needed to export, firms in more time-sensitive industries are less likely to become exporters. Moreover, firms that do export have lower export intensities. These findings imply that time is a significant determinant of comparative advantage. The estimates suggest that, given two industries that have the same export probability and intensity, but differ in time sensitivities by one standard deviation, reducing time to export by 50% would increase the difference in their respective export probabilities by 6 percentage points favoring the time-sensitive sector; the differences in their exports intensities would increase by 1.9 percentage points. This impact applies to firms with different productivity levels and those from developing countries with different income levels.

JEL codes: F13, F14, and F15
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I. Introduction

Growing evidence has shown that time is a significant impediment to trade. Still, there are marked variations in the required time for exports to take place across countries. It takes 43 days in Cambodia to move a 20-foot export container from the factory to the nearest port and complete all the administrative hurdles to load it onto a ship. By contrast, it takes just 18 days in Malaysia or China[1]. Time delays impose additional transaction costs on traders. An increase of shipping time of one day, for instance, could be worth 0.8 percent ad-valorem of a traded good (Hummels 2001).

Moreover, the adverse effects are greater on time-sensitive goods (Harrigan and Venables 2004, Djankov et al. 2008). This changes the composition of a country's export bundles. In industries having just-in-time business practices, for instance, the entire production process will come to a halt if even a single input is missing. In industries shifting toward a more fragmented process and relying on international supply chains, delays in the delivery of intermediates accrue in all successive production stages. Eventually, small transaction costs can amount to disproportionately large values. Time delays yield higher transaction costs for these time-sensitive industries, and, thus, disproportionately dampen their exports.

Given this, the large differences across countries in the time need to export may help to explain why exports in sectors relying on timeliness grow rapidly in some countries but remain impeded in others. That is, time acts as a determinant of comparative advantage in addition to a wedge on trade flows. The variations in countries' ability to move goods for exports stem from differences in the efficiency of infrastructure services, logistics services, trade regulations, customs administration, as well as the quality of broader regulatory policies and institutions.

However, despite the potentially profound policy implications, empirical evidence on the compositional effects of time as a trade barrier is rather scarce. Existing literature mainly look at the aggregated effects of time costs on a country's trade without distinguishing the channel of compositional effects. A handful of studies began to look at the issue but they rely on data of aggregated trade flows (e.g. Djankov et al. 2008). Firms are *the* major players in global production and trade. It is critical to understanding trade costs and trade facilitation from their perspective. Thus, in this paper, we take a step toward filling the gap and try to answer: do we observe this impact of time delays at the firm level? For that purpose, we test whether firms of more time-sensitive sectors perform better in countries that are able to move goods quicker for exports. First, we study whether time delays affect the probabilities of exporting. The channel builds on the well-established insight that decreasing trade costs will reduce the minimum productivity level necessary for entering export markets and increase the average probabilities of exporting (e.g. Melitz 2003). One might also expect existing exporters to send more products abroad following a reduction in trade costs. As a second test, we assess the impact of time delays on export intensities, i.e. the shares of exports in total sales.

We compile a unique cross-country data set which pools information from the Enterprise Surveys of 64 countries together with data on time required for exports to take place from the

[1] The information is from the Doing Business database and is recorded as an average within a specific country.

Doing Business database. To quantify the time sensitivities of industries, we construct a variable that measures, for each industry, the proportion of its international shipments that are transported by air. Air transport helps to bring producers closer to markets. Airplanes can reach most destinations in a day or less. By contrast, it takes weeks to ship containers by sea. However, air transport is also more expensive. Nowadays, firms use a mixture of transport modes to reduce transaction costs associated with time delays in order to maximize profits (Aizenman 2004, Hummels and Schaur 2009). The extent to which goods are transported using air modes thus represents the time sensitivity of a certain industry. We use United States import data with detailed information on transportation mode to calculate the share (Hummels 2007). Deviating from existing literature on trade costs, we use a Difference-in-Difference specification[2]. The approach, first adopted by Rajan and Zingales (1998), enables us to focus on cross-industry, cross-country interaction effects, i.e. the differential effects of country-level variables across industries that should be most responsive to them. Additionally, the methodology can gauge the effectiveness of time costs by showing the relative effect, though it cannot tell us the overall magnitude of the effect; by absorbing country-level variables, it is also less prone to endogeneity problems than traditional cross-country analyses.

To compare with previous studies, we first conduct a simple cross-country analysis, and find that longer delays tend to be associated with lower probabilities and intensities. Focusing on the Difference-in-Difference approach, we find that firms in more time-sensitive industries are less likely to export in countries having longer required time for exports to take place. We also find the same pattern for export intensities. Take two industries differing in time sensitivities by 18 percentage points—the standard deviation across industries—and having the same export probabilities and intensities in a country. The coefficient estimates suggest that, if the country reduces time delays by half, the differences in the export probabilities between the two countries will increase to 6 percentage points favoring the time-sensitive industry; the differences in their exports intensities will become 1.9 percentage points. The results are robust to the possibility that a country's remoteness, endowment structure, and financial market development may have different effects across sectors as well. The results also hold when we control for the potential reverse causality problem by restricting samples to domestic SMEs, non-major exporters, and those without membership in lobbying business associations. The impact applies to firms with different productivity levels and remains significant when considering the disparities in countries' income levels. This suggests that costs associated with time delays matter, thus confirming previous evidence on trade flows. More importantly, it implies that time is a significant determinant of comparative advantage and that it influences comparative advantage through both extensive and intensive margins.

This paper proceeds as follows: the next section discusses the related literature. Section III presents the estimation strategy. Section IV describes the data. Section V presents the empirical results and extensions. Section VI concludes.

II. Related Literature

[2] Romalis (2004), Levchenko (2004) and Nunn (2007) take a similar approach to assess determinants of comparative advantage.

This study belongs to the growing literature on trade costs and trade facilitation. As tariff rates have come down, the trade literature increasingly recognizes the importance of non-tariff barriers in lowering transaction costs and facilitating efficient trade flows. In their seminal work, Finger and Yeats (1976) first establish the equivalency between transportation costs and tariff barriers. Ever since, more empirical studies have examined the effect of various barriers on trade flows. Limao and Venables (2001) show that poor infrastructure accounts for 40 percent of transportation costs in coastal countries and up to 60 percent in landlocked countries, thereby highlighting the importance of infrastructure investment in stimulating export growth. Anderson and Marcouiller (2002) extend the scope of barriers to institutions and establish the relationship between inadequate institutions and low trade flows. Wilson et al. (2005) find that port efficiency, customs administration, regulatory environment, and "e-business" development all have significant trade impacts. If the below-average countries in their sample group improve halfway to the average in all aspects, there would be a US$377 billion gain in trade flows[3].

In addition to direct monetary outlay, these trade barriers involve costs associated with time delays. Hummels (2001) is the first to argue the time dimension of trade barriers. He classifies the costs into the depreciation of goods and the increased inventory carrying costs. Using US import data, Hummels (2001) shows that one day's delay reduces the probability that a country will export to the US by 1-1.5 percent. He also discusses how the advent of air transport influences trade growth through the compositional effects. Following his work, the idea that time delays are a barrier to trade and the distinct role of time-sensitive goods has gained growing interest. Nordas et al. (2006) use control of corruption as an instrument for delays in export time and show that delays will reduce the probability and the volume that a country will export to Australia, Japan and the UK in a set of time-sensitive industries, including intermediate inputs, clothing and electronics[4]. Using data on the days it takes to move standardized cargo for exports[5], Djankov et al. (2008) show that a delay of one day reduces trade by at least one percent or is equivalent to distancing countries by an additional 70 km. They find that one day's delay reduces a country's relative exports of time-sensitive to time-insensitive goods by 6 percent[6]. This thereby confirms the compositional effects of time in terms of trade volumes.

