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Trade, Law, and Product Complexity

Daniel Berkowitz
University of Pittsburgh, Department of Economics, dmberk@pitt.edu

Johannes Moenius
University of Redlands, johannes_moenius@redlands.edu

Katharina Pistor
Columbia Law School, kpisto@law.columbia.edu

Columbia Law School
The Center for Law and Economic Studies
435 West 116th St.
New York, NY 10027-7201

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Daniel Berkowitz* Johannes Moenius** Katharina Pistor***

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Abstract

How does the quality of national institutions that enforce rule of law influence international trade? Anderson and Marcouiller (2001) argue that bad institutions located in the importer's country deter international trade because they enable economic predators to steal and extort at the importer's border. We complement this research and show how good institutions located in the exporter's country enhance international trade and, in particular, trade in complex products whose characteristics are difficult to fully specify in a contract. We build a model in which both exporter and importer institutions impact both international and domestic transaction costs in complex and simple product markets. While international transaction costs affect the costs of trade, domestic transaction costs affect complex and simple products differently, thereby changing comparative advantage. We find strong evidence for the model's predictions: most notably, the quality of exporter institutions is most important for enhancing trade in complex product markets and the quality of importer institutions is most important for simple markets.

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*Department of Economics, University of Pittsburgh, Pittsburgh, PA, 15260, dmberk@pitt.edu,
**Kellogg School of Management, Evanston, IL, 60208-2013,
j-moenius@kellogg.northwestern.edu.
***Columbia Law School, New York, NY, 10027, kpisto@law.columbia.edu.

I. Introduction

Before entering into trade agreements, exporters must believe they will receive timely and appropriate payment with sufficiently high probability, and importers must believe they will receive timely shipment of appropriate products with sufficiently high probability. In this paper we focus on the ways in which formal national institutions such as courts, tax collection agencies and bureaucracies that enforce contracts and protect property rights can provide appropriate assurance to exporters and importers and thereby foster mutually beneficial trade.[1] James Anderson and Douglas Marcouiller (2001) (hereafter, denoted A&M) show that when these institutions are ineffective, corrupt government officials and other predators are able to steal and to collect bribes from traders at the importer's border. Their empirical work shows that bad institutions located in the importer's country raise international transaction costs and deter international trade. We complement this research: we show how good institutions located in the exporter's country can enhance international trade, in particular trade in complex products that are highly differentiated and contain many characteristics that are difficult to fully stipulate in a contract.

When the rule of law within the importer's country breaks down, economic predators can hold up shipments at the border. This, in turn, increases both the exporter's risk of not receiving payments and the importer's risk of receiving an inappropriate shipment. However, as noted by Dalia Marin and Monika Schnitzer (1995), efficient international trade agreements also break down when it is lucrative for the importer to withhold payment from the exporter, and when it is also profitable for the exporter to produce a substandard product. We focus on the role that institutions located in the exporter's domicile play in offsetting the importer's risk of receiving a substandard shipment. Specifically, contracts negotiated between exporters and importers—including letters of credit, counter-trade agreements and pre-payment—are broadly and

effectively used in international trade to offset the exporter's risk of not getting paid. However, similar contracts are less effective and, as such, are much less broadly employed to offset the importer's risk. For example, while importers can use a letter of acceptance to withhold payment until the state of the goods received is verified, the acceptance periods are short and defects that are difficult to verify may become apparent only later.[2] Therefore, it is primarily importers that rely on formal institutions such as courts and arbitration tribunals for seeking compensation.

The quality of institutions in the exporter's domicile is critical for offsetting importer risk because these institutions are the last fallback for resolving disputes over the quality and assortment of shipments. Parties can agree in their contract to resolve the dispute in the importer's court, the exporter's court, a court in a third country, or they might use an international arbitration tribunal (i.e. the International Chamber of Commerce, the London Court of International Arbitration, or the Hong Kong International Arbitration Centre), an arbitration board at a trade association, or agree to ad hoc arbitration. In international transactions, arbitration clauses are common because arbitration is less formal, quicker, and ensures greater expertise of those hearing and deciding the case than ordinary domestic courts. However, courts and arbitration tribunals have similar problems compensating the winning party. For example, in the case of court litigation, the importer as plaintiff pays court fees before the hearing proceeds. In general, if the exporter wins it is relatively easy for the court to enforce this ruling because it simply uses a share of the court fees that importer has paid in advance to pay the exporter. If the importer wins, his award will comprise a new shipment of products or monetary compensation, and he is supposed to be reimbursed for the court fees. It is more difficult for the court to enforce this second ruling because the court must force the exporter to compensate the importer for the court fees and either re-send a satisfactory product or compensate the importer for the value of the proper product and

[1] For the literature on the incentives of individual exporters and importers to enforce trade agreements when these modern institutions are weak or even absent, see Milgrom, North and Weingast (1990), Grief (1992, 1993), Greif, Milgrom and Weingast (1994) and Anderson and Young (2000).

any additional losses he may have suffered. If the exporter has assets in the importer's country or in a third country, then the importer can use the court system within that country to seize the exporter's assets. If not, however, the importer depends upon institutions in the exporter's country. Because the exporter is most likely to keep the bulk of its assets in its home jurisdiction, and because the nation state is sovereign and therefore foreign bailiffs cannot be employed, the quality of the exporter country's institutions is critical. When the exporter loses and does not comply with a ruling, the court system in the exporter's country becomes the last resort for enforcement of the ruling, and its ability to make and enforce good decisions depends upon the overall quality of institutions within its country.

We build a model of institutions and trade that draws upon the following ideas. First, the exporter's risk of non-payment is effectively offset by contractual means. Second, good institutions in the exporter's domicile are critical for offsetting the importer's risk of receiving an inappropriate shipment because contractual methods for offsetting this risk are ineffective. Third, it is more difficult for institutions in the exporter's country to enforce trade contracts for complex versus simple products. Complex products are differentiated and contain many characteristics, including size, design, material, and other specifications; thus, it is impossible to fully stipulate an order for these products in a formal contract.[3] Because contracts are less complete for complex products versus simple products, it is more difficult for institutions to determine whether a contract for complex products has been breached or fulfilled. Fourth, following A&M (2001), the predator's costs of stealing does not depend upon product complexity: therefore, bad importer institutions have a similar impact on simple and complex products. Fifth, firms that want to buy inputs and outsource on the domestic markets also depend upon their domestic institutions to limit stealing and corruption and to enforce contracts.

