

Corruption, Delays, and the Pattern of Trade*

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Abstract

We argue that corruption deters international trade by causing delays in exporting and importing, both at customs and in other required administrative procedures. We study three manifestations of corruption as a barrier to trade. The corruption effect is both significant and economically sizeable. We first show the negative relationship between the exporters and importers levels of corruption and trade volumes at the country level in a gravity framework. This country-level effect implies that a standard deviation increase in the exporters corruption level causes a 27% drop in exports. We then show that corruption indeed operates through delays: we establish that this effect stronger in sectors in which goods are more time-sensitive. The magnitude of this interaction effect is large: a standard deviation increase in the exporters corruption level causes a decrease in exports ranging from 7% in the least time-sensitive sector to 42% in the most time-sensitive sector. Finally, we find that corruption also decreases more the probability of positive trade in sectors in which goods are more time-sensitive. We use unpredictability of sales as our measure of time-sensitivity. Our results are robust both to controlling for a variety of alternative explanations and to instrumenting corruption to alleviate concerns of endogeneity.

Keywords: Corruption, Pattern of Trade, Time-Sensitivity, Gravity, Bilateral Trade Flows.

JEL Classification: F17, D73, O17.

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1 Introduction

Corruption is often cited as creating obstacles to doing business. Yet, there is little evidence of the precise mechanisms through which it affects economic activity. In fact, the debate persists between a view of corruption as "greasing the wheel" of commerce and a view of corruption as a distortionary tax that decreases economic efficiency. This paper provides evidence that corruption acts as a barrier to international trade and that its deterrent effect is stronger in more time-sensitive sectors. This evidence corroborates our hypothesis that corruption deters trade through the creation of delays.

We focus on corruption in exporting and importing procedures, including both custom clearance and other administrative procedures required for trading. Indeed, as shown in a global poll of opinion leaders published by the World Bank (World Bank, 2003), customs are generally ranked among the most corrupt government agencies. We argue that corruption at customs, and in other administrative procedures required for trading, affects trade volumes through the power that officials have to delay goods in transit. In effect, corruption may manifest itself as an actual delay or as a bribe payment exchanged for faster processing. As stated by a Ghana official, "delay in customs procedures creates the opportunity for officials to request unofficial payments". Clearly, it follows that the delay is more of an obstacle to trade for goods that are time-sensitive, i.e. goods for which the expected value of exporting decreases with time delays. As explained by the Secretary General of the Chamber of Trade and Industry in Benin, "custom officers often take advantage of merchants' rush to get their often perishable products on the market by slowing the process and thereby forcing the businesses to pay bribes or risk losing profits"³. In other words, potential delays affect trade in time-sensitive products more, which may translate either in effective delays or in larger bribes being extracted. Micro-evidence of this latter link between the amount of bribes and the time-sensitivity of a shipment is provided by Mullainathan and Sequeira, 2007. That paper investigates bribe payments in two ports located in Southern Africa. The study shows that, when a cargo gets stopped at customs in the exporting country, the amount of bribes extracted is significantly larger when products are perishable. Based on this evidence and the considerations above, we expect that corruption has both an average effect on trade volumes at the country level and a differentially stronger effect in sectors where goods are more time-sensitive.

More specifically, our empirical analysis proceeds in three parts as we study three different manifestations of the way corruption acts as a barrier to trade. We first show the negative relationship between both the exporter's and importer's levels of corruption and trade volumes in a gravity framework. We use data from Kaufmann, Kraay, and Mastruzzi (2005) for corruption levels and from

³Global Integrity Report on Benin, <http://www.globalintegrity.org/reports/2006/pdfs/benin.pdf>

the World Trade Flows database for trade volumes. We introduce an extensive set of controls and instrument for the corruption level to further check the robustness of our results.

We then show that corruption indeed operates through delays: we establish that corruption decreases trade volumes more in more time-sensitive sectors. Empirically, we use again a gravity framework, but with exports disaggregated further by exporter, importer and sector. We introduce an interaction term between the country-level corruption variable and the sector-level time sensitivity and show that its coefficient is significantly negative. We define time-sensitivity as the rate at which the expected value of exporting a given good decreases with the total time it takes to produce and ship it. We proxy for it using the measure of sales unpredictability built in Serfaty - de Medeiros (2007).

Indeed, in Mullainathan and Sequeira, 2007, time-sensitivity comes from perishability. However, other sources of time-sensitivity are likely to be more important in our dataset since we are focusing on trade flows in manufacturing and do not include commodities, or agricultural goods such as cut flowers or fresh produce⁴. Namely, there are two other sources of time-sensitivity that authors typically agree on (see Hummels, 2001): obsolescence and demand unpredictability. Obsolescence is a form of time-sensitivity since, for example, as new designs come out frequently, the value of a computer chip decreases fast with its time-to-market (the time from production decision to the final consumer). Obsolescence is difficult to measure and is likely to be critical only for a handful of sectors where either the pace of innovation is very high (Computer Equipment, Electronic Components) or where products are by nature frequently renewed (Newspapers, Periodicals). Hence, we focus on the third source of time-sensitivity. The existence of unanticipated variations in demand levels is indeed an important source of time-sensitivity: if by the time a good reaches its market, demand for it has vanished, its value falls. More generally, if its sales are difficult to predict, the ex ante expected value of exporting the good decreases with its time-to-market because the forecasting error increases with that time lag and creates potential over-stocks and under-stocks. Finally, the more unpredictable sales are, the worse the forecasts, and the faster the value of exporting the good falls with time, i.e. the larger the time-sensitivity. This mechanism is modeled and explored in Serfaty - de Medeiros (2007). That paper also builds a measure of unpredictability and shows that indeed this measure influences the choice of fast vs. slow transportation in international trade, hence validating its use as a proxy for time-sensitivity.

Finally, we show that corruption also affects the probability of observing positive trade flows between two given countries in a given sector. Specifically, corruption decreases more the probability

⁴Among the 114 3-digit SIC sectors included in our analysis, only less than 10 can be classified as literally perishable. Bakery, Meat and Dairy Products for sure include mostly perishable products, Beverages include some perishable products, and Agricultural and Medicinal Chemicals as well.

of positive trade in sectors in which goods are more time-sensitive. We control for selection in our previous results and find that the effect of corruption on comparative advantage survives: corruption affects both selection, and trade volume conditional on selection.

This paper is organized as follows. The remainder of this introduction examines the relationship of our investigation with the existing literature. The next section, Section 2, further articulates the motivation for our empirical investigation. Section 3 presents our estimation equations and strategy. Section 4 introduces the data we use. Section 5 explains our empirical results and Section 6 concludes.

In terms of method and high-level structure of the analysis, this paper naturally inserts itself in the empirical study of gravity models of trade, of sector-country effects on trade (such as Chor, 2006, Manova, 2007, Cunat and Melitz, 2007, Nunn, 2007 and Romalis, 2004), and of selection into trade (such as Helpman, Melitz and Rubinstein, 2008). In terms of subject matter, this paper bridges the literature on time and trade with that on institutions and trade by showing that institutions impact trade through their effect on delays in administrative procedures.

This paper is related to the literature on timeliness and trade that tries to show how the rate at which a good's value decreases with time affects trade patterns. Hummels (2001) uses an empirical model of the choice of air vs. sea transportation to identify the trade-off between time saved and cost across industries. Time-sensitive goods in his framework are goods that are likely to be shipped by air to save time despite the higher cost. But the good characteristics that lead to this choice are not investigated, i.e. that paper does not unbundle different sources of time-sensitivity. Serfaty -de Medeiros (2007) takes a different approach and shows how sales unpredictability affects the choice of transportation mode, and hence the distance elasticity differentially across sectors. We use the measure of unpredictability built in that paper.

About the effect of delays on trade volume, Djankov, Freund and Pham (2007) show that the overall time taken by administrative procedures has a negative effect on trade. They also show that the effect is more pronounced in sectors where goods are more perishable, or where the trade-off identified by Hummels indicates a higher willingness to pay for speed. We contribute further by unbundling the effect of lengthy procedures in place in a particular country from that of corruption. Also, we address endogeneity of corruption. Finally, we use a model-motivated measure of time-sensitivity that allows us to interpret precisely our results in terms of a particular source of time-sensitivity.

To the best of our knowledge, while there is a budding literature on institutions and trade, only very few papers explicitly study the effect of corruption on trade. Anderson and Mercouiller (2002) study the effect of institution quality on trade. They evoke corruption in the motivation for their study but do not include a measure of it in their empirical analysis. In contrast, we focus on the effect

of corruption and find that our results are robust to controlling for a measure of rule of law such as the ones they use. Nunn (2005) studies the effect of judicial quality on comparative advantage. The second part of our analysis is conceptually close to his in its structure as we look at the interaction of a country-level institutional variable, corruption, with a sector-level characteristic, time-sensitivity and we use related empirical specifications. But the topic is different, and we study also the first-order effect and the effect on selection into trade.

Dutt and Traca (2007) look at corruption at the country-level and their investigation is related to the first part of our analysis. We add to the country-level analysis by proposing instruments for corruption. Also, we use the sector–country analysis to determine precisely the channel through which corruption deters trade.

Finally, we draw from the literature on determinants of corruption when selecting instruments for corruption. Sala-i-Martin and Subramanian (2003) and Ades and Di Tella (1999), for example, show that natural resource abundance is associated with higher levels of corruption. Following this literature, we will use a measure of energy production from the World Bank Adjusted Net Savings database as an instrument for corruption. Further discussion of this instrument as well as of alternative instruments can be found in subsequent sections.

2 How corruption creates delays that matter for trade

We argue that corruption creates time delays, and hence constitutes a barrier to trade because it diminishes the expected profit from exporting. We start out thinking of corruption delays as a tax because goods depreciate, get obsolete, or have uncertain demand. All goods are time-sensitive to some extent, and bribe extraction along exporting and importing procedures take advantage of that. Time-related corruption when it comes to custom clearance, or procedures to export or import can manifest itself as time delays or bribes.⁵

We first look at country-level exports and expect that they are hampered by the exporter’s and the importer’s corruption level (both can delay the delivery of goods to final consumers). Yet, at the country level, corruption can still play out through two different channels. The time channel consists of either time delays or bribes that play on relative patience of the exporter vs. the corrupt official. But either way its effect is stronger on time-sensitive products. If there are additional time delays, time-sensitive goods lose some of their value by definition. If there is bargaining and a bribe is

⁵They are typically related in that the corrupt official has the possibility to either create a time delay or exchange a faster process against a bribe.

extracted in exchange for a reduced time delay, the corrupt official can extract more from the exporter of time-sensitive goods since her outside options diminish quickly with time. As a result, time-related corruption is equivalent to a tax that is increasing in the time-sensitivity of the traded goods.