Notably, recent studies have begun to investigate firm behavior and find that non-tariff barriers, including the time dimension of these barriers, hinder export performance at the firm level. A large number of empirical studies have shown that only a small portion of firms in each country actually export. Those which do export tend to be larger, more productive, and more skill- and capital-intensive, etc. The process is through self-selection[7]. The selection is driven by the existence of cross-border trade costs. Bernard et al. (2003), Melitz (2003), Yeaple (2005) and Bernard, Redding and Schott (2007), among others, incorporate firm-level heterogeneity to account for the new firm-level facts. All models predict that only the most productive firms can

[3] See Ander and van Wincoop (2004) for a survey.
[4] Nordas et al. (2004) also find that infrastructure quality has a significant trade effect on the automotive sector and the textile and clothing sectors, which they believe to be time-sensitive industries.
[5] The data has been collected since 2005 and incorporated into the World Bank Doing Business database. Another related work is Hausman et al. (2005) which estimates the trade impact of time uncertainty using the same dataset.
[6] Their selection of the manufactures is based on Hummels (2001) and the selection of agriculture goods relies on their average storage life.
[7] See Bernard and Jensen 1999, Aw, Chung, and Roberts 2000, Eaton, Kortum, and Kramarz 2006, and Bernard et al. 2007 for examples. Also see Tybout 2003 for a survey on the impact of trade liberalization on productivities.

overcome the additional costs associated with exporting and reap the benefits of producing for a larger market. Less productive ones cannot do so and only produce for the domestic market. Falling trade costs, therefore, affect important firm-level decisions. In particular, reduced trade costs will induce more firms to become exporters, and will stimulate the growth of existing exporters. Roberts and Tybout (1997) test for the presence of sunk costs, while Bernard and Jensen (2004) test for the possible existence of entry costs. Both papers find entry costs to be significant in explaining firms' export decisions. Dollar et al. (2006) draw on firm-level surveys from eight countries and find that firms in countries with shorter time for customs clearance, have a higher probability of exporting to foreign markets. Clarke (2005) and Yoshino (2008) investigate the issues of African countries using firm-level surveys[8]. They both find that exporters in countries with more efficient customs administration tend to send more products abroad. Yoshino (2008) also shows that more efficient customs administration is associated with greater export market diversification.

III. Estimation Strategy

This paper extends existing empirical analyses on time as a barrier to trade by focusing on the compositional effects. The export response to time delays should differ across industries. The ability to move goods faster may, therefore, determine a country's relative export growth of time-sensitive to time-insensitive goods, i.e. comparative advantage. To the best of our knowledge, it has not received sufficient attention previously. Focusing on compositional effect also allows us to use a Difference-in-Difference approach that is less prone to the endogeneity problem associated with more traditional cross-country analyses.

Time is an important barrier to trade. There are two types of costs imposed by shipping time: inventory-holding and depreciation. Inventory costs consist of the capital costs of the goods while in transit and the need to hold buffer-stock inventory at final destinations to absorb demand volatility. Depreciation costs refer to any case that a newer product is preferable to an older one, including literal spoilage and more generally, goods for which demand is hard to predict[9]. The existence of time delays has shown to be a significant impediment to country exports (e.g. Hummels 2001, Djankov et al. 2008).

In this environment, time-sensitive industries are especially vulnerable. Djankov et al. (2008) illustrate that delays in shipping time reduce a country's relative exports of time-sensitive to time-insensitive goods. The development of technology and manage techniques has changed the nature of modern production and made timeliness the key to success in many industries. One example is industries that have adopted just-in-time practices. Just-in-time practices imply that manufacturers have a minimum inventory of intermediates. Chances are that when the delivery of one intermediate is delayed, the entire production process could stop. Another example is industries that have volatile demand; for instance, personal computers. Standardized computers do not appeal to many consumers who are willing to pay extra for a customized model. Many

[8] The surveys used by Dollar et al. (2006), Clarke (2005) and Yoshino (2008) are the World Bank Enterprise Surveys, which are collected to prepare Investment Climate Assessments and also known as Investment Climate Surveys.

[9] See Hummels (2001) for a detailed explanation.

computer manufacturers simply obtain desired specifications first and then build and deliver customized models over-night.

Moreover, time costs magnify themselves significantly in the presence of vertical integration. When the production is carried out in stages, the costs of early-stage delays accrue through the full length of a production chain. As different segments take place through international production networks, manufacturers face even higher risks. Lengthy and uncertain delivery schedules of intermediates may jeopardize the whole business. Harrigan and Venables (2004), for instance, show that these sectors are more sensitive to distance which gives rise to cluster.

A country's ability to move goods faster from the factory gate to ships, hence, will determine its comparative advantage in time-sensitive industries. Let's consider the case of a microchip producer versus a table cloth manufacturer. The microchips are designed to be used for cell phones and need to be shipped overseas for final assembly where just-in-time practices are adopted. The table cloths are designed for households and are bought by a foreign retailer. The microchip producer faces much a higher risk because just-in-time practices require a small window for delivery and the company can be liable for all the losses accumulated in the later stages of the cell phone production. The microchip producer has to put up large buffer stocks overseas or choose expensive air transport to reduce risks. Meanwhile, there is no need for the table cloth manufacturer to do so. In countries where logistics services are faster and more reliable, the microchip producer could worry less about missing delivery schedules. In that case, the amount of buffer stocks or deliveries through airplanes can be reduced. Producing for foreign sales, hence, becomes more profitable. This cost advantage becomes greater with the time sensitivity of a particular industry. For the table cloth producer, for example, the benefits are much smaller. In short, a given reduction in required time for exports to take place can yield larger cost reduction in time-sensitive industries than in time-insensitive sectors, and this can turn into a source of comparative advantage.

Difference-in-Difference Approach

In order to test this hypothesis against firm-level data, we explore the relative effects of time delays on firm export performance across industries with different time sensitivities. We focus on the interaction between time sensitivity, which is industry specific, and time needed for exports to happen, which is country specific. Rajan and Zingales (1998) first use this Difference-in-Difference approach. Romalis (2004), Levchenko (2004), and Nunn (2007), among others, use similar specifications to assess the determinants of comparative advantage[10]. The generic structure of the specification is as follows:

$$y_{cs} = F(\alpha + \beta z_s Z_c) \quad (1)$$

y_{cs} is a country-industry specific performance measure. Z_c represents certain country character and z_s denotes certain industry character responsive to Z_c. $F(\bullet)$ is a monotonically increasing

[10] Klapper, Laeven and Rajan (2004), Micco and Pages (2006), and Hallward-Driemeier and Li (2009) take the same approach to examine the effect of regulatory policies on industry performance using cross country data.

function. The coefficient of the interaction suggests the relative effects of Z_c on industries with larger z_s to those with smaller values. In our case, the performance measure is export performance, which we will discuss in the next section. The country character is the time required for exports to take place, shorten as *export time* and denoted as EXP_T_c, and the industry character is *time sensitivity*, denoted as ts_s. The interaction will be shorten as *time interaction*. If time delays impose relatively higher transaction costs in time-sensitive industries, export performance should be disproportionately worse in these industries. We would expect the coefficient on time interaction to be negative. We assume that time sensitivity is technologically based and relatively stable across countries. Fresh vegetables and flowers are easier to decay than energy drinks, for instance. The production of electronics is far more fragmented than the manufacturing of wood products. Thereby, we do not expect the ordering of industries based on time sensitivities to vary much across countries.

The Difference-in-Difference approach also allows us to include fixed effects to absorb other country-level characteristics which tend to affect all industries equally. In our sample, we have two years of observations for a few countries so we include country-year fixed effects. It will control for time-consistent and time-varying country differences, for instance, level of income, and political stability. Some products (i.e. electronics) are more likely to be traded across borders due to the higher level of vertical integration. We also use industry fixed effects to control for these differences. The model is as follows:

$$y_{sc} = F(D_{ct} + D_s + \beta_1 ts_s EXP\_T_c). \quad (2)$$

The estimation here differs from existing work that estimates a cross-country model and shows that there is a negative relationship between a country's export performance and its shipping times (e.g. Nordas et al. 2006, Dollar et al. 2006). In our specifications, the average impact of export time EXP_T_c on export performance is captured by country-year fixed effects. Because of the emphasis on the relative differences among industry and controlling for country fixed effects, the approach reduces the problems of omitted variables and reverse causality associated with traditional cross-country studies. However, there are still reasons to be cautious about the estimates as causality may still run from relative export performance across industries to trade policies. We test our results against this possibility.

Another reason that we should be cautious about the estimates is that other country characteristics can have relatively different effects across industries as well. Failing to control for them may bias our estimates. Increasingly, trade literature has recognized the importance of a country's remoteness in explaining its export performance (Anderson and van Wincoop, 2003). The intuition is that more remote countries are more likely to trade with their neighbors or existing partners as they have fewer alternatives. In our case, there are two concerns: first, a country close to major markets or at the center of a large market certainly has comparative advantage in participating in international production networks or producing some type of time-sensitive products; second, countries that have more opportunities to export may have higher returns to trade facilitation reforms and invest more in improving efficiency. The estimate of

time interaction may be biased upward by the impact of remoteness across industries. To take this possibility into account, we augment the model with a time remoteness interaction, $ts_s RM_c$.