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[2] Under the Convention of the International Sale of Goods (CISG), for example, the importer is obliged to examine the goods for defects "within as short a period as is practicable" after delivery. See Art. 38 CISG.
[3] Ongoing work in contract theory argues that it is impossible specify a complete contract for even the simplest products. See Grossman and Hart (1986) and Hart and Moore (1999).

We generate testable predictions regarding the impact of exporter and importer institutions on world trade in complex and simple products by extending the Rudiger Dornbush et al. (1997) Ricardian model. In our version of the model, good importer institutions reduce international transaction costs by lowering predation risk, good exporter institutions reduce transaction costs primarily in complex product markets by eliminating the exporter's incentive to shirk, and good domestic institutions increase a country's comparative advantage in complex products. The model makes clear predictions about the impact of good institutions on domestic and international transaction costs, and about trade in complex and simple products. We find strong evidence in the data to support the model's predictions. Most importantly, we find that the overall impact of exporter institutions is strongest in complex product markets and the overall impact of importer institutions is strongest in simple product markets. We also find that the impact of institutions on transaction costs is strongest in complex product markets. Finally, the impact of institutions on trade is comparable to other standard determinants such as GNP per capita, distance between countries and language differences. The results imply that policies that increase the quality of legal institutions will have a substantial impact on trade by deterring predators both in the importer's and the exporter's countries, by encouraging exporters to make a good faith effort to fulfill their contractual obligations, and by enabling producers to cheaply outsource within their domestic markets, thus influencing comparative advantage.

Our paper contributes to a growing literature on the relationship between institutions and trade. This literature includes the work of James Anderson and Douglas Marcouiller (2001) and Helena Svaleryd and Janos Vlachos (2001), who show that strong financial institutions encourage countries to be more open to aggregate trade. Arvind Subramanian, Dani Rodrik and Francesco Trebbi (October, 2002) show that institutions cause trade; our paper analyzes the impact of exporter and importer institutions on trade in simple and complex products.

The next section shows how international transaction costs depend upon product complexity as well as exporter and importer institutions; section III builds a general equilibrium

model of institutions and trade and derives testable predictions. Sections IV and V describe the data and our estimation procedure. Section VI reports empirical results, and section VII concludes.

II. Institutions, Complexity and Transaction Costs

As noted by James Anderson (2001), crossing an international border imposes substantial costs because it generally indicates the point where formal taxes are imposed and where informal groups extort bribes. The A&M (2001) model shows how high quality importer institutions can limit the expected gains from piracy and bribes and thereby reduce transaction costs. A&M assume that costs imposed by predators do not depend upon product complexity. Incorporating their results in a reduced form, define $s(I^{imp})$ as the expected share of goods that survives predation, where I^{imp} is the quality of importer legal institutions, and $s \in [0,1)$ is increasing in I^{imp}. Let $\tau(\cdot)$ denote the expected share of goods that survives for standard reasons including distance, differences in trading blocs, etc (see James Rauch (1999)). Let $r(\cdot)$ denote the expected share of an order that an importer believes will comply with his specifications (after netting out losses from piracy and other transaction costs). Then $\varphi(I^{imp}, \cdot) = r(\cdot)s(I^{imp})\tau(\cdot) \in [0,1]$ is the overall share of products that survives and is received by the importer.

We informally derive the properties of r, where

$$r(\cdot) = \delta(\cdot) + (1 - \delta(\cdot))[\pi(\cdot) - (1 - \pi(\cdot))\psi] \qquad \textbf{(1)}$$

In equation (1) $\delta(\cdot)$ is the probability that the importer is satisfied with the shipment, $\pi(\cdot)$ is the probability that the importer is compensated if there is a breach of contract, and ψ denotes legal costs (normalized as the share of the importer's costs of the overall shipment) the importer must pay if he decides to take the exporter to court for breach of contract.[4] If the importer is suing

[4] A formal derivation of equation (1) is available upon request. In the more general situation, the importer can decide whether or not to go to court if there is a breach of contract, the importer can decide whether or

the exporter for breach of contract, he typically must make an advance payment to cover the costs of dispute settlement. If the importer loses, the court or arbitration tribunal simply keeps the importer's advance payment. If the importer wins, he is fully compensated for these costs and for the value of the shipment. If there is a breach of contract and the importer takes the exporter to court, then $\pi(\cdot)$ is the importer's expected gain from taking legal action when he wins, $-(1-\pi(\cdot))\psi$ is the importer's expected loss if he loses. Therefore, at the time of the order, the importer's expected compensation (as a share of the initial order) if there is a breach of contract is $(1-\delta(\cdot))[\pi(\cdot)-(1-\pi(\cdot))\psi]$.

The exporter has a greater incentive to make a good faith effort when she believes the probability she will be punished for breach of contract is high. A good faith effort from the exporter, in turn, increases the probability that the importer is satisfied. As complexity of an order increases, it becomes more difficult to specify every detail and it is becomes more likely that the importer will be dissatisfied even when the exporter makes a good faith effort. Therefore, the probability that the importer is satisfied with the shipment, $\delta(\cdot)$, depends upon enforcement, $\pi(\cdot)$, and product complexity, c. In summary,

$$\delta = \delta(\pi, c):\ \partial\delta/\partial\pi > 0,\ \partial\delta/\partial c < 0\ for\ \delta,\pi \in [0,1) \qquad (2)$$

High quality institutions in the exporter's country, such as courts and agencies capable of enforcing court rulings, are critical for enforcement, $\pi(\cdot)$. Enforcement can be more problematic when the importer wins because the relevant institution must make the exporter reimburse the importer for her advance coverage of costs, and it must make the exporter compensate the importer. Because the exporter generally holds the bulk of her assets in her home jurisdiction, institutions in her country become critical no matter where the hearing is held

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not to pursue a frivolous lawsuit when the contract has been fulfilled, and the exporter can decide whether or not to shirk. Equation (1) is a reduced form in which the high quality of institutions ensures that the importer does not pursue frivolous lawsuits, the importer goes to court when there is a breach of contract, and the importer can be sincerely dissatisfied when the exporter makes a good faith effort.

because they are the last resort for resolving disputes over the fulfillment of her contract with the importer.