But there can be bribes that are independent of the time factor. Some bribes may exist even in the absence of time-sensitivity. For example, Dutt and Traca (2007) model bribes as essentially related to the payment of existing tariffs in the importing country and independent of time. Such bribes operate as a tax increasing or decreasing vehicle and their effect across sectors should not correlate with time-sensitivity.

Hence, it is the variation in the effect of corruption across sectors with different degrees of time-sensitivity that enables us to identify the time channel we are interested in. Specifically, we test whether the negative effect of corruption on trade flows is stonger in sectors where goods are more time-sensitive. Since only time-sensitive corruption is equivalent to a tax that is increasing in the time-sensitivity of the traded goods, this test provides evidence of the time channel.

Let us now precise what we mean by time-sensitivity and how we proxy for it empirically. We specifically take time-sensitivity to mean that the expected value of exporting a given good decreases with the total time it takes to produce and ship it. As explained in the introduction, we focus on the third element of time-sensitivity: sales unpredictability as we think it is both better measured and more crucial than perishability and obsolescence in our dataset. As shown formally in Serfaty - de Medeiros, 2007, the more unpredictable sales of a given good are, the faster the expected value of exports decreases with the time it takes to produce and ship it. Indeed, in the presence of uncertainty about future demand for a given good, the decision on the quantity produced is based on a forecast of future sales. The longer the time lag between the decision and the actual sales, the more imprecise the forecast, and the larger the cost of uncertainty. Indeed, uncertainty is costly to the extent that the imprecise forecast implies over/under-stocks. So, the expected value of exporting decreases with time. And the speed at which it does increases with the underlying level of uncertainty. The advantage of using this measure is that it has been constructed for a large array of sectors using firm-level data and is clearly interpretable in an explicit theoretical framework. Also, it has been shown to indeed influence the choice of air vs. sea transportation, implying that it is indeed an empirically important element of time-sensitivity.

We propose a third test of the effect of corruption in line with the former ones: we expect to find that corruption also decreases the probability of positive trade, and more so in more time-sensitive sectors. Indeed we show that in observed trade flows, corruption decreases the value of exporting, and more so in more time-sensitive sectors. But then we would expect this to be true in unobserved

trade flows as well. Simply, if the expected value of exporting from country i to country j in sector s is too low, then we do not observe trade at all in that triplet. Hence, the same explanatory variables should also explain the selection of triplets into trade.

Finally, some papers have argued that corruption might help "grease the wheel"⁶ of economic activity by effectively enabling dynamic economic agents to bypass red tape. The equivalent argument in our context would be that corruption may actually help expedite the exporting or importing processes when procedures are lengthy. Corruption might actually be a substitute to efficient procedures in terms of trade facilitation. We do not exclude this possibility a priori, but take an empirical approach to this question. To explore this argument, we first control for the complexity of procedures. In unreported results, we also interact the corruption variable with the measure of the complexity of procedures. If such a mechanism was at play in our data, we would expect that the effect of corruption would vary with the complexity of procedures in place. We find no evidence to that effect, and hence conclude that this mechanism is not at play in exporting and importing procedures.

3 Estimation Strategy

In this section, we lay out our empirical framework for each of the three questions that we address: the effect of corruption on country-level trade flows, the differential effect of corruption in more time-sensitive sectors, and its effect on selection into trade.

All of our analysis focuses on trade flows for a particular year (year 2000), as in Chor (2006) and Cumat-Melitz (2007), because of constraints on data availability. The measure of time-sensitivity is built for year 2000. This measure is the standard deviation of unpredictable sales and is computed using quarterly data from COMPUSTAT. Hence, to have enough points to calculate significant standard deviations, calculations use 10 years of data (1991-2000). One more independent observation could be built for 1990 using the same methodology (the database starts in 1980). But then, the corruption data would not be available.

3.1 Country-level tests: first-order effect of corruption

3.1.1 Baseline Specification

We first investigate the effect of corruption using data on trade flows aggregated by exporter- importer pairs. Our base specification is the following:

⁶this phrase is used by Rose-Ackerman, 1997 to describe this particular view of corruption.

$$\ln X_{ij} = \alpha + \beta_{1or}C_i + \beta_{1dest}C_j + \gamma G_{ij} + \zeta_{or}Z_i + \zeta_{dest}Z_j + \varepsilon_{ij} \quad (1)$$

where X_{ij} are the total exports from country i to country j , C_i and C_j represent the level of corruption of, respectively, the origin and destination country. G_{ij} is a vector of pair-wise gravity variables including distance between the origin and destination countries and a set of dummies: contiguity indicates whether both countries have a common border, colony indicates whether the countries have had a colonial relationship, common language indicates whether they have an official or unofficial language in common. γ is the corresponding vector of coefficients. Z_i and Z_j are sets of country-level variables that serve as controls for the characteristics of, respectively, the origin and the destination country. In our base specification, since we want to identify the effect of corruption at the country level we do not include country fixed effects⁷. Hence, as demonstrated by Anderson and Van Wincoop (2003), it is crucial that we control for the multilateral resistance terms. Otherwise, our estimates of the effect of trade barriers would be biased. And since we interpret corruption as a trade barrier, this would be problematic. We follow Baier and Bergstrand (2001), and proxy for the multilateral resistance term using the log of the PPP price levels in both the country of origin and that of destination, $\ln P_i$ and $\ln P_j$ (they are included in the sets of controls, Z_i and Z_j).

Beyond controlling for GDP levels⁸ and democracy levels to ensure that we are really capturing the independent effect of corruption, our set of controls allows for an interesting interpretation. Indeed, we control for the complexity of exporting and importing procedures, respectively in the origin and destination countries (variables are $PROC_i$ and $PROC_j$). We use data from the "Doing Business" report from the World Bank on the number of signatures required by law and regulations respectively to export and to import. We also control for the general administrative delays in the country using data from the same source on the number of days needed to start a business. These controls allow us to isolate an effect of corruption beyond that of administrative complexities of exporting.

We expect to find a negative average effect of corruption on trade ($\beta_{1or} < 0$ and $\beta_{1dest} < 0$), even after controlling for signatures. We expect the coefficients on procedure complexity and general delays to also be negative.

3.1.2 Further Checks

To further check the robustness of our results, we expand our set of controls and instrument the corruption variable.

⁷We do introduce, in the Appendix, a set of specifications with importer and exporter fixed effects. Results are reported in Appendix Table A2 and provide a robustness check.

⁸We control separately for GDP per capita and population, both in logs.

Omitted variables First, we check that the effects we find and attribute to corruption are indeed independent from effects of other variables that are correlated with corruption and also affect trade volumes. To that end, we add controls for the level of labor market flexibility, *FLEX*, the level of financial development proxied by a measure of credit extended to the private sector, *FINDEV*, and a measure of the rule of law, *LAW*. All of these variables have been shown to affect trade flows at the country-sector level by shaping the pattern of comparative advantage.⁹ The effects of these variables at the country level, i.e. their average effects, on a country's exports have not been the focus of empirical studies but the magnitude of their second-order effects makes them important controls.

We include levels of each of these three variables, both for the exporter and for the importer. The subscript i denotes the exporter and the subscript j denotes the importer.

Reverse causality Finally, we are concerned that trade may have an effect on corruption on top of the effect of corruption on trade. This potential effect of trade on corruption can, a priori, work in either direction. On the one hand, an increased volume of trade may give a country more incentives to reduce corruption due to pressure from foreign governments. International institutions have more leverage when the country trades more given that trade restrictions can be used as a threat. Also, earlier literature has suggested that trade restrictions generate rents and rent-seeking activities, and hence are likely to increase corruption (Leite and Weidmann, 1999). On the other hand, corruption, especially at customs, could increase with trade to the extent that higher volumes of trade imply larger potential bribes.

We use three different instruments to alleviate this concern. First, we use the lagged level of corruption (in 1996, 4 years earlier), which allows to control for any simultaneous effect of trade on corruption. Yet, it can still be the case that the past state of institutions for example influenced both current trade and current corruption. So, we next instrument corruption using the average total production of oil between 1990 and 1995 (World Bank data), that is before the period that we are studying. Our choice of instrument follows a growing body of literature, including Sala-i-Martin and Subramanian (2003) and Ades and Di Tella (1999), showing that indeed natural resource abundance is associated with higher levels of corruption. This is especially true for "point source" resources such as oil and minerals because these resources are easy for a small minority to appropriate, and it is true in our data.¹⁰ There is still a concern that the level of production might not be fully exogenous

⁹Cunat and Melitz (2007) show that a higher degree of labor market flexibility creates a comparative advantage in sectors that have more volatile firm-level sales. Beck (2003) and Manova (2006) show that a country's financial development increases its specialization in sectors that require more outside financing. Finally, Levchenko (2004) and Nunn (2007) show that countries with stronger legal systems have a comparative advantage in sectors more vulnerable to hold-up problems from suppliers.

¹⁰One idea of the mechanism is that these resources lower the need for tax revenue, which in turn makes citizens less

since a corrupt government could distort the allocation of resources across different sectors of the economy. Hence, we also instrument using legal origins, which are clearly exogenous. The issue here is that the exclusion restriction might not be satisfied because legal origins may affect trade through many channels other than corruption. A large set of controls may capture most of these potential channels and alleviate this concern, but may also be problematic to the extent that these controls may be endogenous as well. We take a middle-of-the-road approach to this trade-off and report results including our first set of controls only¹¹.

3.2 Country · Sector: Corruption and Comparative Advantage

We now turn to tests of the channel through which corruption deters trade. To confirm our hypothesis that corruption deters trade through creating delays, we show that corruption decreases trade more in more time-sensitive sectors.