The standard Heckscher-Ohlin model predicts that factor endowments are important determinants of trade patterns. Romalis (2004) provides empirical evidence to the theory using a similar specification. The availability of financial resources affects firms' growth potential. Rajan and Zingales (1998) show that sectors that are more dependent on external finances grow faster in countries with better developed financial markets; and Hallward-Driemeier and Li (2009) find that these sectors invest more in countries with better regulated credit markets. The concern is that time interaction may partly capture the fact that more skill- or capital-abundant countries tend to specialize in high skill- and capital- intensive industries, or that fact that countries with better developed financial markets tend to specialize in industries that rely more heavily on external finance. Thus, we include the interactions between these industry and country characteristics in the specification. The model becomes:

$$y_{sc} = F(D_{ct} + D_s + \beta_1 ts_s EXP\_T_c + \beta_2 ts_s RM_c + \beta_3 k_s K_c + \beta_4 h_s H_c + \beta_5 fd_s CR_c), \quad (3)$$

where RM_c represents the remoteness of country *c*; k_s and h_s are the skill and capital intensity of industry *s*, and K_c and H_c denote country *c*'s capital and skill endowment so $k_s K_c$ and $h_s H_c$ are the capital interaction and the skill interaction, respectively ; fd_s denotes the dependence on external finance by industry *s*, CR_c represents the ratio between private credit and GDP of country *c*, and $fd_s CR_c$ is the *financial interaction*. These interactions can be interpreted along the same logic as the interactions of time sensitivity and export time.

Export Probabilities and Intensities

Due to data availability, existing empirical studies mainly use aggregate trade flows to investigate the importance of trade costs. What we are interested in here is firm export performance. Firms are the major players in global trade. It is essential to recognize their role and assess policy implications from their perspective. Following Dollar et al. (2006), we first look at the probability that a random firm will become an exporter. There is a growing body of literature documenting firm behavior in cross-border trade. One important consensus is that the portion of exporters in each country is relatively small. Exporters tend to be larger and more productive.[11] Melitz (2003), among others, interpret the newly-found norm by incorporating firm-level heterogeneity. He assumes that the process of becoming an exporter is through self-selection. The existence of cross-border trade costs is the key driver of the process. Only the most productive firms can overcome the additional costs associated with exporting and reap the benefits of producing for a larger market. Less productive ones are unable to do so and can only produce for the domestic market. This has important implications for trade facilitation. First and foremost, decreasing trade costs will increase exporters' profits. Firms that used to be constrained to domestic markets will now find it profitable to export. Lower trade costs reduce the minimum productivity level required for exporting, thereby encouraging entry into foreign markets. But, it also implies that the domestic market becomes more competitive. The least productive firms, once able to produce for the domestic market, will now find it harder to

[11] See Bernard et al. (2003), Yeaple (2005) and Bernard, Redding and Schott (2007) for other examples.

compete and will likely exit markets entirely. As explained, time delays increases transaction costs. It follows that when countries can ship goods out faster, firms on average are more likely to export. We are interested in the relative effects on time-sensitive industries and estimate a probit function to investigate this hypothesis:

$$\rho_i = \Phi(D_{ct} + D_s + \alpha X_i + \beta_1 ts_s EXP\_T_c + \beta_2 ts_s RM_c + \beta_3 k_s K_c + \beta_4 h_s H_c + \beta_5 fd_s CR_c), \quad (4)$$

where ρ_i is a measure of the probability that firm *i* will export to foreign markets. The coefficient on time interaction, β_1, again implies the differentials between the effects of time on the probabilities of exporting across industries. A group of firm-level variables are included in the model to take into account that firms' characteristics affect their ability to export, denoted by X_i. It consists of employment level, value added per worker, and capital stock per worker which are entered as logarithm and lagged by one year. Firms' value-added per worker and capital stock per worker are used to control for differences in productivity[12]. Firm age and foreign ownership shares are shown to be correlated with export performance as well.

The probability of exporting captures how the time needed to export affects extensive margins. But how about intensive margins? One would expect that exporters, on average, send more products abroad when there are fewer delays domestically. Still following the insights of Melitz (2003), falling trade costs have two effects: first, exporting becomes more profitable; second, the competition of domestic market becomes fiercer. As a result, all exporters will find it appealing to increase the proportion of its foreign sales, i.e. export intensity. Clarke (2005) and Yoshino (2008), for instance, show that in Africa, exporters have higher export intensities in countries where customs administration is more efficient. In order to investigate this idea, we estimate a tobit model:

$$y_i = \begin{cases} 0 & if \quad y_i^{*}, <= 0 \\ y_i^{*} & if \quad 0 < y_i^{*} < 1 \\ 1 & if \quad y_i^{*} >= 1 \end{cases} \quad (5)$$

$$y_i^{*} = D_{ct} + D_s + \theta X_i + \gamma_1 ts_s EXP\_T_c + \gamma_2 ts_s RM + \gamma_3 k_s K_c + \gamma_4 h_s H_c + \gamma_5 fd_s CR_c + \upsilon_i$$

$$where \quad \upsilon_i \sim N(0,1)$$

y_i represents the export intensity of firm *i*, which is measured as the share of exports in total sales. The observed firm export intensity equals the latent export intensity, denoted by y_i^{*}, if and only if y_i^{*} is within zero and one. All other variables retain their meanings in equation (4). The coefficient on time interaction, γ_1, represents the relative effects of time on export intensities across industries. A negative coefficient will suggest that exporters of time-sensitive industries send disproportionately fewer products abroad in countries with longer time required for exports to happen.

[12] We use the World Bank Enterprise Surveys for firm-level information. The data does not have panel structure so we are unable to compute more sophisticated measures on productivity, for instance, following Olley and Pake (), or A (). The quality of surveys also varies considerably over countries. In order to include as many observations as possible, we use a simple measures to control for productivity.

IV. Data

We combine data on time needed for export to take place from the Doing Business database with the information from the Enterprise Surveys. It enables us to assess the impact at the firm-level where the evidence is limited due to data availability. It also avoids using firm perception from survey data to measure regulatory environments, thereby reducing potential bias.

Exporter Status, Export Intensities and Firm Characteristics

We draw information on firm performance from the World Bank Enterprise Surveys. The surveys are designed to assess the investment climate of developing economies. Each survey is based on a standardized set of survey instruments and uses a similar methodology: stratified random sample of establishments[13]. For simplicity, we will refer each establishment-year observation as a firm. We dropped observations that report missing information or inconsistent information for outputs and inputs. The final sample covers 21336 firms from surveys conducted over 2002-2008[14]. The data on exporter status, shares of exports in total sales, shares of foreign ownership, and firm age are available from the surveys. We use total outputs, wage bills, material costs, value of capital stocks and employment sizes to calculate value-added per labor and capital intensities. The values are converted into 2000 US dollars using exchange rates and inflation rates from "International Financial Statistics" published by the International Monetary Fund. Appendix 3 presents the summary statistics.

The final sample covers 64 developing economies. For 12 countries, surveys conducted in two years are included. The shares of exporters and export intensities vary considerably across countries (Appendix 1). Less than 5 percent of the surveyed firms export in Algeria, Burundi, Ethiopia, and Mozambique. By contrast, more than 60 percent of the selected firms from South Africa, Thailand, Turkey, and Malaysia are exporters[15]. The average share of exporters is 39 percent with a standard deviation of 19 percentage points. The export intensities of exporters display a similar pattern. The mean value is 21 percent while the standard deviation is 18 percentage points.

The observations are classified into 13 manufacturing industries in the original surveys (Appendix 2). 39 percent of all the firms export. Among exporters, foreign sales, on average, stand for 53 percent of total sales. There are clear distinctions across industries. Half of the surveyed firms export in garment industries and more than three quarters of sales are foreign sales. This is followed closely by electrical and electronics (E&E), leather, and textile industries in which more than 40 percent of firms sell to foreign markets and average export intensities exceed 50 percent. By contrast, only one quarter of firms in beverage industry enter foreign market. In paper and wood production sectors, the shares of exporters are also small, close to one third. In terms of other characteristics, 16 percent of firms are foreign owned[16]. Two thirds of

[13] For more information on the methodology of the survey, see the Enterprise Surveys website http://www.enterprisesurveys.org/

[14] Most surveys do not have panel structure.

[15] More than 100 firms are kept in the final sample for all the above countries,.

[16] Foreign owned is defined as companies with over 10 percent of foreign equity.

firms are small- and medium-sized enterprises (SMEs)[17]. The average employment size is about 200.

"Time for Export" Indicator and Time Sensitivity

We use the "time for export" indicator from the Doing Business database to measure the required time for exports to take place. The information is collected through contacting local freight forwarders, shipping lines, customs brokers and port officials. The indicator represents the days it takes to move a standard 20-foot dry-cargo from a factory in the largest business city to a ship in the most accessible port and clear all customs, regulatory and port procedures[18](Appendix 4). It registers the remarkable variations of export time across countries. The process takes only 9 days in Panama, 10 days in Lithuania, and 18 days in China and Malaysia. By contrast, the indicator in some landlocked countries more than triples: 58 days in Mongolia, 59 days in Niger, 64 days in Kyrgyzstan and 66 days in Laos. Poor infrastructure services are only one part of the story. The Doing Business database reports the corresponding time for each stage of the export process in its 2009 edition, including document preparation, customs clearance, ports and terminal handling, and inland transportation and handling. Based on the information, only about one third of the delays in the sample can be attributed to poor ports or terminals and poor inland transport systems. More than two thirds of the delays are caused by administrative procedures—documents preparation, customs clearance, cargo inspection, etc.