The probability of enforcement, $\pi(\cdot)$, increases when courts exercise impartiality in their proceedings and rulings, and when courts are sufficiently competent to handle cases involving complex goods. Impartiality refers to the absence of corruption and to the lack of any home bias that may influence the court's verdict. International treaties, in particular the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards, have been negotiated in order to mitigate home bias. The treaties commit countries that have ratified the convention to enforcing foreign arbitral awards without a review of the substantive law. Domestic courts may, however, review whether procedural requirements established in the Convention have been observed, and whether the award is consistent with fundamental principles of public interest ("ordre public"). One hundred and thirty-two countries have ratified the convention. Still, a number of countries have not done so, and even some of those that have tend to use the "ordre public" exemption to review the findings of the foreign arbitration bodies and frequently reject their ruling as violating fundamental domestic policies.

To demonstrate the uncertainties trading partners face when enforcement of foreign arbitration awards cannot be ensured, consider Brazil, which ratified the New York Convention only in 2002. Until 1990, when the Supreme Court of Brazil changed its previous standard of review, there was substantial uncertainty about the ability of parties to enforce arbitration awards against Brazilian exporters (Samtleben, 1994). In one case, the plaintiff, a Dutch company, had ordered 500 tons of peanut oil from a Brazilian exporter.[5] The oil that was delivered turned out to be defective. The parties had agreed on arbitration by a third party (FOSFA), which awarded the Dutch company US$220,000 in damages. The British High Court confirmed the award. Nevertheless, the Supreme Court of Brazil refused to recognize the award; it refused to enforce

[5] See Sup. Trib. Fed., 4 June 1980, Naamloze Vennotschap Bunge v. Industria de Oleos Paceambu S.A. (original decision printed in Rev. TimrJur. 95, 1001).

this award in Brazil on the grounds that the Brazilian exporter had not been formally notified about the arbitration proceedings in accordance with the law of Brazil. There are many cases prior to 1990 in which Brazilian courts effectively set aside arbitration decisions against Brazilian exporters by invoking procedural requirements unknown outside of Brazil (see Samtleben, 1989, 1994). Thus, if there was a breach of contract by a Brazilian exporter, importers were uncertain whether an arbitration decision would be enforced. As a result, importers were often forced to resort to using costly and highly idiosyncratic adjudication in Brazilian courts.

In 1990, the Supreme Court of Brazil held that in cases (such as the above) where both parties had participated in arbitration and had not challenged the procedural rules on the grounds that they violated domestic law, no party could invoke these arguments at the recognitions stage. In 1996, Brazil adopted a new arbitration law that confirms this new case law, and in 2002 it adopted the New York Convention. Still, these actions may not guarantee that future arbitral awards will be enforced without attempts to review their substance. Recent evidence from Russia, Indonesia, and Pakistan suggests that domestic courts are frequently tempted to put aside foreign arbitration awards to protect domestic companies (Isaacson, 2002).

The second factor that determines the probability of enforcement, $\pi(\cdot)$, is product complexity. Complex products, such as machines and even mass-produced clothing, contain many characteristics. These characteristics—for example, whether T-shirts should conform with Italian, French or US standards for size, material and colors, whether a user's manual for a complex machine is user friendly, whether a belt-loop for a particular shirt is fashionable, etc.—are numerous, subjective (as in the case of fashion or user-friendliness) and highly differentiated across otherwise similar products. When there is substantial product complexity it becomes more difficult for a court to make a correct ruling because it is difficult for the court to verify whether the character of the exporter's shipment fulfills the letter and spirit of the contract. For similar

reasons, it becomes more difficult for agencies that implement court rulings to be effective when products are more complex. Summarizing the discussion, then

$$\pi = \pi(I^{\exp}, c): \ \partial\pi / \partial I^{\exp} > 0, \ \partial\pi / \partial c < 0 \ for \ \pi \in [0,1) \qquad (3)$$

where I^{exp} denotes the quality of exporter institutions.

Substituting equations (2) and (3) into (1) and differentiating, then

$$\partial r / \partial I^{\exp} = (1+\psi) * \partial\pi / \partial I^{\exp} (\partial\delta / \partial\pi * (1-\pi) + (1-\delta)) > 0 \qquad (4)$$

$$\partial r / \partial c = (1+\psi)[(1-\pi)(\partial\delta / \partial\pi * \partial\pi / \partial c + \partial\delta / \partial c) + (1-\delta)\partial\pi / \partial c) < 0 \qquad (5)$$

Therefore, an improvement in the quality of exporter institutions increases π, which then raises the probability that the exporter makes a good faith effort. This raises the probability that the importer is satisfied, and that the importer is compensated if there is a breach of contract, which in turn, increases *r*. An increase in product complexity directly lowers the probability that the importer is satisfied, and also lowers the probability that the importer is compensated if there is a breach of contract. This provides an exporter with a greater incentive to shirk, and consequently lowers the probability that the importer is satisfied. Thus, overall, an increase in *c* lowers *r*.

Differentiating (4) with respect to *c*, then

$$\partial^2 r / \partial I^{\exp} \partial c = -(1+\psi) * \partial\pi / \partial I^{\exp} [\partial\delta / \partial\pi * \partial\pi / \partial c + \partial\delta / \partial c] > 0 \qquad (6)$$

Equation (6) establishes the connection between the quality of exporter institutions, defined as their commitment to be impartial, and product complexity. Because contracts for complex products are less complete than contracts for simple products, they are more vulnerable to disputes, and they lower *r*. Therefore, better institutions in the exporter country dampen the marginal negative impact of complexity on *r*, and the cross derivative is positive.

Finally, the share of surviving products,

$\varphi(c, I^{\exp}, I^{imp}, \cdot) = r(c, I^{\exp}) \cdot s(I^{imp}) \cdot \tau(\cdot) \in [0,1)$, has the properties established in equations (4)-(6) and is increasing in I^{imp}.