3.2.1 Baseline specification

We test our hypothesis by estimating the following equation:

$$\ln X_{ijs} = \beta_{2or} C_i \cdot T_s + \beta_{2dest} C_j * T_s + \gamma G_{ij} + \zeta_{or} Z_{is} + \zeta_{dest} Z_{js} + d_i + d_j + d_s + \varepsilon_{ijs} \quad (2)$$

where X_{ijs} are exports from exporter i to importer j in sector s , $(d_i)_{i \in I}$, $(d_j)_{j \in J}$ and $(d_s)_{s \in S}$ are respectively sets of exporter, importer and sector fixed effects. G_{ij} is, as before, a vector of pair-wise gravity variables. T_s denotes sector s level of time-sensitivity. Z_{is} (resp. Z_{js}) is a vector of importer (resp. exporter)- sector interactions that serve as controls. In particular, we control for Hecksher-Ohlin factors, the traditional determinants of comparative advantage.

We now use data on export volumes across triplets of exporter, importer and sector, which allows us to identify the interaction of the country-level corruption variable with the sector-level time-sensitivity variable T_s . We expect both coefficients β_{2or} and β_{2dest} to be negative.

The main difference between our specification and the one used in Rajan - Zingales [1998] and Romalis [2004] to study comparative advantage is that we keep the variation across destination, and add importer fixed effects. The variation across destination in our specification allows us to explore the same country · sector interaction for the importer side as well. That is, we do not only focus on traditional comparative advantage but a priori think of corruption as a trade barrier that operates differentially across sectors with different levels of time-sensitivity.

demanding in terms of accountability (Ross, 2001).

¹¹In Appendix Table A3, we vary this set of controls and see that results are robust.

3.2.2 Further Checks

Here our concerns are similar to those we discussed at the country level.

Omitted variables We want to make sure that we include other determinants of comparative advantage that may be correlated to the ones we highlight. As before, we separate out lengthy procedures from corruption by including a control for *PROC* interacted with our sector-level variable T_S . We treat bureaucratic delays, the democracy level, the flexibility of the labor market, the level of financial development and the rule of law similarly.

In addition, we control for the mechanism highlighted in Koren and Tenreyro (2007) according to which countries at higher levels of development tend to specialize in sectors with lower levels of productivity volatility. We build a measure of productivity volatility at the sector level and interact it with the log of GDP per capita.

Reverse Causality The reverse causality problem here is of a slightly different nature given that we control for fixed effects. Indeed, our set of controls ensures that what we are capturing in $\hat{\beta}_2$ is not just the effect of the level of corruption on the volume of trade, but the marginal effect of the level of corruption as time-sensitivity increases across sectors. For simplicity of exposition, let us think of a case with only two sectors and two levels of corruption. One sector, agricultural chemicals, is highly time-sensitive and the other, metal cans¹², is not. Reverse causality here is an issue to the extent that an increase in relative demand for chemicals (relative to metal cans) induces both an increase in relative exports of chemicals and a decrease in the difference in corruption between highly corrupt and less corrupt countries. This would be the case if this change in relative demand created incentives to decrease corruption across the board. But these incentives were higher in highly corrupt countries because they have more latitude to make such changes. Such reverse causality would imply that trade of time-sensitive products is particularly strong in low corruption countries (relative to what it is in high corruption countries), but because it actually causes their lower corruption.

To address this issue, we instrument for the interaction of corruption and time-sensitivity. We use the same instruments as we used for corruption, but interact them with the measure of time-sensitivity¹³. This way we control for how these variables may affect comparative advantage across sectors, not just for how these variables may affect overall country-level trade volumes. For the exclusion restriction to be satisfied we need to further control for channels other than corruption through which our country-level instrumental variables (lagged corruption, energy abundance and

¹²These two sectors are among, respectively, the 10 most sensitive sectors and the 10 least sensitive sectors. See Appendix Table A1.

¹³This method is also used in Nunn, 2007.

legal origins) may influence the country \times sector patterns of trade. We can do that most effectively for the energy abundance instrument by using the Heckscher-Ohlin theory. The theory predicts that a factor’s abundance influences comparative advantage through its interaction with the intensity of use of this factor in each sector. Hence the main control we use to satisfy the exclusion restriction is the interaction of energy abundance with a measure of the energy intensity of a sector (calculated as the ratio of the cost of energy to the value of output). We still present results where we instrument for lagged corruption since it is a clean way to reduce the simultaneous bias. Also, as we are still concerned with possible endogeneity of the energy production variable, we present results where we use legal origins as an instrument. As before, we use an intermediate set of controls.

3.3 Selection

In this section we restrict the sample to US imports, mostly for computational reasons. The possible number of (sic, importer, exporter) triplets in our full sample is above 3 million observations. Hence the difficulty of implementing linear estimations, and even more so for non-linear estimations such as probit. Since we cannot identify variation at the importer’s level any more, importer’s variables are not included in the specification and this section of the analysis focuses exclusively on the effect of the exporter’s level of corruption. The gravity variables are now captured by the exporter’s fixed effects.¹⁴

As before, we expect to find a negative coefficient for the interaction of the exporter’s corruption level with the sector’s time-sensitivity.

The selection equation consists of a probit equation where the left-hand side variable, T_{is} is a dummy indicating whether we observe positive exports from country i to the US in sector s . The right-hand side variables are mostly as before. But we now include religion, a variable that has been shown by Helpman, Melitz and Rubinstein (2008) to influence the fixed costs of exporting firms, but not their export volume conditional on exporting. More precisely, we interact religion with sector fixed effects, allowing its effect to vary across sectors (this interaction effect is identified even in the presence of country and sector fixed effects).

$$T_{is} = \Phi(\beta_{2or}C_i \cdot T_s + \zeta_{or}Z_{is} + d_s \cdot R_i + d_i + d_s + \varepsilon_{is}), \quad (3)$$

where $\Phi()$ is the cumulative distribution function of the Normal distribution and $d_s \cdot R_i$ is the interaction of sector fixed effects with the religion variable R_i . The religion variable is an index of similarity of the religious composition of the population of country i with the US.

¹⁴The modified specification for export volumes is reported in the appendix.

Finally, we run a two-stage Heckman model where we control for selection using the first stage shown in equation (3). The religion interaction is excluded in the second stage. It satisfies the exclusion restriction and allows us to separate the effect of corruption on selection across sector from that of corruption on trade volume conditional on selection. We expect our results to survive this selection correction.

4 Data

4.1 Trade Data

Trade data is from the World Trade Flows database, for year 2000. We use data at the SIC 3-digit level.

Gravity variables are from CEPII. Distance between capitals is our primary measure of distance. From this database, we also use variables indicating contiguity, common language and the existence of a former colonial relationship. The variable indicating landlocked countries is from Glick and Rose (2002).

4.2 Country-Level Data

Main variables

It is particularly difficult to quantify the phenomenon of corruption that is specific to customs and trade procedures. Following much of the cross-country empirical literature, we focus on indices of corruption perception that are based on institutional assessments or surveys.¹⁵ Our main dependent variable is the “Control of Corruption” measure from Kaufmann, Kraay and Mastruzzi (2006, henceforth KKM), a comprehensive effort that pools together country governance indices from disparate sources. In all, 31 indices from 25 different organizations (such as Gallup International, the World Bank, and the World Economic Forum) were collected and aggregated using an unobserved component methodology, yielding an extensive dataset with more than 150 countries, of which 137 are retained in our dataset. KKM reports scores at two-year intervals for the 1996-2002, and annually thereafter (up to 2005). At the cross-country level, the KKM dataset arguably offers the best coverage, compared to other corruption perception or rating datasets such as Transparency International’s Corruption Perceptions Index (CPI) and the International Country Risk Guide (ICRG)¹⁶, or data on the experience of corruption. By using a measure of corruption perception instead of experienced corruption data,

¹⁵See Kaufmann, Kraay and Mastruzzi (2007) for a detailed response to criticisms against such corruption measures.

¹⁶Svensson (2005) also noted that alternative corruption perception indices highly agree with each other.

we also take the position that corruption regarding customs and trade exceeds the scope of surveys that focus on actual, mostly petty corruption experience at the individual level.

The data on exporting and importing procedures is from the World Bank "Doing Business" dataset, and more specifically from the "Trading across Borders" section. Djankov, Freund and Pham (2007) explain clearly how they explicitly build the measure of number of signatures needed to be exogenous to corruption. They only retain data that corresponds to an existing regulation.

Capital abundance and skill abundance variables are from Hall and Jones (2001). Skill abundance is calculated as the average years of schooling in the total population from Barro and Lee (2000).

Controls and Instruments

The measure of the level of democracy we use is the "Polity" variable from the Polity IV database described in Beck et al. (2000). It ranges between -10 and +10: democratic countries are usually thought of as those with a polity measure over 5. We use the amount of credit extended by banks and other intermediaries to the private sector as the measure of financial development. The data comes from Beck and al (2001). The measure of labor market flexibility is from the "Doing Business" dataset. The proxy for the rule of law is from Gwartney and Lawson (2004).

The measure of energy abundance is from the World Bank Adjusted Savings Database.¹⁷ We compute an average of energy production for years 1990 to 1995, and take its log. Energy includes both oil and gas extraction.

Our remaining country level variables, PPP price levels, GDP per capita and population, come from the PennWorld Tables (PWT 6.0 and 6.1).

4.3 Sector-Level Data

As explained above, we use the measure of unpredictability constructed at the sector level in Serfaty-de Medeiros (2007) as our measure of time-sensitivity. The measure is built by taking, for each firm in a given sector, the standard deviation of the unpredictable share of demand. This unpredictable share is obtained as the residual of a prediction equation including lagged values of sales as well as quarter fixed effects controlling for seasonal variation. The measure used here for each sector is a weighted average of the unpredictability for firms in that sector.

This type of data is not available across our large sample of countries (at the needed detailed level of sectoral disaggregation), so we rely on the commonly used assumption that these needed measures are intrinsic to sectors and do not vary across countries. We therefore use a reference country, the US, to measure all these needed sector characteristics. Our analysis restricting the sample to US imports

¹⁷The data can be found online at the following url: http://siteresources.worldbank.org/INTEEI/1105643-1115814965717/21683431/oil_and_gas_rents.xls

serves as a robustness check that the effects we identify do not rely heavily on this assumption.

Measures of factor intensities at the sector level are computed from variables in the NBER-CES Manufacturing Industry Database. The capital intensity is computed as the capital per worker and the skill intensity as the ratio of non-production wages to total wages. Energy intensity equals cost of energy (electricity and fuel) divided by total shipments.