The information of "time for export" is available since 2005. More than half of our observations, however, are from the Enterprise Surveys conducted prior to 2005. To avoid losing these observations, we use the logarithm of the 2005 value of the indicator as our primary measure. We do not expect this to bias our results since the cross-country differences in the indicator dominate the within-country differences—the between standard deviation is about three times the within standard deviation (Appendix 4). We also use data recorded from the same year to check the robustness of our results.

We measure the time sensitivities of industries by calculating the shares of air transport in total international transport costs. International transaction put a significant lag between when a product is purchased and when it arrives. Air transport helps to bring producers and consumers closer significantly in time. Shipping containers from European ports to the US Midwest requires 2-3 weeks; Far Eastern ports 6 weeks. By contrast, air shipping requires only a day or less to most destinations. But it is also more expensive. In US imports, costs per kg shipped are average 6.6 times higher for air shipment[19]. As discussed, time imposes additional costs on traders. In this environment, there exists a-willingness-to-pay for time savings (Hummels 2001). Manufactures trade off fast but expensive air transport against low but cheap ocean or land shipping[20]. A significant proportion of internationally traded products are now transported via a mixture of modes. For instance, they mount to 71 percent of all US imports from outside of

[17] SMEs are defined as those that employ less than 100 workers.
[18] For more information on the construction of the indicator, see Djankov et al. (2008) and the Doing Business Website http://www.doingbusiness.org/MethodologySurveys/TradingAcrossBorders.aspx.
[19] See Hummels and Schaur (2009) for details.
[20] Air transport has shown to be an alternative solution to the timeliness problem (Aizenman 2004, Hummels and Schaur 2009).

North America. In this environment, manufacturers are more willing to pay for a higher premium when the goods are time sensitive. It follows that the extent to which a product is shipped by airplanes represents its time sensitivity.

As discussed, we assume industry time sensitivity is technical based and relatively stable across countries. We use the "US Imports of Merchandise" data from Hummels (2007) to calculate the ratio between air transport and total international transport costs for each industry. It is the best source of customs data reporting the custom values of air transport, vessel transport and total transportation costs. We take the data from 1998 to 2001, which is prior to the first year of the Enterprise Surveys, and calculate the average to smooth out year-to-year variations. We first restrict the shipments to those exceeding one percent of total US imports in the product. The ratio between air transport and the total costs based on these large shipments is our primary measure of time sensitivity. The ratio based on the information of all shipments is used as an alternative measure. We converted the original data classified by 5-digit SITC[21] into the 13 industries defined in the Enterprise Surveys. The two measures are highly correlated with each other (Appendix 5). Beverage and paper products are the least time sensitive, followed by transportation equipments. Wood, food products, textiles and garments require relatively more timeliness. Electronics, chemicals, and other manufacturing products, including medical and optical goods, are the most sensitive to time. The industry classification of the surveys is highly aggregated. It makes our measures on time-sensitivity less accurate. But, the order captures the general ideas that time-sensitive products tend to be those with more extended international production networks, represented by electronics and medical and optical goods. The time sensitivity is higher when the product is more easily to spoil or if demand is less certain, illustrated by comparing food with beverage and comparing garments with paper products.

Data on other industry and country characteristics are from conventional sources. We follow Head (2003) and define a country's remoteness as the inverse of the sum of partner countries' GDP weighted by their distance to the country[22]. Data on the skill and capital intensity are from an updated version of Bartelsman and Gray (1996). Capital intensity is the ratio of the total capital stock to the total value added of an industry in the United States. Skill intensity is the ratio of non-production worker wages to total wage bills of an industry in the United States. To smooth out yearly variations, the average value of 1998-2001 is used. Information on counties' stocks of human capital and physical capital are drawn from Antweiler and Trefler (2002). The data of 1996, the latest available year, is used. The human capital stock is measured as the logarithm of the ratio of workers who completing high school to those not and the physical capital stock is the logarithm of the capital stock per worker. Data on industry dependence on external finance is drawn from Rajan and Zingales (1999). Data on the ratio between private credit and GDP is from the World Development Indicators. We convert all the industries to the 13 industries defined in the Enterprise Surveys.

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[21] SITC stands for Standard International Trade Classification.

[22] Remoteness of country *j*: $RM_j = \frac{1}{\sum_{k=1}^{N} \frac{GDP_k}{D_{kj}}} = \frac{1}{\frac{GDP_1}{D_{1j}} + \frac{GDP_2}{D_{2j}} + \ldots + \frac{GDP_j}{D_{jj}} + \ldots + \frac{GDP_N}{D_{Nj}}}$,

where N is the total number of countries, D_{kj} is the distance between country k and j, and GDP_k is the GDP of country. A country's internal distance is the square root of its area multiplied by 0.4.

Appendix 6 reports the correlation coefficients between "time for export' and other country characteristics, and the correlation coefficients between time sensitivity and other industry characteristics. "Time for export" is positively correlated with remoteness though the magnitude is small, around 0.2. Interestingly, it is negatively correlated with capital stocks, skill endowment and the ratio between private credit and GDP. Time sensitive sectors tend to be skill intensive and rely more on external finance but are not capital intensive.

V. Empirical Results

Results from Cross-country Analysis

Before turning to the Difference-in-Difference analysis, we check whether our firm-level data provide evidences consistent with previous cross-country analyses that find time delays hinder a country's export performance (e.g. Hausman et al. 2005, Djankov et al. 2008). We do this by using the time required for exports to happen to explain export probabilities and intensities while controlling for firm characteristics, industry fixed effects and year fixed effects. Table 1 reports the estimates. More time delays tend to be associated with lower probabilities that firms will become exporters and lower export intensities. These results, however, need to be interpreted with caution. Important countries characteristics, for instance income level, and political stability, are not accounted for, which may lead to both longer export times and undesirable export performance. More importantly, there might be other unobservable characteristics that affect both. The Difference-in-Difference approach specified in (4) and (5) helps to reduce this concern.

Results from Difference-in-Difference Approach

Now let's turn to the formal estimates of the Difference-in-Difference approach. Estimates of probability equation, (4), are reported in the top panel of Table 2 and estimates of the intensity equation, (5), are reported in the bottom panel. Column 1 of both panels presents the results with time interaction while controlling for firm characteristics, country-year fixed effects and industry fixed effects. The estimated coefficients on employment sizes, shares of foreign ownership and value-added per worker are all positive and significant in both equations. It implies when manufacturers are larger, with higher foreign shares and more productive they are more likely to enter foreign markets and export more once they do. These results are consistent with the predictions from Melitz (2003) and previous empirical evidences. Interestingly, the estimates also suggest that firms with more intensive capital investments are more likely to become exporters but not necessarily have higher export intensities. It indicates that capital deepening only influence extensive margins. Finally, the estimates also show that older firms tend to export less, which may due to the fact that older firms are better rooted domestically and enjoy larger market shares at home.

In columns 2 to 5 of Table 2, we introduce time remoteness interaction, factor endowment interactions, and financial interaction. Remoteness seems to have a negative impact on export performance. As expected, the fact that some countries locate far away from major

global markets depresses the performance of times-sensitive industries more—in terms of both export probabilities and intensities. But, the impact is only statistically significant when all other interactions are controlled for. The information on factor endowments only exists for 33 countries. The number of observations, therefore, drops to 16567 when controlling for factor endowment interactions. Capital endowment interaction seems to be positively related with both export probabilities and intensities. Meanwhile, skill interaction has significant and positive impact on export intensities. That is, more capital-abundant countries tend to specialize in capital-intensive industries and more skill-abundant countries tend to specialize in skill-intensive ones. The results offer another piece of evidence supporting the fundamental idea that a country's endowment structure is a source of comparative advantages. Interesting, the availability of credit is also shown to positively affect export intensities once other interactions are controlled for. Exporters of industries that rely more heavily on external finances tend to perform better when countries have better developed financial markets. It is consistent with the idea that financial market development is important to economic growth.

Turning to our variable of interests, the estimated coefficients on time interaction are negative and statistically significant for both equations (4) and (5). They are also robust to the inclusion of other industry and country characteristics interactions. For export probabilities, the associated marginal effects are about -0.0048. We also report the marginal effects on export intensities conditioned on that the firm is an exporter. The magnitudes is between -0.0015 and -0.0013 (Column 6 and 7 of Table 3). Our results confirm the hypothesis that in countries having longer required time for exports to take place, firms of more time-sensitive industries are less like to become exporters and even when they enter foreign markets they tend to export less as well. The results imply that time delays dampen exports through both extensive margins and intensive margins. More importantly, the estimates indicate that time costs have disproportionately adverse effects on time-sensitive industries and hence, are important for understanding comparative advantage.