III. Institutions, Transaction and Production Costs

In order to generate predictions about the impact of institutions on trade, we incorporate transaction and domestic production costs into a general equilibrium model based upon Rudiger Dornbusch et al (1977) (proofs of results are in the Appendix). There are two countries (home and foreign); two simple products denoted *S* and *S** that can be produced only by the home and foreign country, and a continuum of equally complex products distributed on $z \in [0,1]$. The labor and institutional endowments in the home and foreign country are (*L*, *I*) and (*L**,*I**). Because competitive outsourcing of parts production on the domestic market requires low transaction costs, high transaction costs enforce potentially inefficient in-house production. Therefore, we call this a production cost effect of legal institutions. Good domestic institutions discourage predators and also offset domestic suppliers' incentive to shirk. Because the cost of predation does not depend upon product complexity, while shirking is more lucrative for complex products, an improvement in domestic institutions lowers production costs of complex relative to simple products and, thereby, increases a country's comparative advantage in complex products. To capture this, we assume that producing either simple product requires one labor unit. Let $a(z)/I$ and $a^*(z)/I^*$ denote production (unit labor costs) for complex product *z* in the domestic and foreign country. Thus, better domestic institutions lower the relative production cost of complex products.

We sort products by comparative advantage. The home country has a falling comparative advantage in complex products:

$$A(z,I,I^*) \equiv a^*(z)I / a(z)I^*, \text{ where } \partial A/\partial z < 0; \\ \partial A/\partial I = A/I;\ \partial A/\partial I^* = -A/I^* \tag{7}$$

The representative agents in each country have the same utility function

$$U(S,S^*,x(z)) = (1-\beta)\ln(S^{\rho} + S^{*\rho}) + \beta \ln \int_0^1 \ln x(z)dz \tag{8}$$

where $\{\beta, 1-\beta\} \in (0,1)$ are shares of income spent on simple and complex products,

$\rho = 1 - (1/\sigma)$, σ is the elasticity of substitution within simple products, and the elasticity of substitution across complex products is one. We assume that *S* and *S** are relatively closer substitutes than complex products:

$$\sigma > 1 \tag{9}$$

Thus, in complex product markets consumers buy the entire continuum and spend the same amount of money on each product. However, in simple product markets consumers spend less on *S* and more on *S** as the price of *S* relative to *S** increases.

The home country takes into account transaction costs as well as home and foreign production costs when it decides whether to produce or import the z^{th} complex product. Specifically, the home country produces all *z* for which its unit labor costs are lowest:

$$wa(z)/I \leq w^* a^*(z)/\{I^* \cdot r(c{=}1,\, I^*) \cdot s(I) \cdot \tau(\cdot)\} \tag{10}$$

where $c = 0, 1$ denotes the simple and complex product, *w* and *w** are the home and foreign wage rate; the home country produces all $z \leq z_2$, and imports otherwise. The right side of equation (10) shows that an increase in the quality of foreign (exporter) institutions lowers transaction and production costs by impacting the terms $1/r(c{=}1,I^*)$ and $1/I^*$. The left side shows that the quality of home (importer) institutions impacts only home production costs. Equation (10) can be rewritten:

$$\omega \equiv w/w^* \leq A(z,I,I^*)/\{r(c{=}1,\, I^*) \cdot s(I) \cdot \tau(\cdot)\} \tag{10*}$$

where ω is the relative wage. Similarly, the foreign country produces all *z*, satisfying:

$$wa(z)/\{I \cdot r(c{=}1,\, I) \cdot s(I^*) \cdot \tau(\cdot)\} \geq w^* a^*(z)/I^* \tag{11}$$

This can be rewritten:

$$\omega \geq A(z,I,I^*) \cdot \{r(c{=}1,\, I) \cdot s(I^*) \cdot \tau(\cdot)\} \tag{11*}$$

The foreign country produces all $z \leq z_1$, and imports otherwise. Solving (10*) and (11*) as strict equalities, then $z_1 < z_2$, and the home country imports complex goods $z \in (z_2, 1]$, the

foreign country imports complex goods $z \in [0,\ z_1)$, and there is an interval of complex non-tradeables $z \in [z_1, z_2]$.

Because there are constant returns to scale in production, there are zero profits in a competitive equilibrium. Normalizing the foreign wage to unity, the sale price of simple product *S* in the home country is ω, and the sale price of *S** in the foreign country is one.

If the foreign country imports *S,* its price of *S* relative to *S** is

$$P_s^*(\omega, I^*, I) = \omega / \{r(c=0,\ I) \cdot s(I^*) \cdot \tau(\cdot)\} \tag{12}$$

If, however, the home country imports *S**, its price of *S* relative to *S** is

$$P_s(\omega,\ I^*, I) = \omega \cdot r(c=0,\ I^*) \cdot s(I) \cdot \tau(\cdot) \tag{13}$$

Solving the representative agent's utility function, the share of income that the home and foreign countries spend on *S* is $\sigma_1(\omega, \mathrm{I}, \mathrm{I}^*) = (1-\beta) \cdot (1 + \{P_s(\omega,\ I,\ I^*)\}^{\sigma-1})^{-1}$ and $\sigma_1^*(\omega, \mathrm{I}, \mathrm{I}^*) = (1-\beta) \cdot (1 + \{P_s^*(\omega,\ I,\ I^*)\}^{\sigma-1})^{-1}$. Payments to laborers producing *S* are

$$\omega L^{simple} = \sigma_1(\omega, I, I^*) \cdot \omega L \ + \sigma_1^*(\omega, I, I^*) \cdot L \tag{14}$$

where ωL and L^* denote home and foreign income (normalized by the relative wage).