5 Empirical Results

5.1 Examining the Raw Data

We first present summary statistics for all of our variables in Table 1.

5.1.1 Country-level results

We start by looking at whether a country's corruption level is negatively correlated with its trade volumes in the raw data. Figure 1 plots each country's aggregate exports (across sectors and destinations) against its corruption level. Figure 2 is a similar figure for imports.

[INSERT FIGURE 1]

[INSERT FIGURE 2]

The relationship is indeed negative in the raw data for both exports and imports. Magnitudes are similar, though the regression coefficient in the case of exports is larger at -1.66, compared to -1.33 for imports.

5.1.2 Comparative Advantage

Exports

We now look at whether countries with higher levels of corruption export more in highly time-sensitive sectors. We start by comparing the share of time-sensitive goods exports across countries with, respectively, high and low levels of corruption.

We aggregate the data to the level of an exporter-sic pair, adding all exports of a country in a given sector, across importers. We then look at the percentage of each country's exports that are in sectors with an unpredictability level above the median level of 18%. We have 136 countries in the sample

at this point. On average across all countries, 30% of export volumes take place in sectors with high unpredictability. We next sort countries into two groups corresponding to high and low corruption levels. The threshold used is the median level of the corruption index (0.38). We compute the same average percentage for each group. The average proportion of time-sensitive exports is only 25% in high corruption countries, whereas it goes up to 35% in low corruption countries: in the raw data, time-sensitive sectors represent a lower share of exports in countries that are highly corrupt relative to less corrupt countries.

To look at this in a more continuous way, we also compute the correlation between the country share of high unpredictability exports and the corruption level. We find a significant negative coefficient of -0.14, reported in Table 2. Of course, one of our main concern to establish the relationship between corruption and comparative advantage is to clearly distinguish this channel from the effect of other variables that are correlated with corruption. For example, are the differences in corruption levels really only reflecting differences in GDP per capita levels? We will systematically control for this factor, and others, in subsequent sections. For now, a first pass at controlling for GDP per capita is to purge both variables, the share of time-sensitive exports, and the corruption level, or the effect of GDP and compute the partial correlation of the residuals. We obtain an even stronger negative coefficient of -0.32 (Table 2, column (2)): the effect of corruption is even stronger once we control for the GDP level. This is because GDP per capita actually affects the share of time-sensitive goods negatively. This alleviates the concern that we are capturing the effect of GDP since both GDP and corruption affect trade in high-sensitive goods in the same direction but countries with high GDP typically have low corruption.

Finally, we can also check in the raw data that there is variation in the corruption level within similar income groups despite the large negative correlation or -0.89 between corruption and GDP per capita. For example, Hungary and Gabon are respectively at the 25th and 75th percentile of the distribution of the corruption index, even though they have very similar incomes per capita (respectively, \$11,116 and \$10,821). The difference in the share of their exports that are in highly time-sensitive sectors is very large: the share is 42% for Hungary vs. only 12% for Gabon. This suggests that the corruption level impacts the pattern of comparative advantage independently of the GDP level.

To go deeper into these patterns, Figure 3 shows the relationship between the level of exports of Hungary in each sector (across destinations) and plots these against the measure of time sensitivity in each sector.

[INSERT FIGURE 3]

We see that the relationship is slightly positive. On the contrary, the same relationship is clearly negative for Gabon, suggesting that indeed the less corrupt country has a comparative advantage in more time-sensitive sectors.

Imports

We next look at imports and find similar patterns, suggesting that corruption works like a trade barrier that affects time-sensitive goods the most.

First, the share of imports that are in highly time-sensitive sectors decreases with the corruption level of the importer. On average across countries, the share is 32%, but it goes down to 28% among importers with a corruption level above the median while it reaches 35% in low corruption countries. The differences go in the same direction as those for exports, though they are smaller.

Panel B of Table 2 presents the correlation between the share of highly time-sensitive imports and the corruption level of each country. We get a strong negative correlation of -0.36 with the base variables. Once we purge the variables of the effect of GDP, the correlation is even stronger at -0.44.

Again, we can compare Hungary and Gabon and see that this share is 41% in Hungary vs. 23% in Gabon.

The graph of the sector import level in each of these country against the sector's characteristic of interest, unpredictability, goes in the same direction (see Figure 4). The pattern is different than that for exports, though. In both countries, imports are now increasing in the level of unpredictability. Yet, the slope is higher in the less corrupt country, Hungary, so that the difference in imports between the two countries does indeed increase with time-sensitivity of the sector.

[INSERT FIGURE 4]

This section has shown that in the raw data, corruption works as a trade barrier at the country level on average across sectors. Moreover, this trade barrier is stronger in sectors that are more time-sensitive. This pattern remains after our first-pass control for GDP per capita levels.

We now move on to a full-fledged empirical analysis that will allow us to control appropriately for alternative explanations and to address concerns of endogeneity.

5.2 Corruption and Trade at the Country Level

We start by documenting the first-order effect of corruption on trade flows. We use a gravity framework, with country-level exports as the dependent variables. We have 8217 country pairs in the sample.

Gravity Regressions

Here we show that corruption diminishes trade volume beyond the mere effect of complex administrative procedures in the exporting and importing countries. We find that both the exporter's and the importer's corruption level matter for trade, but that the exporter's corruption matters more. We run the specification in equation (1) with varying sets of controls Z_i and Z_j and report results in Table 3, columns (1) through (5).

In regression (1) of Table 3, we include usual gravity equation controls. The effect of corruption is sizeable. The corruption measure is normalized to have a standard error of 1. So a one standard deviation increase in the exporter's corruption level decreases log exports by -0.31 , i.e. it decreases exports by 27%. Similarly, a one standard deviation increase in the importer's corruption level decreases exports to that country by 12%.

All controls have the expected signs and magnitudes for the gravity variables are in line with other studies.

Next, in regression (2), we control for the number of signatures needed to export as well as for the dynamism of the business environment (using the number of days to start a business) and the level of democracy. The number of signatures needed to export and import is a very direct measure of how complex and time-consuming the exporting procedures are. Hence, it allows us to distinguish between the effect of generally complex and long procedures and the effect of corruption. We see that the effect of corruption is still significant with this control, and at -0.41 for the exporter's corruption and -0.07 for the importer's variable, not significantly different from the previous estimates. The importer's corruption variable is less significant. This implies that the effect of corruption does not just capture the fact that procedures themselves are more lengthy in more corrupt countries. Instead, corruption adds to the time it takes.¹⁸

Complex procedures have a significant negative effect on trade flows. The coefficients imply that a standard deviation increase in the number of signatures required to export (respectively import) causes a 29% (resp. 14%) decrease in trade. So, after standardizing, the effect of the exporter's signatures is about twice as strong as that of the importer's.

The delays in starting a business come out insignificant, suggesting that it is indeed delays in

¹⁸It can be argued that, in the long run, lengthy procedures might be put in place because of corruption, because they would increase the potential for corruption. First, this endogeneity happens over time and we are using simultaneous measures. Secondly, there is no evidence in our data that the effect of corruption on trade, and on time, is indeed larger when procedures are lengthier. Thirdly, even if complex procedures are endogenous to corruption, we are still capturing the direct effect of corruption and distinguishing it from the indirect effect through that complexity of procedures. Finally, we also control for the level of democracy in the same regression, which could determine both corruption and the complexity of procedures.

exporting procedures that matter, and not the general "slowness" of bureaucratic procedures in the country. The level of democracy of the exporting country comes out strongly significant and positive.

Robustness

In regressions (3) to (5), we control for additional variables that are correlated with corruption to check that the effect of corruption that we find is independent. We add controls for labor market flexibility and the level of financial development in column (3). We find that both labor market flexibility and the rule of law have a positive influence on trade. Yet, while the point estimate for the exporter's corruption diminishes slightly, the coefficient is still not significantly different from that in column (1). Given the strong negative correlation of -72% between corruption and the level of financial development in the cross-section, the fact that corruption remains strongly significant suggests that it does indeed have an effect strongly independent from that of financial development. The effect of the importer's corruption, though, is less robust: as it diminishes, it loses significance. We then add controls for the rule of law in column (4). That variable is even more correlated with corruption (the correlation is -91%), hence this is a hard test to pass. Indeed, the coefficient on the exporter's corruption diminishes further, but it remains significant. We finally combine all of these controls in column (5) and check that our coefficient, while smaller, is significantly negative.

Overall, our results for the exporter's corruption are robust to an extensive set of controls. The results for the importer's corruption are less clear-cut, but robust to our first set of controls.

Instrumental Variable Estimation

We are concerned about reverse causality and instrument corruption using three different instruments. Results are reported in Table 4.¹⁹

Since our instruments are available for a somewhat smaller part of our sample, we first run again our base specification, equation (1), on that sub-sample. The results are very similar to its full-sample counterpart, column (2) of Table 3.

We start by instrumenting the corruption level using a four-year lag of corruption for the exporter and the importer. We report the results from the IV estimation in column (2), followed by the first stage for the exporter's corruption variable C_i (C_i is the dependent variable) and that for the importer's corruption variable. Unsurprisingly, lagged corruption comes out very significant and with a coefficient close to 1 in both first stage regressions. Yet, the coefficient is significantly lower than 1, implying that there is variation in corruption that remains unexplained by lagged corruption. Results from the IV in column (2) confirm our baseline results. Both coefficients for exporter's and importer's

¹⁹All regressions include the gravity variables G_{ij} as well as the price levels, GDP and population variables, but we do not report coefficients for them since they are all as expected and we want to focus on the instrumentation.

corruption are negative and similar to those in column (1), even though significance is decreased for the importer's corruption. So, when we rule out simultaneous reverse causality (i.e. the effect of trade in 2000 on corruption in 2000), corruption still deters trade.

We then instrument using energy production and report results in a similar fashion in columns (5) to (7). The exporter's corruption's coefficient increases substantially, but the standard error does too, so that the difference just passes a test of significance at the 5% level. The first stage regressions are as expected, with the energy production predicting corruption positively, with significant coefficients. In the exporter's corruption first stage, the coefficient of 0.04 implies that when the energy production increases by one standard deviation, corruption increases by .54 points, i.e. slightly over half a standard deviation. The effect is substantial since corruption ranges from -2.5 to 1.5.