Since it is a Difference-in-Difference estimation with nonlinear models, it is worth pointing out what the coefficients mean with some examples. First, consider two industries with different time-sensitivities and the difference is about 18 percentage points—the standard deviation. Assume firms of the two industries have the same export probabilities and intensities in a country. The estimates suggest that if the country reduces the required time for exports by half, the export probability of the time-sensitive industry will be 6 percentage points higher than that of the time-insensitive industry; the differences in their export intensities will become 1.9 percentage points also favoring the time-sensitive industry. The point can be illustrated through cross-country comparisons as well. Take electronics that are the most sensitive to time and textiles that have the median value of time sensitivity. The estimates suggest that the differences in export probabilities between electronics and textiles in Malaysia (which is at 10^{th} percentile in terms of export time and can transport goods from factory to ships in 18 days) are 15 percentage points higher than the differences in export probabilities between the same industries in Cambodia (which is at the 75 percentile in terms of export time and has an average export time of 43 days). The differences in export intensities between the same industries in Malaysia are 5 percentage points higher than in Cambodia as well. The prediction is consistent with the observation that almost ninety percent of Cambodia's exports compose of textiles and garments

while electronics industry is the largest exports sector in Malaysia, accounting for about three quarters of total exports.

Robustness and Sensitivity Analysis

The results presented above have not considered the possibility that other country characteristics, rather than export time and remoteness, affect time-sensitive industries more. We check this possibility by allowing time sensitivity to interact with endowments and ratios of private credit to GDP. Table 3 summarizes the results. The alternative interactions between time sensitivity and capital endowment, skill endowment and availability of credit do not matter for firms' export performance in most specifications. The only exception is when interacting time sensitivity with human capital endowment. In all cases, however, the estimated coefficient for time interaction remains negative and statistically significant in both probability equation and intensity equation. The magnitude of the estimates is also consistent with the baseline results.

As a next step, we test the robustness of our results to alternative measures on export time and time sensitivity. We first consider using the "time for export" indicator reported in the same year to replace the value of 2005. This way, we measures export time more accurately but lose the observations by half. To make comparisons, we first re-estimate (4) and (5) restricting to the subsample of 2005-2008 (Columns 1, 2, 7 and 8 of Table 4). The estimated coefficients on time interaction are consistent with our baseline results. We then proceed with using the "time for export" reported in the same year. The overall results are in line with baseline results regardless we control for additional industry-country interactions or not (Columns 3, 4, 9 and 10 of Table 4). The estimated coefficients on time interaction remain negative and statistically significant for both equations. The magnitude stays in the same range as baseline results as well. We also test the robustness of the measure on industry time sensitivity by using the shares of air transport to total transportation cost based on data of all shipments, ts_2 (Columns 5, 6, 11 and 12 of Table 4). Again, time interaction is shown to be significantly and negatively correlated with the probabilities and the intensities of exporting. The magnitude remains in the range of baseline estimates. The results stay when controlling for other industry-country interactions.

In table 5, we also check the robustness of our results by restricting the number of surveys. In the final sample, some surveys only include a small number of observations, for instance, 8 for Georgia, 12 for Niger, and 35 for Laos. The firms kept might be the most successful ones –more than half of the observations are exporters for all three countries. It may bias our results. We check out results against this possibility by excluding country surveys in which the number of the selected observations is less than 50 (Column 1, 2, 5 and 6 of Table 5). As noted, for twelve countries, we include observations from two surveys. Some firms might be included in both surveys which we do not have sufficient information to track. The duplication may bias our results if these firms tend to be more successful or come from certain sectors. As another check, we only include the latest survey for each country in addition to excluding small surveys (Column 3, 4, 7 and 8 of Table 5). Overall, our results are not biased by the way we select surveys.

Endogeneity

The relationship identified could run the other way around. The required time for exports to happen could depend on the relative export performance of time-sensitive industries due to the "lobbying effect". As argued, time costs of trade matters more for the exports of time-sensitive industries. Producers of these sectors may provide a strong political pressure for trade facilitation. The lobbying effects may also be self-reinforcing. Export growth of time-sensitive industries will increase their incentive to lobby and strengthen their bargaining power. However, not all firms will engage in political bargaining. We would like to argue that larger or foreign owned companies are more likely to put pressures on governments as they have more resources and are more visible. One way of assessing how serious the bias could be is to restrict the sample to domestic SMEs (Columns 1, 2, 7 and 8 of Table 6). Members of business associates are another group of firms that may influence trade related policies. For 60 surveys, we have information on whether a firm belongs to a business association and whether the organization provides lobbying services. As a second check on the reverse causality problem, we exclude members of any business association involving in lobbying (Columns 3, 4, 9 and 10 of Table 6). The estimated coefficients on time interaction remain close to baseline. We are more confident that our results are not entirely driven by reverse causality.

Major exporters, especially those of time-sensitive industries, have more incentive to push for trade facilitation reforms as well. Including them in our estimation is another channel that the lobbying effects may bias our results upward. To assess this potential bias, we restrict the sample to a subset of firms with export intensities less than 50 percent (Columns 5, 6, 11 and 12 of Table 6). The estimates on time interaction stays significantly negative for both models. But, the magnitude of the estimates is reduced and the significant levels also drop when controlling for other industry interactions. Overall, the suspected lobbying effects may explain parts of the relationship, but not enough to change the whole story.

Extensions

The results presented to this point have not considered the possibility that the relationship between time interaction and export performance may vary over country groups. Various country factors may affect the relationship, including levels of economic development, institutional quality, etc. We augment equations (4) and (5) by adding a triple interaction between time sensitivity, export time and income levels which we use to capture the overall economic and social development of a country (Column 1, 2, 5 and 6 of Table 7). The coefficients on time interaction remain close to the baseline results. The estimated coefficients on the triple interaction for both equations appear to be positive and significant at first. But, they are small and lose statistical significance when controlling for all other interactions. It indicates that the relationship between export time and the differences in export performance across industries applies to developing economies with different income levels but may be slightly stronger in lower income countries.

Productivity is a key driver behind the export performance of a company. As a next extension, we want to check whether the impact of export time differs across productivity levels. We argument the specification with a triple interaction between time sensitivity, export time, and value-added per labor (Column 3, 4, 7 and 8 of Table 7). The coefficients on time interaction are consistent with baseline. No significant results have been found for the new triple-interaction

term. The impact of time as a determinant of comparative advantage is not affected by productivity levels.

In its 2009 edition[23], Doing Business database reports the corresponding time for each stage of the export process: document preparation, customs clearance, ports and terminal handling, and inland transportation and handling. In Table 8, we use the interactions between time sensitivity with the time recorded for each stage to assess to what extent different components matter for export performance. The results need to be interpreted with caution as we use information on the last year of our sample. We first use the total time for export reported for 2008 to re-estimate (4) and (5). As reported in Column 1 and 7, the estimated coefficients on time interaction are negative and statistically significant but the magnitude is smaller than baseline results. This is due, at least in part, to the fact that we use the information on the last year. Columns 2 to 5 and 8 to 11 present the estimates when introducing individual component of export process one at a time. Estimated coefficients on all time interactions are negative and statistically significant for both equations (4) and (5). Notably, when using time for customs clearance the magnitude is the largest among all. Column 6 and 12 report the estimates when all time interactions are considered together. The coefficients on time interactions using time for customs clearance and time for inland transportation remain large and significant. The results do not imply that documents preparation and port handling do not matter for export performance. Rather, they indicate that in countries with longer delays in these stages the export performance of firms from more time-sensitive industries is not disproportionately worse. By contrast, firms from more time-sensitive industries are less likely to export and have lower export intensities when located in countries with longer delays in customs clearance and in inland transportation.

VI. Conclusion

We are interested in the importance of the time costs of trade in explaining firm-level export performance. For that purpose, we construct a unique data set by combining the information on export time with data on firm export performance in 64 countries. Deviating from existing literature on trade costs, we use a Difference-in-Difference approach to assess the compositional effects. We find that firms of time-sensitive industries are less likely to export in countries where there is a longer time needed to export. Firms that do export tend to have lower export intensities in such countries. These findings confirm that costs associated with time delays depress exports through both extensive and intensive margins. Moreover, they suggest that time is a significant determinant of comparative advantage in the trade of time-sensitive products.

Take, for instance, electronics, which are the most sensitive to time and textiles, which have the median value of time sensitivity. The estimates suggest that the differences in export probabilities between electronics and textiles in Malaysia (which can transport goods from factory to ship in 18 days) are 15 percentage points higher than the differences in export probabilities between the same industries in Cambodia (which has an average export time of 43 days). Furthermore, the differences in export intensities between the same industries in Malaysia are 5 percentage points higher than in Cambodia as well.

[23] 2009 update of Doing Business report information on 2008.