Consumers spend a share β of their income on complex products and spend the same amount of money on each complex product. Because the home country produces complex products on the interval [0, z_2], and the foreign imports from the home country on [0, z_1], the total payments to labor in the home complex sector are

$$\omega L^{complex} = \beta \cdot \{z_2 \omega L \ + z_1 L^*\} \tag{15}$$

Substituting the identity $L^{simple} + L^{complex} = L$ into (14) and (15), summing and converting to logs, ω is expressed as an implicit function:

$$\begin{aligned} &\Gamma(\omega,\ z_1,\ z_2;\ I, I^*) = \ln\omega + \ln L + \ln\{1 - \{\beta z_2 + \sigma_1(\omega, z_1, z_2)\} \\ &- \ln L^* - \ln\{1 - \{\beta z_1 + \sigma_1^*(\omega, z_1, z_2)\} \equiv 0 \end{aligned} \tag{16}$$

Our interest is in characterizing the impact of exporter and importer institutions on trade flows. We limit the analysis to the most empirically relevant case, in which there is two-way trade in simple and complex products (accounting for 81% of all non-missing cases), and derive the foreign country's equilibrium import expenditures on complex and simple products (all results apply for home country imports). Using (14) and (15), the logs of foreign import expenditures are

$$\log M_*^{simple} = \log \sigma_1^*(\omega, I, I^*) + \log L^* \quad (17)$$

$$\log M_*^{complex} = \log \beta + \log z_1 + \log L^* \quad (18)$$

Solving equations (10*) and (11*) as strict equalities and using equation (16), we obtain a system of three equations for which z_1, z_2 *and* ω are functions of *I* and *I**. Assuming an equilibrium exists, we totally differentiate the system defined by (16), (10*) and (11*) with respect to *I* (exporter institutions) and *I** (importer institutions):

$$\partial \log M_*^{complex} / \partial \log I = \partial \log M_*^{complex} / \partial \log I_{production} + \partial \log M_*^{complex} / \partial \log I_{transaction} > 0 :$$
$$\partial \log M_*^{complex} / \partial \log I_{production} > 0; \partial \log M_*^{complex} / \partial \log I_{transaction} > 0 \quad (19)$$

$$\partial \log M_*^{complex} / \partial \log I^* = \partial \log M_*^{complex} / \partial \log I^*_{production} + \partial \log M_*^{complex} / \partial \log I^*_{transaction} = ? :$$
$$\partial \log M_*^{complex} / \partial \log I^*_{production} < 0; \partial \log M_*^{complex} / \partial \log I^*_{transaction} > 0 \quad (20)$$

Equations (19) and (20) break down the impact of exporter (home) and importer (foreign) institutions on complex product imports into production and transaction cost components. According to (19), following an improvement in exporter institutions, the foreign (importer) country's comparative advantage falls because the exporter can produce complex products relatively more cheaply. Furthermore, the foreign (importer) country's transaction costs also fall because its risk of receiving shoddy complex products from an exporter with better institutions is lower. Thus, by both the production and transaction cost effects complex imports increase. By (20), following an improvement in domestic institutions, the foreign (importer) country's comparative advantage in complex products increases, and its transaction cost fall because better

domestic institutions lower its predation risk at its border. Thus, complex imports decrease by the production effect and increase by the transaction effect, and the overall impact of an improvement in importer institutions is ambiguous.

Regarding foreign imports of simple products:

$$\partial \log M_*^{simple} / \partial \log I = \partial \log M_*^{simple} / \partial \log I_{production} + \partial \log M_*^{simple} / \partial \log I_{transaction} = ?:$$
$$\partial \log M_*^{simple} / \partial \log I_{production} < 0;\ \partial \log M_*^{simple} / \partial \log I_{transaction} = ? \quad (21)$$

$$\partial \log M_*^{simple} / \partial \log I^* = \partial \log M_*^{simple} / \partial \log I^*_{production} + \partial \log M_*^{simple} / \partial \log I^*_{transaction} > 0;$$
$$\partial \log M_*^{simple} / \partial \log I^*_{production} > 0;\ \partial \log M_*^{simple} / \partial \log I^*_{transaction} = ? \quad (22)$$

Because a gain in comparative advantage in the complex sector implies growing comparative disadvantage in the simple sector, the production cost effects of exporter and importer institutions for simple products have the opposite sign in their impact on complex product markets. The impacts of institutions on transaction costs are ambiguous in simple product markets. However, for reasons that are spelled out in the Appendix, the overall effect of importer institutions (production plus transaction costs) on simple product imports is positive under very general conditions, while the overall effect of exporter institutions is ambiguous.

The model also predicts that the sum of production effects in both markets is zero:

$$\partial \log M_*^{i} / \partial \log I_{production} + \partial \log M_*^{i} / \partial \log I^*_{production} = 0: \quad (23)$$
$$i = simple, complex.$$

Equation (23) implies that we can isolate the impact of exporter and importer institutions by analyzing transaction costs:

$$\partial \log M_*^{i} / \partial \log I + \partial \log M_*^{i} / \partial \log I^* =$$
$$\partial \log M_*^{i} / \partial \log I_{transaction} + \partial \log M_*^{i} / \partial \log I^*_{transaction} \quad (24)$$

where the sign of (24) is strictly positive and ambiguous for complex and simple products.

From the results derived in equations (19)-(24), several testable predictions emerge.

Proposition 1. The overall effect of importer institutions on complex product imports is negative if and only if their production effect dominates their transaction effect (i.e., the absolute effect of production costs dominates the absolute impact of transaction costs). If the production effects of importer institutions dominate, then the overall absolute effect of exporter institutions is stronger than importer institutions in complex product markets.

Proof. See the Appendix.

Proposition 2. If the production effect of exporter institutions in simple product markets dominates their transaction effect, then the overall impact of importer institutions in simple product imports is negative.

Proof. See the Appendix.

In the remainder of this paper, we take these predictions to the data.

IV. Data

The data comes from a variety of sources. The national accounts data is collected from the IMF Financial Statistical Yearbook, the gravity controls are taken from Rauch (1999). We use the 1990 values throughout.[6] Data on the quality of institutions comes from the International Country Risk Guide. This data is constructed as an annual index from a simple average of quality ratings of institutions by country. Each rating ranges from one to ten with ten representing the highest quality. For our purpose, we include in these ratings an average of indices of rule of law,

[6] This only poses a problem for the language variable, since in some countries with large immigration activities, these numbers may not be constant. However, we think the variations are generally small enough to not change the results in any significant way.

expropriation risk, corruption in government, and bureaucratic quality.[7] We do not include expropriation risk and ethnic tensions in the averages we used for our econometric exercise, since those dimensions do not fit the concept of legal quality we introduced.[8] Summary statistics for the average index number we used in the estimation can be found in Table 1a. Trade data is obtained from the World Trade Database compiled by Statistics Canada. To categorize the products into different degrees of complexity, we employ the classification developed by Rauch (1999). Since complexity cannot be determined directly, he sorts four digit SITC industries into trading categories: those goods that are predominantly traded on organized exchanges (metals, pork), those that are reference priced (chemicals, fertilizers) and those that neither have reference prices nor are traded on organized exchanges (e.g., shoes, cars and machinery). We reinterpret this classification in terms of product complexity, where "organized exchange" denotes low complexity (simple) and "neither" captures high complexity.[9] In Table 1b, we report summary statistics of the relative importance of simple versus complex products. There are 55 countries (see Table 1c) in the data set, and all variables are either fixed or reported on an annual basis from 1982 to 1992.