Lastly, we instrument using legal origin dummies. The first stage is as expected. We exclude the Scandinavian legal origin dummy and find that, relative to those, all other possible origins increase corruption. British origin causes the least increase, and Socialist origin the most, with German and French origins in the middle. Again, the coefficient for the exporter's corruption is strengthened with a larger magnitude and is still significant at the 1% level. The coefficient on the importer's corruption on the other hand becomes insignificant, suggesting that it was driven by reverse causality.

Finally, instrumenting for corruption using a variety of instruments, our results overall are confirmed, even though in two cases the coefficient on the importer's corruption level becomes insignificant.

We conclude from the results in Tables 3 and 4 that indeed the corruption level of the exporter and of the importer decreases trade volume, even after introducing a large set of controls and instrumenting. The effect of the exporter's variable is both larger and more robust. We next move to the estimation of the differential effect of corruption across sectors that will allow to determine more precisely the channel through which corruption operates.

5.3 Corruption and Comparative Advantage

Here we test our predictions in a sector-level gravity framework. We report results for the specification in equation (2), with a varying set of controls, in Table 5.

In regression (1), we control for Hecksher-Ohlin factors, the traditional comparative advantage factors and still find significant effects for the interactions of corruption with time-sensitivity. The coefficient for exporter's corruption though is much higher than the importer's one. We also find significant coefficients for the interaction of a country's factor abundance with the corresponding sector factor intensity. The coefficients for all three factors are positive and significant, confirming the Hecksher-Ohlin theory. The coefficient of -1.38 on the first interaction of exporter's corruption with

sector level unpredictability means that the exporter’s corruption decreases trade more in sectors with a higher level of unpredictability. For a level of unpredictability at the 25th percentile, one standard deviation increase in the exporter’s corruption implies a 11% decrease in trade. In contrast, for a level of unpredictability at the 75th percentile, one standard deviation increase in the exporter’s corruption implies a 22% decrease in trade. Over the whole range of unpredictability, the effect of a standard deviation’s increase in the exporter’s corruption ranges from -7% to -42%.

Similarly, over the whole range of unpredictability, the effect of a standard deviation’s increase in the importer’s corruption ranges from -2% to -17%.

When standardizing these coefficients to capture the effect of a simultaneous standard deviation increase in each variable of the interaction, we find that the effect of the exporter’s corruption on comparative advantage is -.08, about twice smaller than that of the capital and schooling factors (respectively 0.22 and 0.17) and twice larger than that of the energy factor (0.04). The standardized coefficient for the importer’s corruption interaction effect is -0.03. We conclude from this exercise that the effects of corruption on the cross-sectoral patterns of trade are of the same order of magnitude, though smaller, than the effects of the Heckscher-Ohlin factors.

In regression (2), we add our first set of controls for corruption and interact them with the sector-level variable T_s . Our result is robust and the point estimate is roughly unchanged.

Robustness

Columns (3) to (7) expand the set of controls to explore the robustness of the results. The coefficient on the interaction of the exporter’s corruption with time-sensitivity is by and large unchanged. Yet, the coefficient on the importer’s interaction becomes insignificant and very close to 0 in terms of point estimate. It seems that the effect of importer’s characteristics across sectors is fully captured by the complexity of importing procedures whereas on the exporter’s side, the exporting procedures also matter but the corruption level matters beyond that (the corruption effect is actually twice stronger when comparing standardized coefficients).

In column (6), we test for the theory in Koren and Tenreyro, 2007, according to which countries at higher levels of development tend to specialize in sectors that are less volatile in terms of their productivity. We do find this negative effect, but our coefficient of interest remains unchanged. We also control in the same regression for an interaction of the exporter’s corruption with the sector’s volatility measure to check that our time-sensitivity is not capturing the aggregate volatility of productivity.

Our result that corruption of the exporter decreases trade more in more time-sensitive sector is clear and robust to our large set of controls. Corruption creates a comparative disadvantage in time-sensitive goods. On the importer’s side, if there is an effect of corruption, it seems to be mostly operating through the complexity of importing procedures.

Instrumental Variable Estimation

Here again, there may be a reverse causality issue. Table 6 presents results of the instrumentation. Since these are the results that are significant in Table 5, we focus on the exporter’s variable, i.e. on the interaction of the exporter’s corruption level with the sector time-sensitivity. Hence, the specification is essentially the same as that in equation (2), but without the $C_j * T_s$ and Z_{js} terms and instrumenting for $C_i * T_s$ by an interaction $I_i * T_s$.

The table is organized in a way similar to Table 4, except that there is only one first stage regression for each IV specification. All first stages are as expected, with strongly significant coefficients on the instruments and large R-square. The coefficient of interest, β_{2or} , is larger (in absolute value), but not statistically different when we instrument using lagged corruption or energy production. It does increase significantly when instrumenting with legal origins.

5.4 Corruption, Comparative Advantage, and Selection

In this section we restrict the sample to US imports mostly for computational reasons. The possible number of (sic, importer, exporter) triplets is above 3 million observations. Hence the difficulty of implementing linear estimations, and even more so for non-linear estimations such as probit.

Concomitantly, this sample restriction also serves the purpose of checking that our results are robust in this sub-sample. Given that the measure of time-sensitivity, T_s , is built using US data, the restriction to US imports is of particular significance. The regression now includes only exporter and sector fixed effects since there is only one importer. We only control for exporter variables interacted with sector-level variables. Results are reported in Table 7.

Column (1) shows results from gravity equation (6) with exports as the dependent variables. We see that the coefficient on the interaction of the exporter’s corruption (-1.63) with the sector’s unpredictability is close to that found in Table 5 (standard errors are larger due to the smaller number of observations). So the results shown previously are robust to restricting the dataset to US imports only.

Column (2) shows results from the probit equation (3) where the dependent variable is a dummy equal to 1 when a given exporter-sector pair has strictly positive trade with the US, 0 otherwise. We report marginal effects. The coefficient of -0.27 translates into corruption decreasing the probability of positive trade by 1% to 10% across the range of sector-level unpredictability.

Column (3) presents results of a two-stage Heckman estimation that controls for selection (the first stage is the probit from column (2)). We see that the coefficient of interest, β_{2or} , is very close and not significantly changed, at -1.68 and is still significant at the 5% level (the standard error has decreased

slightly). Hence, we conclude that the effect we find in the data is not attributable to selection bias. In sum, corruption affects both the extensive margin of trade (the selection into trade) and the intensive one (the volume traded across selected sectors).

Robustness

Columns (4) to (6) repeat the same three specifications but with more controls. The magnitudes of coefficients found in columns (1) to (3) are robust to adding our first set of controls even though the coefficient becomes less significant in the probit selection equation.

In sum, we can conclude from this section that corruption influences selection into exporting differentially across sectors: it decreases the probability for country i of trading in sector s more for time-sensitive sectors. Also, we have provided evidence that this selection process does not cause a bias in our estimation of the effect of corruption on comparative advantage.

Finally, we have shown that corruption decreases the average level of both imports and exports of a given country. This deterring effect on exports is stronger in more time-sensitive sectors and manifests itself both across exporter, importer, sector triplets with positive trade and in the selection of triplets into this positive trade.

6 Conclusions

In this paper we have shed light on the link between time delays and corruption levels, once controlling for relevant institutional features and for the inherent complexity of the procedures. First, our results imply that corruption plays an important role in shaping aggregate country-level export and import volumes. As such, our findings provide evidence of a novel channel through which corruption has a detrimental effect on economic activities, as reviewed by Lambsdorff (1999). Corruption inhibits exports and imports, hence may impede international market integration, thus slow down the catch-up process of low income countries (as in Barro and Sala-i-Martin).

Secondly, our results show that more corrupt countries are at a comparative "disadvantage" to export more time-sensitive goods and that corruption also plays out in selection into trading. These results contribute to the understanding of the relationship between institutions and trade by highlighting a specific channel through which an institutional feature of countries, corruption, affects trade. Corruption creates a comparative disadvantage in time-sensitive sectors, confirming that it does indeed deter trade through causing additional delays.

In a broader perspective, our results add to the current policy debate on non-tariff barriers to trade. They suggest that in terms of trade facilitation, merely simplifying exporting procedures is

not a substitute to decreasing corruption levels. Changing regulations may be an important step, but corruption definitely hinders trade well beyond the effect of cumbersome regulations.

7 Appendix

7.1 Country-level regressions with fixed effects

7.1.1 Specification

As a robustness check for the country-level regressions, we also include a specification where we do have country fixed effects, which takes care of the multilateral resistance term in a more definite way. First, we include only a set of importer's fixed effects, $(d_i)_{i \in I}$, where, for each i , d_i is a dummy indicating country i . In that specification, the importer's variables are not identified any more. But the pair-wise gravity variables and the exporter's variables are, so we include them:

$$\ln X_{ij} = \alpha + \beta_{1or}C_i + \gamma G_{ij} + \zeta_{or}Z_i + d_i + \varepsilon_{ij}. \quad (4)$$

Hence, we obtain an alternative estimate for β_{1or} . We expect this alternative estimate to not differ substantially from the previous one.

We then run a symmetric specification with a set of exporter's fixed effects, $(d_j)_{j \in J}$, and all of the importer's variables (C_i) and controls (Z_i) and obtain an estimate for β_{1dest} .

Then, in a third specification, we include both set of fixed effects $d_i + d_j$. Hence, the effect of corruption in country i and of corruption in country j are not identified separately any more. Instead, we include a variable indicating whether the corruption level is above the median corruption level in at least one of the two countries, HC_{ij} :

$$\ln X_{ij} = \alpha + \beta_{1H}HC_{ij} + \gamma G_{ij} + d_i + d_j + \varepsilon_{ij}. \quad (5)$$

This specification serves to check that we get a negative effect of corruption, i.e. a negative sign for $\widehat{\beta_{1H}}$, even after introducing both exporter and importer fixed effects.

7.1.2 Results

Results are reported in Appendix Table A2. We first test the specification outlined in equation (4), where we introduce respectively, importer's and exporter's fixed effects. Results are reported in columns (1) and (2). Coefficients on both the exporter's and the importer's levels of corruption are essentially unchanged.

As a last control, we test equation (5), which features both importer and exporter fixed effect. The coefficient of interest now has a different interpretation: we are testing whether trade is lower when at least one of the countries has a corruption level above the median. We find indeed a negative, significant, coefficient of -0.23.