In developing countries, much work is still needed to improve their inefficient international trade systems. The inefficiency can stem from poor trade-related infrastructure, underdeveloped logistics services, as well as redundant regulations and administrative hurdles. Unlike cutting tariffs or eliminating quotas, progress on trade facilitation can involve substantial resource costs and requires a cautious approach. Our findings suggest that effective trade facilitation reforms may enable countries to change the structure of trade in addition to stimulate the volume of international transactions, which, thereby, provides another piece of evidence in support of trade facilitation in the cost-benefit analysis.

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Appendix 1 Distribution of Firms, by Country

Country	No. of Observations	Share of Exporter	Exports/Sales	Country	No. of Observations	Share of Exporter	Exports/Sales
ALGERIA	191	3.1%	0.6%	OMAN	54	40.7%	13.4%
BURUNDI	57	3.5%	0.6%	NAMIBIA	65	41.5%	18.1%
ETHIOPIA	341	5.6%	2.6%	CHILE	873	41.6%	15.0%
MOZAMBIQUE	50	12.0%	4.4%	BANGLADESH	943	43.3%	39.2%
ERITREA	26	15.4%	5.0%	MOLDOVA	55	43.6%	26.6%
UGANDA	157	17.8%	6.4%	LITHUANIA	66	43.9%	23.5%
TANZANIA	205	18.5%	4.4%	INDONESIA	414	44.4%	31.5%
MAURITANIA	44	20.5%	11.5%	GHANA	20	45.0%	22.6%
POLAND	67	20.9%	8.1%	PERU	201	46.3%	21.7%
RWANDA	32	21.9%	10.5%	URUGUAY	90	46.7%	20.6%
MEXICO	422	22.3%	10.3%	EL SALVADOR	721	46.9%	20.7%
INDIA	3213	22.3%	13.5%	VIETNAM	1108	47.7%	31.3%
BOTSWANA	76	22.4%	7.1%	JORDAN	241	47.7%	25.8%
GUINEA	56	23.2%	7.0%	NIGER	12	50.0%	29.9%
EGYPT	715	23.6%	8.6%	CHINA	933	52.1%	25.8%
PANAMA	42	23.8%	6.2%	JAMAICA	23	52.2%	9.5%
NICARAGUA	644	24.5%	12.2%	ARGENTINA	217	55.8%	16.2%
BOLIVIA	124	25.8%	10.9%	SENEGAL	16	56.3%	22.4%
MALAWI	92	27.2%	10.5%	SOUTH AFRICA	598	60.7%	13.7%
PAKISTAN	117	27.4%	17.3%	THAILAND	2011	61.9%	39.5%
BURKINA FASO	25	28.0%	9.2%	GEORGIA	8	62.5%	43.6%
KYRGYZSTAN	85	28.2%	14.6%	TURKEY	525	63.8%	30.1%
MONGOLIA	120	28.3%	24.0%	UKRAINE	28	64.3%	38.3%
SYRIA	51	29.4%	9.3%	MAURITIUS	105	66.7%	34.4%
BRAZIL	1473	32.1%	8.1%	CAMEROON	61	68.9%	24.5%
HONDURAS	583	32.4%	17.9%	SRI LANKA	353	71.1%	62.6%
COSTARICA	275	32.7%	13.0%	LAOS	35	71.4%	96.2%
PARAGUAY	64	32.8%	17.0%	LEBANON	64	73.4%	29.7%
COLOMBIA	267	33.0%	9.7%	MALAYSIA	285	80.4%	65.6%
GUYANA	148	34.5%	18.2%	CAMBODIA	37	81.1%	76.1%
MADAGASCAR	124	34.7%	29.7%	Total	21336		
ZAMBIA	74	35.1%	12.0%	Mean		39.2%	21.1%
PHILIPPINES	577	37.8%	28.7%	Median		36.5%	16.6%
GUATEMALA	637	39.1%	15.7%	Standard Deviation		0.189	0.177

Appendix 2 Distribution of Firms with Different Characteristics, by Industry

	Total	Garments	E&E	Leather	Textiles	Transport	Chemicals
Export Orientation (%)							
Exporter	39.4	52.2	42.7	42.2	42.1	38.9	36.8
Non-Exporter	60.6	47.8	57.3	57.8	57.9	61.2	63.2
Export Intensity : Exports/Sales	53%	78%	60%	64%	56%	27%	27%
Foreign Owned (%)							
Yes	15.6	13.2	32.8	6.2	12.4	21.1	16.1
No(< 10% of equity)	84.4	86.8	67.2	93.8	87.6	78.9	83.9
SMEs (%)							
Yes(<100 workers)	66.6	60.3	54.7	72.6	57.0	57.9	71.4
No	33.4	39.7	45.3	27.4	43.0	42.1	28.6
Total No. of Firms	21,336	3,289	1,423	614	2,087	1,040	1,809
	Non-metal & Plastic	**Other Manu.**	**Food**	**Metals & Machinery**	**Paper**	**Wood & Furniture**	**Beverages**
Export Orientation (%)							
Exporter	36.5	36.3	36.0	34.2	33.0	31.6	26.0
Non-Exporter	63.6	63.7	64.0	65.8	67.0	68.4	74.0
Export Intensity : Exports/Sales	46%	39%	55%	36%	30%	56%	44%
Foreign Owned (%)							
Yes	16.6	22.7	14.3	16.1	7.6	6.8	13.3
No(< 10% of equity)	83.4	77.3	85.7	83.9	92.4	93.2	86.7
SMEs (%)							
Yes(<100 workers)	71.9	76.4	66.4	73.3	77.1	69.6	65.8
No	28.1	23.6	33.7	26.7	22.9	30.5	34.3
Total No. of Firms	1,668	1,136	3,626	2,523	1674	266	181

Appendix 3 Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Exports/Sales	20997	0.21	0.36	0	1
Firm Age	21336	19.00	31.90	0	2015
Employment	21336	215.50	614.89	1	21554
Share of Foreign Ownership	21336	0.12	0.29	0	1
Value Added/L (mil USD 2000)	21336	90.07	4387.99	0	391934
Capital Stock/L (mil USD 2000)	21336	153.14	11094.64	1.90E-10	1466294

Appendix 4 "Time For Export" of Countries

Country	Time for Export 2005	Time for Export 2008	Country	Time for Export 2005	Time for Export 2008
PANAMA	9	9	SOUTH AFRICA	30	30
LITHUANIA	10	10	TANZANIA	30	24
ALGERIA	15	17	UKRAINE	31	31
ARGENTINA	16	13	MOLDOVA	32	32
MAURITIUS	16	17	BOTSWANA	33	31
MEXICO	17	17	GUINEA	33	33
PHILIPPINES	17	16	PAKISTAN	33	24
POLAND	17	17	COLOMBIA	34	14
BRAZIL	18	14	BANGLADESH	35	28
CHINA	18	21	PARAGUAY	35	35
MALAYSIA	18	18	COSTARICA	36	18
GUATEMALA	20	19	INDIA	36	17
HONDURAS	20	20	NICARAGUA	38	29
JAMAICA	20	21	CAMEROON	39	27
SENEGAL	20	14	MAURITANIA	42	35
TURKEY	20	14	UGANDA	42	39
CHILE	21	21	CAMBODIA	43	22
EL SALVADOR	22	14	BURKINA FASO	45	45
LEBANON	22	27	MALAWI	45	45
OMAN	22	22	ETHIOPIA	46	46
BOLIVIA	24	19	BURUNDI	47	47
PERU	24	24	GHANA	47	19
THAILAND	24	14	MADAGASCAR	48	23
URUGUAY	24	19	SYRIA	49	15
VIETNAM	24	24	ZAMBIA	53	53
INDONESIA	25	21	GEORGIA	54	12
SRILANKA	25	21	MONGOLIA	58	49
EGYPT	27	14	NIGER	59	59
MOZAMBIQUE	27	26	RWANDA	63	42
JORDAN	28	19	KYRGYZSTAN	64	64
NAMIBIA	29	29	LAOS	66	50
GUYANA	30	30	ERITREA	69	50

Distribution of Time for Export (2005-2008)

	Mean	Std. Dev.	Min	Max	Observations
overall	29.0	13.5	9	69	N = 256
between		12.7	9	64	n = 64
within		5.0	15.3	60.5	T = 4

Appendix 5 Industry Time Sensitivity

Industry	Time Sensitivity	
	Large Shipments (ts1)	All Shipments (ts2)
Beverages	0.52	0.52
Paper	0.56	0.71
Transportation Equipments	2.54	2.78
Wood and furniture	2.67	3.12
Food	3.71	4.23
Leather	12.07	12.92
Textiles	16.20	16.90
Garments	17.45	18.54
Metals and machinery	20.18	20.55
Non-metallic and plastic materials	34.26	33.92
Other manufacturing	37.63	38.23
Chemicals and pharmaceutics	45.14	44.78
Electronics	52.88	53.69

ts = custom value of air transportation/total custom value

Appendix 6 Correlation between "Time for Export", and Other Country Characteristics