V. Estimation

In this section, we describe our econometric strategy. We first integrate our two-country results into a multi-country world. Next we discuss the estimation equation that results from this mapping. Finally, we discuss further econometric issues.

[7] Source is the International Country Risk Guide used by La Porta et al. (1997, 1998) and Kaufmann (1999). We thank Stephen Knack for providing this data. The other indices are risk of repudiation of government contracts and ethnic tensions. Our results our robust to the inclusion of these two indices into our average index of institutional quality. All six of the indices are highly correlated and could also be aggregated using principal components.

[8] However, it should be noted that all results are robust with the inclusion of these two dimensions.

[9] All results for "reference priced", which one might interpret as mid-complexity, are generally consistent with the model we present and are available from the authors upon request.

As Eaton and Kortum (2002) have shown, the Ricardian Model of Dornbusch et al. (1977) in a multi-country setting leads to a gravity specification of bilateral trade-flows. Our set-up differs from theirs in two important aspects. First, we differentiate by the types of goods, since we introduce both a simple and a complex products sector. We assume that each national economy is fully described by these two sectors: only the complex goods sector is identical to the Dornbusch et al. (1977) specification. Second, we utilize a mechanism that influences both domestic production and international transaction costs.[10] We therefore estimate the empirical model:

$$IM_{ijtk} = \alpha_i + \alpha_j + \beta_k X_{ijt} + \gamma_k I_{it} + \delta_k I_{jt} + \varepsilon_{ijtk} \qquad (25)$$

where IM_{ijtk} denotes the dollar value of imports originating from country j and shipped to country i in year t and industry group k. Similarly, X_{ijt} contains the standard gravity variables including GDP and GDP per capita for each country[11], distance between the two countries, and whether or not the countries share a common border, have colonial ties, share languages or are remote. The coefficients α_i and α_j are associated with country dummy variables. Whenever a country is part of a bilateral trading relationship, this dummy variable assumes a value of 1; the variable is zero otherwise. This guarantees that country-specific effects for both exporters and importers, which can be assumed constant over our eleven-year period (such as geography and infrastructure in general) are absorbed. Our variables of interest are I_{it} and I_{jt}, which denote the quality level of the exporter's and importer's legal institutions, hereafter referred to simply as institutions.[12]

[10] These two differences require changes in the estimation equation relative to theirs, as well as in the interpretation of the coefficients, since changes in the quality of legal institutions cannot be interpreted as being similar to a national technology effect.

[11] It is important to note that GDP and GDP per capita were entered separately in the regression, since the quality of legal institutions is highly correlated with GDP per capita (ρ=0.82)

[12] This specification simplifies the Eaton and Kortum (2002) specification because it excludes the effect of changes in all other countries' legal qualities on a particular country-pair's bilateral imports. This, however, will only cause omitted variable bias if there is correlation between the importer's quality of legal institutions and all other countries' quality of institutions *corrected by distance and other impediments to trade*. This bias, however, seems negligible.

Finally, a feature of the gravity model regressions, which is problematic for calculating standard errors, is that the same country's characteristics will be represented on the right hand side repeatedly. Defining these repetitions as groups, error terms within those groups are likely to correlated with each other, while error terms across groups should not correlate. In order to account for this grouping effect, we replace the traditional Huber-White errors (White, 1980) with robust standard errors that additionally account for within-group correlation. As a result, our standard errors are considerably higher than those normally reported, and this hurts the statistical significance of our estimates. However, we include this adjustment in an effort to produce the most cautious estimates.

VI. Results

The predictions of the model from Section 3 for the case of two-way trade in all categories are reproduced in the following table:

Table 2: Predictions of the Model

	Importer Institutions			Exporter Institutions		
	Production	Transaction	Overall	Production	Transaction	Overall
Complex Products	-	+	- ⇔ Production dominate Transaction Effects	+	+	+
Relative Impact of Institutions Complex Markets	If Production Effect of Importer Institutions dominates, then |Overall Importer Institutions| < |Overall Exporter Institutions|					
Simple Products	+	?	+	-	?	- if Production dominate Transaction Effects

The model therefore delivers several testable implications when the production cost effect of importer institutions (that is, the effect of importers' institutions on comparative advantage) dominates the transaction cost effect, and the production cost effect of exporter institutions dominates in simple markets. Under these general assumptions, the model predicts that in complex markets the coefficient for exporter institutions is positive, the coefficient for importer institutions is negative, and exporter institutions have the greatest absolute impact. In simple markets the coefficients for importer and exporter institutions are reversed. We would expect the sum of coefficients for exporter and importer institutions in complex product markets to be strictly positive since the sum of these coefficients adds up to the sum of transaction cost effects, which are each strictly positive. Finally, our model does not generate these clear predictions about the impact of institutions on transaction costs in simple product markets.

In order to test these predictions, we proceed in three steps. First, to best compare our results with A&M (2001), we estimate the effect of institutions on overall imports. Next, we repeat this exercise for complex and simple imports. Finally, we use disaggregated data of all 471 SITC industries in our panel and employ a difference-in-difference estimator that allows us to control for a larger number of influences.

Table 3 reports results for the estimation of the effect of institutions on imports. In the first column, we present the results of our estimates when institutions are excluded. We note that all variables have the expected sign and are of a reasonable order of magnitude.[13] In Column 2, we include importer and exporter institutions. We confirm the A&M (2001) result that importer institutions have a positive effect on imports. However, we also find that exporter institutions matter more than importer institutions: the hypothesis that exporter and importer have the same effect can be rejected at a 10% level. To check the robustness of our results, we first include country-dummies to control for country-specific effects (for example, geography) and then add

year dummies to control for overall time effects (for example, average growth or technology effects) into our regression. Both sets of dummies erase the effects of GDP. They also render the effect of importer institutions on trade insignificant. However, the effect of exporter institutions on trade survives these robustness checks, and we are able to reject the hypothesis that importer and exporter legal institutions have the same effect at the 5% level.