7.2 Gravity specification on restricted sample

Here, we report the specification used in the first and fourth columns of Table 7. It consists of a gravity equation for sector-level exports on the sample of US imports only. Since the importer does not vary in the sample, the export volume specification is modified accordingly. It now excludes importers' variables as follows:

$$\ln X_{is} = \beta_{2or} C_i \cdot T_s + \zeta_{or} Z_{is} + d_i + d_s + \varepsilon_{is}, \quad (6)$$

where d_i and d_s denote respectively country and sector fixed effects.

The coefficient β_{2or} captures, again, the effect of corruption on comparative advantage.

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Figure 1. Bilateral Exports and Exporter's Corruption

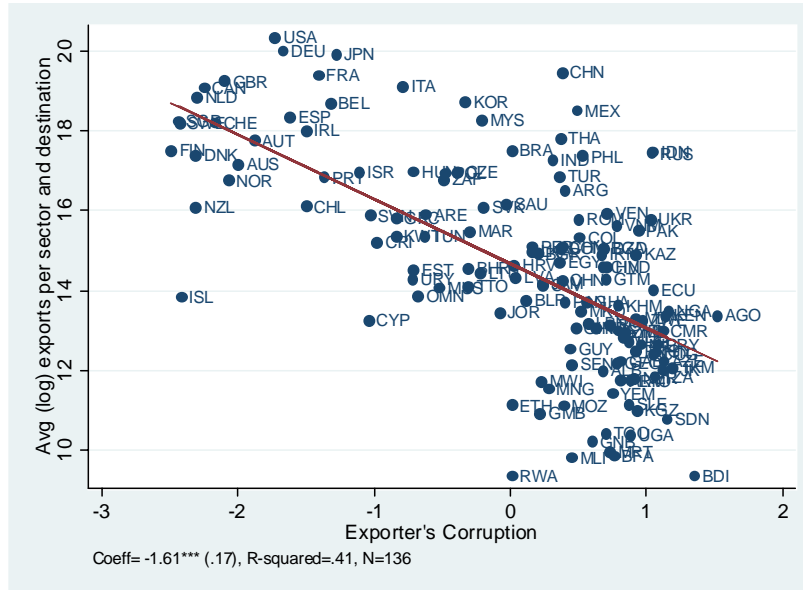


Figure 2. Bilateral Imports and Importer's Corruption

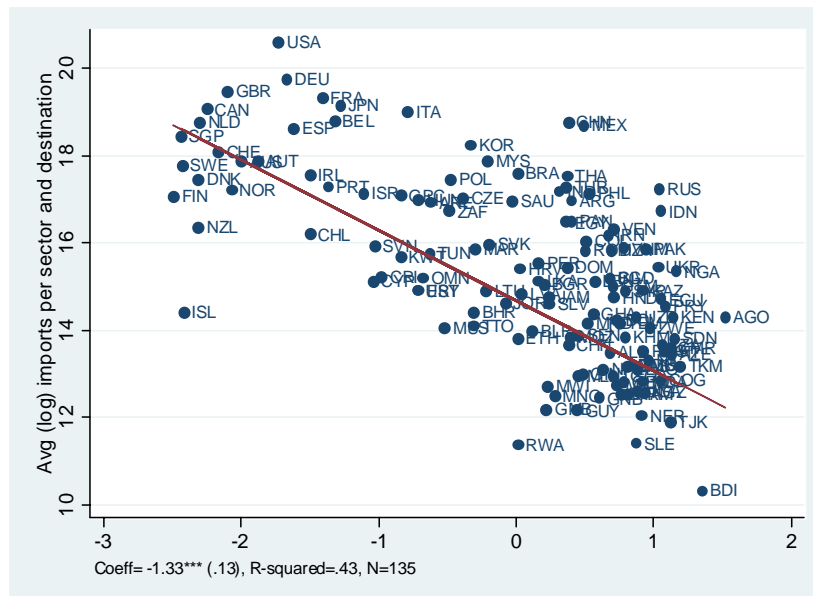


Figure 3. Hungary vs. Gabon: Sector-level Exports

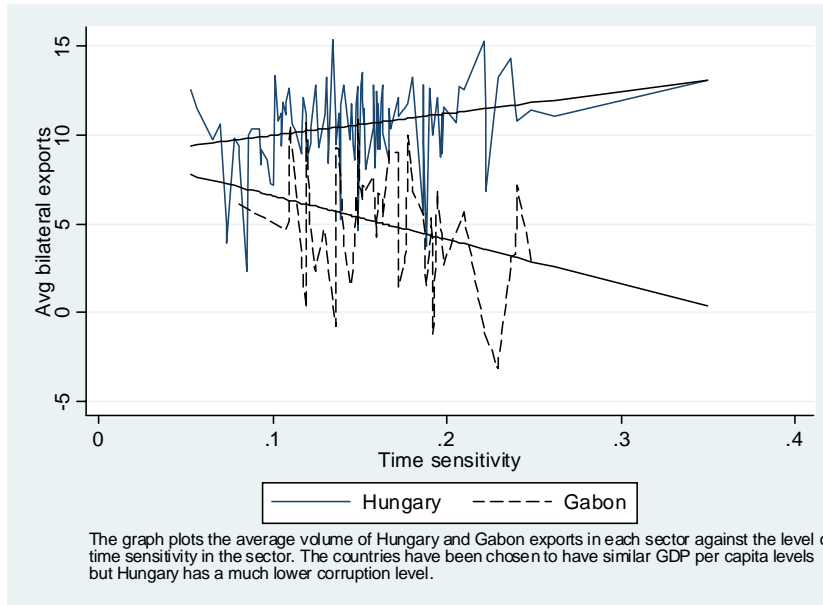


Figure 4. Hungary vs. Gabon: Sector-level Imports

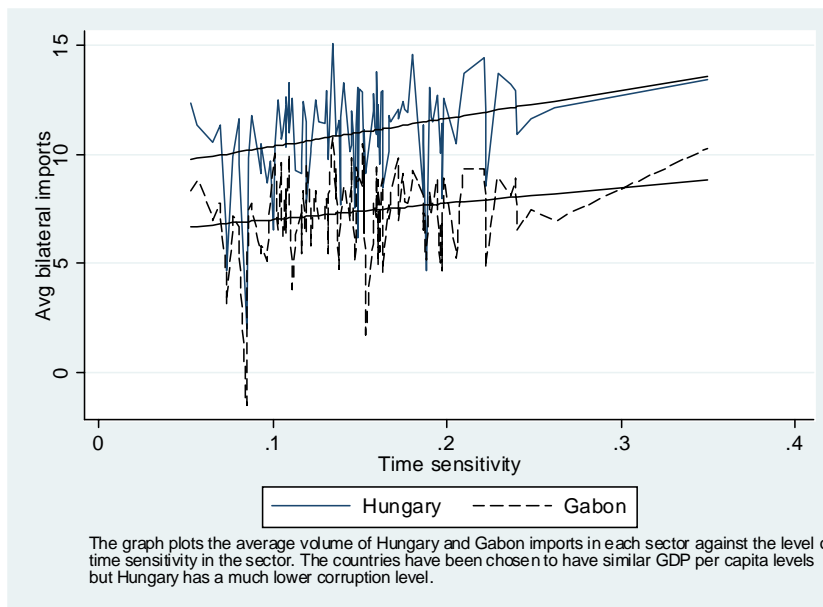


Table 1
Summary Statistics

	Observations	Mean	St. dev.	Min	Max
Country-level variables					
Corruption (KKM)	136	0.01	1.04	-2.49	1.52
GDP per capita (ln)	160	8.52	1.17	6.01	10.51
Population (ln)	164	9.04	1.86	3.66	14.04
Signatures required to export	119	9.92	8.50	1.00	40.00
Signatures required to import	118	14.66	14.79	1.00	75.00
Days to start a business	128	0.23	0.18	0.00	1.00
Polity	129	3.46	6.60	-10.00	10.00
Labor market flexibility	139	0.64	0.17	0.22	1.00
Financial development	138	0.39	0.39	0.02	1.92
Rule of law	120	0.50	0.24	0.00	1.00
PPP Price level (ln)	164	3.65	0.62	2.13	5.05
Average years of schooling	121	4.77	2.77	0.54	12.04
Capital abundance (ln)	116	9.25	1.56	5.76	11.59
Energy abundance (ln)	101	0.07	0.16	0.00	0.98
Sector-level variables (3-digit SIC codes)					
Mean Unpredictability	114	14.9%	5.5%	5.3%	40.3%
Productivity volatility	115	0.05	0.03	0.02	0.19
Skill intensity (ln)	115	-0.97	0.33	-1.77	-0.12
Capital intensity (ln)	115	4.17	0.82	2.20	6.71
Energy intensity (ln)	115	-4.22	0.83	-6.26	-1.69

Table 2
Correlation between Corruption and the Share of Time-Sensitive Trade

	Share of Time-Sensitive Trade Flows			
	Exports		Imports	
	Baseline (1)	Purged (2)	Baseline (3)	Purged (4)
Panel A: Exports				
Exporter's corruption	-0.14** (0.07)			
Exporter's corruption (purged)		-0.32* (0.18)		
N	136	134		
Panel B: Imports				
Importer's corruption			-0.36*** (0.07)	
Importer's corruption (purged)				-0.44** (0.19)
N			135	133

Correlation coefficients are reported.

Standard errors of correlation estimates in parenthesis.

Purged variables are purged of the effect of the log GDP of the exporter by first regressing them on that variable and taking the residual.