	Time for Export	
	2005	2008
Time for Export: EXP_T (2008)	0.7708	1
Remoteness	0.1931	0.2583
Capital Stock: K	-0.4795	-0.4777
Skill Endowment: H	-0.5431	-0.5192
Private Credit/GDP: CR	-0.4476	-0.3164

Correlation between Time Sensitivity, and Other Industry Characteristics

	Time Sensitivity	
	Large Shipments (ts1)	All Shipments (ts2)
Capital Intensity: k	-0.143	-0.158
	(0.641)	(0.607)
Skill Intensity:h	0.593	0.587
	(0.033)	(0.035)
Reliance on External Finance: fd	0.749	0.746
	(0.003)	(0.003)

significant levels are reported in parentheses

Table 1 Cross-Country Analysis

	Export Probability		Export Intensity	
	(1)	**(2)**	**(3)**	**(4)**
Export Time, EXP_T (2005)	-0.008***		-0.004***	
	(0.001)		(0.001)	
Export Time, EXP_T (t)		-0.006**		-0.005***
		(0.003)		(0.002)
No. of Obs	21336	8270	21099	8099
No. of Obs not censored			6336	2624
Log-likelihood	-12303	-4243	-16245	-5469
Chi-Square	5847	2085		
F statistics			261	112
Pseudo R-squared	0.233	0.237	0.205	0.217

All regressions include firm characteristics, year fixed effects and industry fixed effects.
Robust standard errors in parentheses. Significance levels: *=10%, **=5%; ***=1%.

Table 2 Baseline Results from the Difference-in-Difference Analysis

	Export Probability						
	Coefficients					Marginal Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Time Interaction: ts1 X EXp_T(2005)	-0.013***	-0.013***	-0.014***	-0.012***	-0.013***	-0.0048***	-0.0048***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.0009)	(0.0012)
Time Remoteness Interaction: ts1 X RM		-0.004	-0.025	-0.005	-0.041**		-0.0155**
		(0.015)	(0.018)	(0.015)	(0.019)		(0.0073)
Capital Interaction: k X K			0.656***		0.678***		0.2558***
			(0.064)		(0.065)		(0.0245)
Skill Interaction: h X H			0.008		0.012		0.0044
			(0.016)		(0.016)		(0.0061)
Financial Interaction: fd X CR				0.043	0.375***		0.1416***
				(0.113)	(0.141)		(0.0533)
ln(Firm Age)	-0.019	-0.019	-0.003	-0.019	-0.001	-0.0072	-0.0002
	(0.014)	(0.014)	(0.017)	(0.014)	(0.017)	(0.0054)	(0.0063)
ln (Employment)	0.476***	0.476***	0.486***	0.476***	0.485***	0.1787***	0.1830***
	(0.009)	(0.009)	(0.011)	(0.009)	(0.011)	(0.0035)	(0.0040)
Share of Foreign Ownership	0.619***	0.620***	0.509***	0.620***	0.503***	0.2324***	0.1898***
	(0.044)	(0.044)	(0.053)	(0.044)	(0.053)	(0.0165)	(0.0202)
ln(Value Added/L)	0.083***	0.083***	0.101***	0.084***	0.102***	0.0311***	0.0383***
	(0.009)	(0.009)	(0.010)	(0.009)	(0.010)	(0.0032)	(0.0038)
ln(Capital Stock/L)	0.013*	0.013*	0.017**	0.014**	0.017**	0.0050*	0.0064**
	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)	(0.0026)	(0.0030)
No. of Observations	21336	21336	16567	21292	16567	21336	16567
Log-likelihood	-10276	-10276	-7873	-10255	-7869	-10276	-7869
Chi-Square	5470	5470	4351	5454	4346	5470	4346
Pseudo R-squared	0.282	0.282	0.293	0.282	0.293	0.282	0.293

All regressions include country-year fixed effects and industry fixed effects. Robust standard errors in parentheses. Significance levels: *=10%, **=5%; ***=1%.

Table 2 Baseline Results from the Difference-in-Difference Analysis (cont.)

	Export Intensity						
	Coefficients					Marginal Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Time Interaction: ts1 X EXP_T(2005)	-0.010***	-0.010***	-0.010***	-0.009***	-0.009***	-0.0015***	-0.0013***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.0002)	(0.0003)
Time Remoteness Interaction: ts1 X RM		-0.009	-0.016*	-0.01	-0.029***		-0.0045***
		(0.008)	(0.009)	(0.008)	(0.010)		(0.0016)
Capital Interaction: k X K			0.491***		0.512***		0.0790***
			(0.038)		(0.039)		(0.0060)
Skill Interaction: h X H			0.030***		0.034***		0.0053***
			(0.009)		(0.009)		(0.0014)
Financial Interaction: fd X CR				0.062	0.284***		0.0438***
				(0.058)	(0.072)		(0.0111)
ln(Firm Age)	-0.076***	-0.076***	-0.071***	-0.075***	-0.069***	-0.0114***	-0.0106***
	(0.008)	(0.008)	(0.010)	(0.008)	(0.009)	(0.0013)	(0.0015)
ln (Employment)	0.275***	0.275***	0.278***	0.274***	0.273***	0.0414***	0.0427***
	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.0008)	(0.0010)
Share of Foreign Ownership	0.427***	0.428***	0.318***	0.428***	0.300***	0.0642***	0.0482***
	(0.022)	(0.022)	(0.025)	(0.022)	(0.023)	(0.0033)	(0.0038)
ln(Value Added/L)	0.043***	0.043***	0.053***	0.043***	0.047***	0.0064***	0.0083***
	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.0007)	(0.0009)
ln(Capital Stock/L)	-0.006	-0.006	-0.004	-0.005	-0.008*	-0.0009	-0.0006
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.0006)	(0.0007)
No. of Observations	21099	21099	16252	21055	16252	21099	16252
No. of Obs. not censored	6336	6336	4912	6330	4912	6336	4912
Log-likelihood	-13829	-13828	-10653	-13802	-10646	-13829	-10646
F Statistics	.	.	84	.	83	.	83
Pseudo R-squared	0.254	0.254	0.26	0.254	0.261	0.254	0.261

All regressions include country-year fixed effects and industry fixed effects. Robust standard errors in parentheses. Significance levels: *=10%, **=5%; ***=1%.

Table 3 Difference-in-Difference Analysis: Interactions between Time Sensitivity and Other Country Characteristics

	Export Probability			Export Intensity		
	(1)	(2)	(3)	(4)	(5)	(6)
Time Interaction: ts1 X EXP_T(2005)	-0.013***	-0.016***	-0.013***	-0.013***	-0.011***	-0.010***
	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)
Time Remoteness Interaction: ts1 X RM	-0.023	-0.013	-0.004	-0.008	-0.008	-0.009
	(0.020)	(0.018)	(0.015)	(0.010)	(0.009)	(0.008)
Time Sensitivity X Capital Endowmment: ts1 X K	0.277			0.036		
	(0.266)			(0.137)		
Time Sensitivity X Skill Endowmment: ts1 X H		0.00			0.013**	
		(0.010)			(0.005)	
Time Sensitivity X Credit Availability: ts1 X CR			-0.001			0.00
			(0.002)			(0.001)
No. of Observations	16567	16567	21292	16252	16252	21055
No. of Obs. not censored				4912	4912	6330
Log-likelihood	-7923	-7923	-10255	-10746	-10744	-13803
Chi-Square	4319	4323	5455			
F Statistics				84	84	.
Pseudo R-squared	0.289	0.289	0.282	0.254	0.254	0.254

All regressions include firm characteristics, country-year fixed effects and industry fixed effects.

Robust standard errors in parentheses. Significance levels: *=10%, **=5%; ***=1%.