In the second step, we re-estimate equation (25) for complex and simple imports. The results are reported in Table 4. Regarding complex products, recall that our model predicts that the impact of exporter institutions is always positive. Furthermore, when the production cost effect of importer institutions dominates transaction cost effects, the effect of importer institutions is negative, and exporter institutions have the greatest absolute impact. All of the estimated coefficients match these predictions. The hypothesis that the absolute effect of exporter and importer institutions is equal is rejected at the 5% level when country dummies are included, and at the 1% level when both country and time dummies are included. This suggests that the production cost effect actually dominates the transaction cost effect. Finally, recalling equation (24), the sum of coefficients for exporter and importer institutions equals the sum of their transaction cost effects, and the model predicts this sum to be strictly positive. The estimates are consistent with this prediction: they are $0.85 - 0.51 = 0.34$ and $0.93 - 0.44 = 0.49$ when country dummies or both country and time dummies are included.

Regarding simple products, our model predicts that the effect of importer institutions is always positive. Furthermore, when the production cost effect of exporter institutions dominates, better exporter institutions lower simple product imports. The coefficient estimates for importer and exporter institutions reported in Columns 2 and 4 (where the country dummies and the country and time dummies are included) support these predictions, and suggest that the production cost effect of exporter institutions dominates. While the sum of exporter and importer institution coefficients equals their sum of transaction cost effects, the model makes no clear

[13] Language is an exception, however, it is statistically insignificant.

prediction about the expected sign of this sum. In both estimates the sum of transaction cost effects is 0.66 – 0.53 = 0.13, which is marginally positive and always less than the corresponding sum of transaction costs for complex imports. Thus, the model provides evidence that general equilibrium transaction costs are greater in complex markets.

All estimated coefficients can be interpreted as in the following example: A 10% increase in the legal quality of an exporting country will – on average – lead to about a 9% increase in complex goods exports of that country. This means – again on average – that an increase in rating value from 6.5 to 7.15 in 1990 for the United States would have led to an increase in exports of about $30 billion worth of complex goods.

In our third and last step, we subject these findings to a robustness check and modify equation 25:

$$IM_{ijtk} = F_{ijt} + \gamma DI_{it} + \delta DI_{jt} + \varepsilon_{ijtk} \qquad (26)$$

where k now represents all 471 SITC industries in our sample, and F_{ijt} are fixed effects that absorb country-pair year effects. This specification sweeps away all standard gravity variables, and therefore X_{ijt} is no longer included in the regression. Regarding product groups, D is a dummy variable that is equal to 1 if the industry falls into the complex products category, and equal to zero if it is in the simple products category.[14] This technique is known as "difference-in-difference estimation" (see, for a very nice example, Athey and Stern (2002)). In our case, we cannot estimate the effect of importer or exporter institutions per se. All we can estimate is the differential effect of these institutions on our "treatment group," that is, industries in the complex goods sector that refers to the first difference. The second difference is the change in the quality of institutions over time. Since we eliminate all other effects, we are left solely with the differential effect of institutions on complex relative to simple products.

[14] We dropped all intermediate goods industries. Again, however, our results are robust with these exclusions, and are available from the authors upon request.

Table 5 reports the results of this estimation. The first column refers exactly to the specification in equation (26). Regarding complex relative to simple products, we find that exporter institutions have a positive effect and importer institutions have a negative effect. Comparing the coefficient sizes with Table 4, Columns 1 and 2, we should have expected a coefficient on exporter institutions of around 1.36 (0.85 + 0.51, since this time we measure *relative* to simple products) and around -1.2 (-0.53 – 0.66) for importer institutions. The actual estimates we get are quite close (1.58 for exporter institutions and –1.01 for importer institutions). As another robustness check, we include a lagged dependent variable as a regressor. The results (reported in Column 2) are robust regarding these inclusions. Columns 3 and 4 in Table 5 replace the country-pair-year dummies with a substantially larger set of country-year-two-digit industry dummies with and without a lagged dependent variable. In both cases, exporter institutions have a positive effect on complex imports relative to simple imports, while importer institutions have a negative effect. Table 5 then confirms that the results reported in table 4 are strongly robust.

VII. Conclusion

Drawing on the theory of incomplete contracts, we have argued that good legal institutions located in an exporter's domicile are critical for trade in complex products because they offset the exporter's incentive to breach contract. The analysis has shown that these institutions impact the exporter's ability to outsource on the domestic market and to sell on world markets. The effect of institutions on national transaction costs should influence comparative advantage in complex products, while their effect on international transaction costs should influence the costs of exporting complex products. Furthermore, drawing on the work of A&M (2001), we have noted that good institutions located in importer's country influence trade by lowering predation risk. When we embedded these claims into a general equilibrium model, we

found that, under general conditions, strong legal institutions in the exporter's domicile increase its comparative advantage in complex goods production and lower its comparative advantage in simple goods production. Furthermore, good legal institution in an importer's country lead to a shift away from complex goods imports into simple goods imports.

We took these claims to the data and found that legal institutions have a major impact on overall trade flows. We also found the effects predicted by the model to be present in the data.

These findings have important implications: political actors can change institutions and, thereby, indirectly influence the industrial structure in their countries. These issues are of especially high importance for developing countries. We will explore the effect of legal institutions on developing countries in future research.