Table 3
Country-level Gravity Equation: Corruption as a First-Order Barrier to Trade

	Country-level log(exports) lnXij				
	Base specification		Robustness checks		
	(1)	(2)	(3)	(4)	(5)
X corruption	-0.31*** (0.03)	-0.40*** (0.04)	-0.27*** (0.04)	-0.18*** (0.06)	-0.13** (0.06)
M corruption	-0.13*** (0.03)	-0.07* (0.04)	-0.01 (0.04)	0.00 (0.06)	-0.04 (0.06)
ln(XGDPpc)	1.44*** (0.04)	1.24*** (0.05)	1.18*** (0.06)	1.13*** (0.06)	1.04*** (0.06)
ln(MGDPPC)	0.80*** (0.03)	0.80*** (0.05)	0.76*** (0.05)	0.80*** (0.05)	0.75*** (0.05)
ln(Xpop)	1.01*** (0.02)	1.04*** (0.02)	1.00*** (0.02)	1.03*** (0.02)	0.99*** (0.02)
ln(Mpop)	0.75*** (0.02)	0.76*** (0.02)	0.81*** (0.02)	0.76*** (0.02)	0.82*** (0.02)
Distance	-0.97*** (0.03)	-1.00*** (0.03)	-1.10*** (0.03)	-0.99*** (0.03)	-1.10*** (0.03)
Contiguity	0.93*** (0.14)	0.80*** (0.15)	0.67*** (0.16)	0.62*** (0.16)	0.51*** (0.16)
Colony	0.86*** (0.11)	0.64*** (0.11)	0.59*** (0.11)	0.55*** (0.11)	0.50*** (0.11)
Common Language	0.62*** (0.07)	0.72*** (0.08)	0.63*** (0.07)	0.78*** (0.08)	0.67*** (0.08)
X Landlocked	-0.16*** (0.05)	0.02 (0.06)	-0.11 (0.07)	-0.16** (0.07)	-0.28*** (0.07)
M landlocked	-0.57*** (0.05)	-0.49*** (0.06)	-0.54*** (0.07)	-0.58*** (0.08)	-0.59*** (0.08)
X Signatures to export		-0.03*** (0.00)	-0.04*** (0.00)	-0.04*** (0.01)	-0.04*** (0.01)
M Signatures to import		-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
X Days to start a business		0.17 (0.15)	0.58*** (0.16)	0.75*** (0.17)	1.00*** (0.18)
M Days to start a business		0.10 (0.15)	0.37** (0.16)	0.36** (0.17)	0.49*** (0.18)
X Polity		0.03*** (0.00)	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)
X Polity		0.01* (0.00)	-0.01 (0.00)	0.01* (0.01)	-0.01 (0.01)
X Labor Flex			0.65*** (0.15)		0.58*** (0.16)
M Labor Flex			0.54*** (0.14)		0.52*** (0.15)
X Fin. Devt			0.76*** (0.07)		0.81*** (0.07)
M Fin. Devt			0.54*** (0.08)		0.56*** (0.08)
X Rule of Law				1.72*** (0.28)	1.15*** (0.28)
M Rule of Law				0.64*** (0.25)	0.00 (0.25)
X ln(price level)	0.18*** (0.06)	0.13** (0.06)	0.02 (0.06)	0.08 (0.07)	0.05 (0.07)
M ln(price level)	0.71*** (0.05)	0.85*** (0.06)	0.70*** (0.06)	0.79*** (0.07)	0.72*** (0.07)
Exporter fixed effects	No	No	No	No	No
Importer fixed effects	No	No	No	No	No
R square	65.8%	68.8%	73.1%	69.8%	74.0%
N	8217	6506	5819	5830	5370

Standard errors are clustered by country pair.

Table 4
Country-level Gravity: Instrumental Variable Estimation

	Benchmark	Corruption Lagged as Instrument			Energy Production as Instrument		
	Restricted	IV	1st stage		IV	1st stage	
	Sample	lnX	X Corr.	M Corr.	lnX	X Corr.	M Corr.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
X corruption	-0.46*** (0.04)	-0.57*** (0.05)			-0.96*** (0.15)		
M corruption	-0.09** (0.04)	-0.08* (0.04)			-0.05 (0.19)		
X lag Corruption			0.83*** (0.01)	0.00 (0.00)			
M lag Corruption			0.00 (0.01)	0.89*** (0.00)			
X Energy Production (log)						0.04*** (0.00)	0.00 (0.00)
M Energy Production (log)						0.00 (0.00)	0.03*** (0.00)
X Signatures to export	-0.03*** (0.01)	-0.03*** (0.01)	-0.01*** (0.00)	0.00 (0.00)	-0.03*** (0.01)	0.00 (0.00)	0.00 (0.00)
M Signatures to import	-0.01** (0.00)	-0.01** (0.00)	0.00 (0.00)	0.00 (0.00)	-0.01** (0.00)	0.00 (0.00)	0.00*** (0.00)
X Days to start a business	0.27* (0.15)	0.37** (0.16)	0.07*** (0.03)	0.00 (0.02)	0.77*** (0.21)	1.02*** (0.04)	0.02 (0.05)
M Days to start a business	0.04 (0.16)	0.03 (0.16)	0.00 (0.02)	0.02 (0.02)	0.01 (0.24)	0.02 (0.05)	1.10*** (0.04)
X Polity	0.02*** (0.01)	0.02*** (0.01)	0.00 (0.00)	0.00 (0.00)	0.02*** (0.01)	0.00*** (0.00)	0.00 (0.00)
X Polity	0.01 (0.01)	0.01 (0.01)	0.00 (0.00)	0.00*** (0.00)	0.01 (0.01)	0.00 (0.00)	0.00*** (0.00)
R square	68.7%	68.6%	95.1%	97.3%	67.9%	81.1%	81.0%
N	5474	5474	5474	5474	5474	5474	5474

Standard errors are clustered by country pair.

All equations have controls for the Distance, Contiguity, Colony, Common Language and Landlock variables as well as for the GDP per capita, population, and price levels in each country.

Table 4 (Continued)
Country-level Gravity: Instrumental Variable Estimation

	Benchmark	Legal Origins as Instrument		
	Restricted	IV	1st stage	
	Sample	lnX	X Corr.	M Corr.
	(1)	(8)	(9)	(10)
X Corruption	-0.46*** (0.04)	-1.18*** (0.10)		
M Corruption	-0.09** (0.04)	-0.10 (0.11)		
X German Leg. Or.			0.51*** (0.03)	-0.02 (0.04)
X UK Leg. Or.			0.43*** (0.02)	-0.01 (0.03)
X French Leg. Or.			0.80*** (0.02)	-0.01 (0.03)
X Socialist Leg. Or.			0.90*** (0.03)	0.01 (0.03)
M German Leg. Or.			-0.03 (0.04)	0.53*** (0.03)
M UK Leg. Or.			-0.03 (0.03)	0.46*** (0.02)
M French Leg. Or.			-0.01 (0.03)	0.80*** (0.02)
M Socialist Leg. Or.			-0.02 (0.04)	0.89*** (0.03)
X Sign.	-0.03*** (0.01)	-0.03*** (0.01)	0.01*** (0.00)	0.00 (0.00)
M Sign.	-0.01** (0.00)	-0.01** (0.00)	0.00 (0.00)	0.01*** (0.00)
X Days	0.27* (0.15)	1.00*** (0.18)	0.65*** (0.05)	0.01 (0.05)
M Days	0.04 (0.16)	0.06 (0.20)	-0.01 (0.05)	0.76*** (0.05)
X Polity	0.02*** (0.01)	0.02*** (0.01)	0.00*** (0.00)	0.00 (0.00)
X Polity	0.01 (0.01)	0.01 (0.01)	0.00 (0.00)	-0.01*** (0.00)
R square	68.7%	67.0%	83.2%	83.1%
N	5474	5474	5474	5474

Standard errors are clustered by country pair.

All equations have controls for the Distance, Contiguity, Colony, Common Language and Landlock variables as well as for the GDP per capita, population, and price levels in each country.

Table 5
Corruption as a Comparative Disadvantage in Time- Sensitive Sectors

	Baseline	Controls	Robustness Checks				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
X Corrup * Time Sens	-1.38*** (0.11)	-1.34*** (0.17)	-1.18*** (0.16)	-1.35*** (0.17)	-1.36*** (0.17)	-1.33*** (0.16)	-1.36*** (0.18)
M Corrup * Time Sens	-0.46*** (0.10)	0.03 (0.15)	0.15 (0.15)	-0.08 (0.16)	-0.04 (0.15)	0.02 (0.14)	-0.08 (0.16)
Skill abundance * Skill int	0.24*** (0.01)	0.24*** (0.01)	0.23*** (0.01)	0.24*** (0.01)	0.24*** (0.01)	0.22*** (0.01)	0.22*** (0.01)
Cap abundance * Cap int	0.13*** (0.01)	0.15*** (0.01)	0.15*** (0.01)	0.11*** (0.01)	0.15*** (0.01)	0.25*** (0.01)	0.23*** (0.01)
NG abundance * NG int	0.33*** (0.08)	0.27*** (0.09)	0.27*** (0.09)	0.29*** (0.09)	0.18** (0.09)	0.36*** (0.09)	0.29*** (0.09)
X Sign. * Time Sens		-0.10*** (0.03)	-0.12*** (0.03)	-0.09** (0.04)	-0.09** (0.04)	-0.09*** (0.03)	-0.06* (0.04)
M Sign. * Time Sens		-0.04*** (0.01)	-0.04*** (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.04*** (0.01)	0.00 (0.01)
X Days* Time Sens		-1.86** (0.78)	-0.58 (0.83)	-1.89** (0.79)	-1.67** (0.81)	-1.97** (0.78)	-1.91** (0.80)
M Days* Time Sens		1.03 (0.81)	1.68** (0.82)	1.37 (0.85)	1.79** (0.83)	1.02 (0.81)	1.72** (0.87)
X Polity * Time Sens		-0.13*** (0.03)	-0.10*** (0.03)	-0.06 (0.03)	-0.16*** (0.03)	-0.13*** (0.03)	-0.09** (0.04)
M Polity * Time Sens		0.06*** (0.02)	0.07*** (0.02)	0.09*** (0.02)	0.02 (0.02)	0.06*** (0.02)	0.07*** (0.03)
X Flex. * Time Sens			4.18*** (0.72)				0.00 (0.00)
M Flex. * Time Sens			2.51*** (0.76)				-0.23 (0.65)
X Fin. Devt * Time Sens				3.67*** (0.70)			2.69*** (0.50)
M Fin. Devt * Time Sens				4.39*** (0.28)			2.85*** (0.19)
X Law * Time Sens					16.81*** (0.50)		0.00 (0.00)
M Law * Time Sens					7.19*** (0.44)		2.74*** (0.42)
X Corrup *VOL						-0.47 (0.52)	-1.40*** (0.54)
X GDP * VOL						-10.53*** (0.73)	-12.55*** (0.80)
R square	50.8%	52.1%	52.1%	52.4%	52.9%	52.4%	53.4%
N	275846	234472	234472	214154	219034	234472	202007

All regressions have exporter, importer and sector fixed effects.
Standard errors are clustered by country pair.
All regressions control for the gravity variables.