Table 4 Difference-in-Difference Analysis: Alternative Time Interactions

	Export Probability						Export Intensity					
	2005-2008		"Time for Export" in the Same Year		Alternative Measure on Time Sensitivity		2005-2008		"Time for Export" in the Same Year		Alternative Measure on Time Sensitivity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Time Interaction: ts1 X EXP_T(2005)	-0.012***	-0.012**					-0.009***	-0.009***				
	(0.004)	(0.005)					(0.002)	(0.002)				
Time Interaction: ts1 X EXP_T(yearly)			-0.014***	-0.008**					-0.010***	-0.006**		
			(0.004)	(0.004)					(0.002)	(0.003)		
Time Interaction: ts2 X EXP_T(2005)					-0.012***	-0.012***					-0.010***	-0.008***
					(0.002)	(0.003)					(0.001)	(0.002)
Time Remoteness Interaction: ts1 X RM		-0.058*		-0.067**				-0.019		-0.025		
		(0.032)		(0.032)				(0.015)		(0.015)		
Time Remoteness Interaction: ts2 X RM						-0.042**						-0.030***
						(0.020)						(0.010)
Capital Interaction: k X K		0.667***		0.673***		0.681***		0.470***		0.474***		0.514***
		(0.111)		(0.111)		(0.065)		(0.059)		(0.060)		(0.039)
Skill Interaction: h X H		0.081**		0.095***		0.013		0.070***		0.080***		0.035***
		(0.035)		(0.034)		(0.016)		(0.017)		(0.017)		(0.009)
Financial Interaction: fd X CR		0.167		0.169		0.380***		0.148		0.147		0.287***
		(0.274)		(0.282)		(0.141)		(0.137)		(0.140)		(0.072)
No. of Observations	8270	5770	8349	5770	21336	16567	8201	5617	8280	5617	21099	16252
No. of Obs. not censored							2631	1902	2652	1902	6336	4912
Log-likelihood	-4042	-2789	-4072	-2791	-10278	-7870	-5228	-3548	-5271	-3552	-13831	-10647
Chi-Square	2223	1561	2249	1559	5470	4346						
F Statistics							.	43	.	43	.	83
Pseudo R-squared	0.273	0.282	0.275	0.282	0.282	0.293	0.257	0.252	0.259	0.251	0.254	0.261

All regressions include firm characteristics, country-year fixed effects and industry fixed effects.

Robust standard errors in parentheses. Significance levels: *=10%, **=5%; ***=1%.

Table 5 Difference-in-Difference Analysis: Restricting the Number of Surveys

	Export Probability				Export Intensity			
	Large Surveys		Only One Large Survey for Each Country		Large Surveys		Only One Large Survey for Each Country	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time Interaction: ts1 X EXP_T(2005)	-0.014***	-0.014***	-0.013***	-0.013***	-0.011***	-0.010***	-0.011***	-0.009***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.001)	(0.002)	(0.002)	(0.002)
Time Remoteness Interaction: ts1 X RM		-0.043**		-0.04		-0.030***		-0.02
		(0.020)		(0.025)		(0.010)		(0.014)
Capital Interaction: k X K		0.670***		0.616***		0.511***		0.512***
		(0.066)		(0.070)		(0.039)		(0.044)
Skill Interaction: h X H		0.012		0.031*		0.034***		0.049***
		(0.016)		(0.019)		(0.009)		(0.011)
Financial Interaction: fd X CR		0.392***		0.085		0.291***		0.069
		(0.142)		(0.164)		(0.072)		(0.088)
No. of Observations	20967	16461	16386	12050	20639	16146	16292	11886
No. of Obs. not censored					6220	4865	4699	3360
Log-likelihood	-10107	-7818	-7840	-5634	-13605	-10582	-10725	-7764
Chi-Square	5308	4300	4208	3187				
F Statistics					82	87	.	70
Pseudo R-squared	0.281	0.293	0.285	0.301	0.249	0.261	0.257	0.269

All regressions include firm characteristics, country-year fixed effects and industry fixed effects.

Robust standard errors in parentheses. Significance levels: *=10%, **=5%; ***=1%.

Table 6 Difference-in-Difference Analysis: Assessing Bias due to the Lobbying Effects

	Export Probability						Export Intensity					
	Domestic Small Firms		Excluding Members of Lobbying Business Associations		Excluding Major Exporters		Domestic Small Firms		Excluding Members of Lobbying Business Associations		Excluding Major Exporters	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Time Interaction: ts1 X EXP_T(2005)	-0.015***	-0.013***	-0.010***	-0.013***	-0.006**	-0.006*	-0.011***	-0.010***	-0.008***	-0.008***	-0.002**	-0.001*
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Time Remoteness Interaction: ts1 X RM		-0.001		-0.027		-0.004		-0.022		-0.027**		-0.004
		(0.027)		(0.023)		(0.021)		(0.018)		(0.013)		(0.005)
Capital Interaction: k X K		0.511***		0.463***		0.232***		0.453***		0.330***		0.051**
		(0.090)		(0.077)		(0.084)		(0.064)		(0.045)		(0.021)
Skill Interaction: h X H		0.008		0.006		-0.021		0.016		0.029**		-0.004
		(0.023)		(0.020)		(0.021)		(0.017)		(0.011)		(0.005)
Financial Interaction: fd X CR		0.403*		0.339*		0.128		0.494***		0.187*		0.025
		(0.233)		(0.193)		(0.165)		(0.165)		(0.097)		(0.036)
	12910	10400	15810	11657	17300	13468	12833	10233	15652	11433	17072	13154
No. of Obs. not censored							2399	1941	4283	3033	4084	3272
Log-likelihood	-5625	-4527	-7348	-5284	-7449	-5734	-6569	-5297	-9516	-6764	-5198	-3874
Chi-Square	1967	1724	3912	2892	3397	2801						
F Statistics							.	24	.	54	.	45
Pseudo R-squared	0.183	0.192	0.28	0.288	0.239	0.256	0.164	0.17	0.254	0.258	0.287	0.31

All regressions include firm characteristics, country-year fixed effects and industry fixed effects.

Robust standard errors in parentheses. Significance levels: *=10%, **=5%; ***=1%.

Table 7 Difference-in-Difference Analysis: Triple Interactions

	Export Probability				Export Intensity			
	Interact with Income Level		Interact with Productivity		Interact with Income Level		Interact with Productivity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time Interaction: ts1 X EXP_T(2005)	-0.018***	-0.014***	-0.013***	-0.013***	-0.013***	-0.009***	-0.011***	-0.009***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)
Time Interaction X Income Level: ts X 1EXP_T(2005) X ln(GDP per capita)	0.002***	0.001			0.001***	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Time Interaction X Firm Productivity : ts1 X EXP_T(2005) X ln(VA/L)			0.000	0.000			0.000	0.000
			(0.000)	(0.000)			(0.000)	(0.000)
Time Remoteness Interaction: ts1 X RM	-0.030*	-0.045**		-0.042**	0.001***	-0.030***		-0.032***
	(0.016)	(0.020)		(0.020)	(0.000)	(0.010)		(0.011)
Capital Interaction: k X K		0.669***		0.678***		0.511***		0.512***
		(0.065)		(0.065)		(0.039)		(0.039)
Skill Interaction: h X H		0.011		0.012		0.034***		0.035***
		(0.016)		(0.016)		(0.009)		(0.009)
Financial Interaction: fd X CR		0.301**		0.375***		0.273***		0.282***
		(0.152)		(0.142)		(0.078)		(0.072)
No. of Observations	21336	16567	21336	16567	21099	16252	21099	16252
No. of Obs. not censored					6336	4912	6336	4912
Log-likelihood	-10260	-7868	-10276	-7869	-13818	-10646	-13828	-10645
Chi-Square	5449	4348	5471	4346				
F Statistics					.	81	.	81
Pseudo R-squared	0.283	0.293	0.282	0.293	0.255	0.261	0.254	0.261

All regressions include firm characteristics, country-year fixed effects and industry fixed effects.

Robust standard errors in parentheses. Significance levels: *=10%, **=5%; ***=1%.

Table 8 Difference-in-Difference Analysis: Different Segments of Factory-to-Port Time

	Export Probability						Export Intensity					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Time Interaction: ts1 X EXP_T(2008)	-0.012***						-0.007***					
	(0.003)						(0.001)					
Time Interaction: ts1 X EXP_T(documents)		-0.006***				-0.002		-0.003**				0.000
		(0.002)				(0.002)		(0.001)				(0.001)
Time Interaction: ts1 X EXP_T(customs)			-0.010***			-0.008***			-0.006***			-0.005***
			(0.002)			(0.002)			(0.001)			(0.001)
Time Interaction: ts1 X EXP_T(ports)				-0.008***		-0.002				-0.004***		0.000
				(0.003)		(0.003)				(0.001)		(0.002)
Time Interaction: ts1 X EXP_T(inland)					-0.007***	-0.005**					-0.004***	-0.003***
					(0.002)	(0.002)					(0.001)	(0.001)
Time Remoteness Interaction: ts1 X RM	0.002	-0.006	-0.015	0.013	-0.011	-0.006	-0.008	-0.013	-0.018**	-0.003	-0.015**	-0.016
	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.018)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.010)
No. of Observations	21458	21458	21458	21458	21458	21458	21221	21221	21221	21221	21221	21221
No. of Obs. not censored							6358	6358	6358	6358	6358	6358
Log-likelihood	-10318	-10325	-10314	-10323	-10321	-10310	-13896	-13902	-13890	-13901	-13897	-13886
Chi-Square	5471	5481	5478	5491	5490	5476						
F Statistics							.	.	.	.	.	.
Pseudo R-squared	0.282	0.282	0.283	0.282	0.282	0.283	0.255	0.254	0.255	0.254	0.254	0.255

All regressions include firm characteristics, country-year fixed effects and industry fixed effects.

Robust standard errors in parentheses. Significance levels: *=10%, **=5%; ***=1%.