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Table 1a: Summary Statistics Quality of Legal Institutions

	Statistics	Value (Index Number)	Countries close to value
Overall (year = 1990)	Average	4.59	Brazil, Chile, Malaysia
	Min	1	Iran, Bolivia, Indonesia, Nigeria
	Max	7	Switzerland, Belgium, Denmark
	Standard Deviation	1.65	
Change over Estimation Period 1982-1992	Decreasers	-55% -19% -15%	Ethiopia Hong Kong South Africa
	Increasers	208% 145% 157%	Iran Egypt Morocco

Table 1b: Complexity Intensiveness of Exports*

	Statistics	Value	Countries close to value
Overall (year = 1990)	Average	10.7	France, Ireland, Spain
	Min	0.02	Iran, Nigeria, Saudi-Arabia
	Max	165	Japan, Hong Kong, Switzerland
	Standard Deviation	24.5	
Change over Estimation Period 1982-1992	Decreasers	-64% -18% -16%	Ghana Hong Kong Paraguay
	Increasers	1,406% 3,185% 5,375%	Indonesia Mexico Venezuela

*Ratio (using US dollar values) of Complex Products to Simple Product Exports

Table 1c: **List of countries**

Argentina	Ecuador	Indonesia	New Zealand	South Africa
Australia	Egypt	Iran	Nigeria	Spain
Austria	Ethiopia	Ireland	Norway	Sudan
Bel-Lux	Finland	Italy	Pakistan	Sweden
Bolivia	France	Japan	Paraguay	Switzerland
Brazil	Germany, FR	Kenya	Peru	Thailand
Canada	Ghana	Korea, Republic	Philippines	Turkey
Chile	Greece	Malaysia	Poland	United Kingdom
China	Hong Kong	Mexico	Portugal	United States
Colombia	Hungary	Morocco	Saudi Arabia	Uruguay
Denmark	India	Netherlands	Singapore	Venezuela

Table 3: Import Regressions Pooled for 1982-1992

Overall Trade

Regression Column	1	2	3	4
GDP importer	0.81 (39.07)	0.81 (38.53)	-0.10 (-0.43)	-0.15 (-0.52)
GDP exporter	0.77 (39.78)	0.76 (39.13)	-0.13 (-0.60)	-0.19 (-0.65)
GDP per capita importer	0.72 (23.30)	0.53 (11.16)	1.00 (3.80)	1.18 (4.00)
GDP per capita exporter	1.04 (32.09)	0.74 (13.96)	1.20 (4.50)	1.39 (4.63)
Distance	-1.12 (-27.30)	-1.16 (-27.97)	-1.02 (-27.09)	-1.03 (-27.11)
Adjacent	0.31 (2.33)	0.35 (2.43)	0.40 (2.64)	0.40 (2.65)
Links	0.51 (4.91)	0.42 (4.07)	0.45 (4.42)	0.45 (4.40)
Language similarities	-0.09 (-0.54)	0.09 (0.51)	0.99 (5.72)	1.00 (5.74)
Remoteness	0.37 (3.79)	0.58 (6.04)	1.46 (2.21)	1.79 (2.31)
Quality of importer legal institutions		0.61 (5.41)	0.17 (0.18)	0.05 (0.51)
Quality of exporter legal institutions		0.91 (7.12)	0.32 (3.07)	0.36 (3.26)
Probability that the quality of legal institution coefficients are the same		0.076	0.035	0.035
Country-dummies			Yes	Yes
Time-dummies				Yes
Constant	-20.04 (-12.13)	-21.45 (-13.16)		
Number of Clusters	2792 (country-pairs)	2792 (country-pairs)	2792 (country-pairs)	2792 (country-pairs)
R^2	0.69	0.70	0.77	0.77
Observations	26,577	23,564	23,564	23,564

T-statistics reported in parentheses are computed from robust standard errors that account for within-group correlation.

Table 4: Import Regressions Pooled for 1982-1992, Complex vs. Simple Goods

Regression Column	1	2	3	4
	Complex	Simple	Complex	Simple
GDP importer	0.34 (1.65)	-1.50 (-4.59)	0.08 (0.27)	-1.06 (-2.52)
GDP exporter	0.58 (2.82)	-1.81 (-5.55)	0.32 (1.08)	-1.38 (-3.26)
GDP per capita importer	0.77 (3.16)	2.35 (6.05)	1.17 (4.05)	2.03 (4.70)
GDP per capita exporter	0.71 (2.92)	2.27 (5.77)	1.10 (3.86)	1.95 (4.48)
Distance	-0.98 (-24.90)	-1.26 (-22.76)	-0.98 (-24.98)	-1.26 (-22.72)
Adjacent	0.44 (2.62)	0.27 (1.55)	0.44 (2.62)	0.27 (1.54)
Links	0.54 (5.11)	0.18 (1.21)	0.54 (5.09)	0.18 (1.22)
Language similarities	1.27 (6.73)	0.11 (0.41)	1.28 (6.77)	0.11 (0.40)
Remoteness	-0.81 (-1.30)	7.83 (7.91)	0.74 (0.96)	6.69 (5.50)
Quality of importer institutions	-0.51 (-5.18)	0.66 (4.54)	-0.44 (-4.24)	0.66 (4.42)
Quality of exporter institutions	0.85 (7.92)	-0.53 (-3.66)	0.93 (8.41)	-0.53 (-3.45)
Probability that the absolute value of the quality of institutions coefficients are the same	0.02	0.54	0.00	0.53
Country-dummies	Yes	Yes	Yes	Yes
Time-dummies			Yes	Yes
Number of Clusters	2755 (country-pairs)	2550 (country-pairs)	2755 (country-pairs)	2550 (country-pairs)
R^2	0.79	0.50	0.79	0.38
Observations	22,669	18,948	22,669	18,948

T-statistics reported in parentheses are computed from robust standard errors that account for within-group correlation.

Table 5: Import Regressions Pooled for 1982-1992, all 471 industries

Regression Column	1	2	3	4
Lagged dependent variable		0.86 (1,159)		0.80 (1,187)
Quality of importer institutions interacted with complexity dummy	-1.01 (-34.97)	-0.79* (-12.41)	-0.44 (-15.61)	-0.45* (-5.46)
Quality of exporter institutions interacted with complexity dummy	1.58 (56.70)	1.65* (26.46)	0.62 (22.62)	0.76* (9.27)
Probability that the absolute value of the quality of institution coefficients are the same	0.00	0.00	0.00	0.00
Country-pair year-dummies	Yes	Yes		
Country-pair year-two-digit industry-dummies			Yes	Yes
Number of Clusters	29,938 (country-year-pairs)	26,504 (country-year-pairs)	884,644 (country-year-twodigit-pairs)	793,468 (country-year-twodigit-pairs)
R^2	0.41	0.84	0.60	0.85
Observations	3,354,262	3,062,340	3,354,262	3,062,340

T-statistics reported in parentheses are computed from robust standard errors that account for within-group correlation.
* coefficients transformed: beta/(1-rho)