Table 6
Corruption as a Comparative Disadvantage in Time- Sensitive Sectors
IV Estimation

	Baseline	IV = Lag corruption		IV = NG production		IV = Legor	
		IV	1st stage	IV	1st stage	IV	1st stage
		X		X		X	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
X Corrup * Time sens	-1.13*** (0.16)	-1.58*** (0.18)		-1.78** (0.72)		-2.91*** (0.36)	
X Lag Corruption * Time sens			1.00*** (0.01)				
X Energy Production					0.03*** (0.00)		
X German Leg or * Time sens							0.38*** (0.02)
X UK Leg or * Time sens							0.53*** (0.02)
X French Leg or * Time sens							0.84*** (0.02)
X Socialist Leg or * Time sens							1.32*** (0.03)
Skill abundance * Skill int.	0.23*** (0.01)	0.23*** (0.01)	0.00*** (0.00)	0.23*** (0.01)	-0.01*** (0.00)	0.22*** (0.01)	-0.01*** (0.00)
Cap abundance * Cap int.	0.13*** (0.01)	0.13*** (0.01)	0.00*** (0.00)	0.13*** (0.01)	0.00*** (0.00)	0.13*** (0.01)	0.00*** (0.00)
NG abundance * NG int.	0.25*** (0.08)	0.25*** (0.08)	0.00* (0.00)	0.26*** (0.08)	0.02*** (0.00)	0.27*** (0.08)	0.01*** (0.00)
X Sign. * Time Sens.	-0.09*** (0.03)	-0.05 (0.03)	0.00*** (0.00)	-0.03 (0.07)	0.08*** (0.00)	0.06 (0.04)	0.08*** (0.00)
X Days* Time Sens.	-1.56** (0.74)	-0.39 (0.76)	-0.10** (0.05)	0.14 (1.95)	2.60*** (0.06)	3.06*** (1.13)	2.12*** (0.07)
X Polity * Time Sens.	-0.13*** (0.03)	-0.16*** (0.03)	-0.01*** (0.00)	-0.17*** (0.05)	-0.07*** (0.00)	-0.25*** (0.03)	-0.04*** (0.00)
R square	50.4%	50.4%	99.5%	50.4%	96.6%	50.4%	97.1%
N	293303	293303	293303	293303	293303	293303	293303

All regressions have exporter, importer and sector fixed effects.

Standard errors are clustered by country pair.

All equations have controls for the Distance, Contiguity, Colony, Common Language and Landlock variables.

Table 7
Corruption as a Comparative Disadvantage in Time- Sensitive Sectors:
Effect on Selection

	Gravity	Selection	Heckman	Gravity	Selection	Heckman
	X_{is}	T_{is}	X_{is}	X_{is}	T_{is}	X_{is}
	(1)	(2)	(3)	(4)	(5)	(6)
X Corrup * Time sens	-1.63** (0.79)	-0.27*** (0.10)	-1.68** (0.76)	-1.90** (0.97)	-0.26* (0.16)	-1.93** (0.95)
Skill abund * Skill int	0.39*** (0.07)	0.02* (0.01)	0.39*** (0.07)	0.39*** (0.07)	0.02** (0.01)	0.39*** (0.07)
Cap abund * Cap int	0.25*** (0.06)	-0.01 (0.01)	0.26*** (0.06)	0.28*** (0.06)	-0.01 (0.01)	0.28*** (0.06)
NG abund * NG int	1.28 (0.79)	0.15** (0.08)	1.23 (0.76)	0.75 (0.71)	0.22** (0.09)	0.74 (0.70)
X Sign * Time sens				0.01 (0.26)	-0.03 (0.02)	0.00 (0.25)
X Days* Time sens				-1.65 (4.44)	0.71 (0.86)	-0.99 (4.11)
X Polity * Time sens				-0.21 (0.17)	-0.01 (0.02)	-0.17 (0.16)
Religion * Sector fixed effects	No	Yes	Yes	No	Yes	Yes
R square	65.5%	61.5%		65.4%	61.8%	
N	6031	9120	9690	5582	8094	9241

All regressions have Exporter and Sector fixed effects.

Standard errors are clustered by exporter.

The R square reported for probit regressions (2) and (4) are pseudo R squares.

For probits in columns (2) and (4) we report marginal effects, not coefficients.

In the Heckman estimations in columns (3) and (6), we report the second stage only. To satisfy the exclusion restriction and predict selection, we use a set of interactions of the religion variable from Helpman, Melitz and Rubinstein (2008) with sector fixed effects.

Both probit regressions include the same set of interactions.

Table A1
Industry Characteristics

SIC code	Industry	Unpredictability
10 Sectors with Lowest Unpredictability Measure		
259	Miscellaneous Furniture and Fixtures	5.3%
301	Tires and Inner Tubes	5.7%
341	Metal Cans	6.6%
325	Structural Clay Products	7.0%
265	Paperboard Containers and Boxes	7.0%
271	Newspapers: Publishing or Publishing and Printing	7.3%
276	Manifold Business Forms	7.4%
324	Cement, Hydraulic	7.8%
345	Screw Machine Products	8.0%
295	Asphalt Paving and Roofing Materials	8.1%
10 Sectors with Highest Unpredictability Measure		
384	Surgical and Medical Instruments and Apparatus	22.2%
274	Miscellaneous Publishing	22.2%
369	Miscellaneous Electrical Machinery, Equipment and Supplies	22.9%
365	Household Audio and Video Equipment	23.7%
355	Special Industry Machinery (No Metalworking Machinery)	23.9%
343	Heating Equip, Except Elec and Warm Air; and Plumbing Fixtures	24.0%
394	Dolls and Stuffed Toys	24.9%
287	Agricultural Chemicals	26.2%
283	Medicinal Chemicals and Botanical Products	34.9%
334	Secondary Smelting and Refining of Nonferrous Metals	40.3%

Table A2
Country-level Gravity Equation:
Fixed-effect Specifications

	Fixed Effects		
	M	X	M and X
	(1)	(2)	(3)
X corruption	-0.36*** (0.03)		
M corruption		-0.09*** (0.03)	
M or X has high corruption			-0.23** (0.10)
ln(XGDPpc)	1.27*** (0.05)		
ln(MGDPPC)		0.89*** (0.04)	
ln(Xpop)	1.03*** (0.02)		
ln(Mpop)		0.77*** (0.02)	
Distance	-1.13*** (0.03)	-1.04*** (0.03)	-1.22*** (0.04)
Contiguity	0.77*** (0.13)	0.60*** (0.14)	0.52*** (0.15)
Colony	0.87*** (0.09)	0.83*** (0.10)	0.87*** (0.11)
Common Language	0.58*** (0.06)	0.76*** (0.06)	0.72*** (0.07)
X Landlocked	-0.05 (0.05)		
M landlocked		-0.56*** (0.05)	
One landlocked			-0.54*** (0.13)
X Signatures to export	-0.04*** (0.00)		
M Signatures to import		-0.01*** (0.00)	
X Days to start a business	0.20 (0.12)		
M Days to start a business		0.17 (0.13)	
X Polity	0.00 (0.00)		
X Polity		0.00 (0.01)	
X Labor Flex			
M Labor Flex			
X Fin. Devt			
M Fin. Devt			
X Rule of Law			
M Rule of Law			
X ln(price level)	0.13** (0.05)		
M ln(price level)		0.78*** (0.05)	
Exporter fixed effects	No	Yes	Yes
Importer fixed effects	Yes	No	Yes
R square	69.4%	73.4%	78.0%
N	9071	8376	8333

Table A3
Country-level Gravity: Instrumental Variable Estimation
Alternative Sets of Controls for Legal Origins Instrument

	Benchmark	Legal Origins as Instrument			Legal Origins as Instrument			
	Restricted	IV	1st stage		IV	1st stage		
	Sample	lnX	X Corr.	M Corr.	lnX	X Corr.	M Corr.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
X corruption	-0.46*** (0.04)	-1.05*** (0.09)			-0.32* (0.19)			
M corruption	-0.09** (0.04)	-0.01 (0.09)			0.14 (0.19)			
X German Leg. Or.			0.50*** (0.03)	-0.02 (0.04)		0.47*** (0.02)	-0.01 (0.03)	
X UK Leg. Or.			0.44*** (0.03)	-0.01 (0.03)		0.35*** (0.02)	0.01 (0.03)	
X French Leg. Or.			0.88*** (0.02)	-0.01 (0.03)		0.35*** (0.02)	0.00 (0.02)	
X Socialist Leg. Or.			0.90*** (0.03)	0.02 (0.04)		0.57*** (0.02)	0.00 (0.03)	
M German Leg. Or.			-0.03 (0.04)	0.51*** (0.03)		0.00 (0.03)	0.49*** (0.02)	
M UK Leg. Or.			-0.02 (0.03)	0.50*** (0.03)		0.03 (0.03)	0.38*** (0.02)	
M French Leg. Or.			-0.01 (0.03)	0.91*** (0.02)		0.01 (0.02)	0.39*** (0.02)	
M Socialist Leg. Or.			-0.02 (0.04)	0.92*** (0.03)		-0.02 (0.03)	0.59*** (0.02)	
X Signatures to export	-0.03*** (0.01)				-0.04*** (0.01)	0.00** (0.00)	0.00 (0.00)	
M Signatures to import	-0.01** (0.00)				-0.01*** (0.00)	0.00 (0.00)	0.00*** (0.00)	
X Days to start a business	0.27* (0.15)				0.96*** (0.18)	-0.15*** (0.04)	0.01 (0.04)	
M Days to start a business	0.04 (0.16)				0.52*** (0.18)	0.00 (0.04)	-0.08* (0.04)	
X Polity	0.02*** (0.01)				0.02*** (0.01)	0.00*** (0.00)	0.00 (0.00)	
X Polity	0.01 (0.01)				-0.01 (0.01)	0.00 (0.00)	-0.01*** (0.00)	
Second set of Controls	No	No	No	No	Yes	Yes	Yes	
R square	68.7%	#	66.8%	82.5%	82.0%	73.9%	91.4%	91.3%
N	5474	#	5474	5474	5474	5370	5370	5370

Standard errors are clustered by country pair.

All equations have controls for the Distance, Contiguity, Colony, Common Language and Landlock variables as well as for the GDP per capita, population, and price levels in each country.