International Trade and Institutional Change

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March 2007

Abstract

This paper analyzes the impact of international trade on the quality of institutions, such as contract enforcement, property rights, or investor protection. It presents a model in which institutional differences play two roles: they create rents for some parties within the economy, and they are a source of comparative advantage in trade. Institutional quality is determined in a Grossman-Helpman type lobbying game. When countries have the same technology, the main result is a "race to the top" in institutional quality: irrespective of country characteristics, both trade partners are forced to improve institutions after opening. On the other hand, domestic institutions will not improve in a country which has a strong enough comparative disadvantage in the good which relies on institutions. We test these predictions in a sample of 141 countries, by extending the geography-based methodology of Frankel and Romer (1999). Countries whose geographical characteristics predispose them to exporting in institutionally intensive sectors enjoy significantly higher institutional quality.

JEL Classification Codes: F11, P48.

Keywords: political economy of institutions, institutional comparative advantage, lobbying models

*I am grateful to Daron Acemoglu, Michael Alexeev, Julian di Giovanni, Simon Johnson, Nuno Limão, and Jaume Ventura for helpful suggestions. The views expressed in this paper are those of the author and should not be attributed to the International Monetary Fund, its Executive Boards, or its management. Correspondence: International Monetary Fund, 700 19th St. NW, Washington, DC 20431. E-mail: alevchenko@imf.org.

1 Introduction

Recent literature on the economics of institutions has established a set of important results. First, institutions matter a great deal for economic performance (La Porta, Lopez-de-Silanes, Shleifer and Vishny, e.g. 1997, 1998, and Acemoglu, Johnson and Robinson, e.g. 2001, 2005a). Second, in spite of the obvious overall benefits to institutional improvement, institutions are in fact very persistent (Acemoglu and Robinson, 2006). Relatedly, episodes of institutional change are rare, and they are typically associated with large and abrupt changes in economic environment. Finally, institutions are a source of comparative advantage in trade, and the welfare consequences of institutional comparative advantage are often ambiguous (Levchenko, 2006, Nunn, 2006, Costinot, 2006).

This paper analyzes the effect of international trade on economic institutions. It builds a model in which institutions play two key roles. First, they generate rents for some parties within the economy. Second, they are a source of comparative advantage in trade. Then, it endogenizes institutional quality using a simple version of the lobbying framework of Grossman and Helpman (1994, 1995). In the lobbying game, the parties which earn rents from imperfect institutions lobby the policymaker to keep those in place. In autarky, we show that sub-optimal institutions can be an equilibrium outcome. What happens when countries open to trade? The first main result of the paper is that when countries have the same technology there is a "race to the top" in institutional quality: trading partners improve institutions up to the best attainable level after opening. This outcome occurs because rents – the reason for some parties to lobby for bad institutions – disappear under trade in countries with inferior institutions. In order for a country to capture some of the rents, institutions must be at least slightly better than in the trading partner. As a result, a Bertrand-type outcome is realized, in which both countries reach the best level of institutions. We then illustrate the simplest case in which this outcome does not occur. In particular, when one of the trading partners has a sufficiently better technology for producing the rent-bearing good, rents may actually increase as a result of trade opening, and institutions will deteriorate.

Why study the effects of trade on institutions? Acemoglu, Johnson, and Robinson (2005a) emphasize the idea that institutions are inherently persistent. The reason for this persistence is that agents in command of political power install the kinds of economic institutions which redistribute resources in the economy to themselves. In turn, the distribution of resources which favors those agents also endows them with political power. The two-way dependence between the distribution of resources in the economy and political power proves

difficult to break. This kind of framework suggests that one way institutional change could occur is through large and discrete changes in the distribution of resources in the economy. Another way is through discrete changes in the preferences over the different kinds of institutions on the part of agents with political power. Trade opening is a natural place to look for a source of such changes, as it affects the structure of the economy in fundamental, and often abrupt, ways. Indeed, it is widely hoped that greater openness will improve institutional quality through a variety of channels, including reducing rents, creating constituencies for reform, and inducing specialization in sectors that demand good institutions (Johnson, Ostry and Subramanian, 2005; IMF, 2005). However, no well-accepted theoretical framework or a set of basic results on this question currently exist. This paper is an attempt to fill this gap.

To analyze the effect of trade on institutional quality, we must first build a model of institutions. To do so, this paper uses the insights from the incomplete contracts literature exemplified by Williamson (1985) and Grossman and Hart (1986). The quality of contract enforcement and property rights are important because they allow agents to overcome the well-known holdup problem. This modeling approach is advantageous because it leads to a concrete interpretation of what constitutes institutional quality, suggested by Caballero and Hammour (1998): in countries with worse institutions contracts are more incomplete. This framework can be adapted seamlessly and tractably to both trade openness and the political economy of institutions.

An important aspect of the incomplete contracts setup is that some parties to production earn rents. If endowed with political power, those parties will install imperfect institutions in order to capture those rents. This feature lends itself naturally to endogenizing institutions. In order to do so, we adopt a political economy model following Grossman and Helpman (1994).[1] As shown by Caballero and Hammour (1998), the parties earning rents benefit from making institutions worse, up to a certain point. In this paper, we use Caballero and Hammour's insight in a fully specified lobbying model in order to derive equilibrium institutional outcomes. We show that in autarky, institutions can be sub-optimal, precisely for this reason. Thus, one of the contributions of this paper is to introduce a parsimonious and tractable model of endogenous institutions, which combines the insights from the literatures on both incomplete contracts and political economy.

When it comes to international trade, it is immediate that institutional differences are

[1] An innovative aspect of this paper is that while the large majority of papers employing the Grossman-Helpman framework apply it to fiscal instruments – be it tariffs, taxes, or subsidies – we use it to model the determination of institutions instead.

also a source of comparative advantage: when countries open to trade, only the country with better institutions produces the institutionally intensive good, which is characterized by rents. Thus, the rents disappear as a result of trade opening in the country with inferior institutions.[2] Under trade, we assume that both countries set institutions non-cooperatively as in the two-country model of Grossman and Helpman (1995). We show that in the symmetric case, the resulting equilibrium is a "race to the top" in institutional quality: both countries improve institutions up to the best attainable level. This is because rents – the very reason to lobby for bad institutions – disappear, unless institutions improve to at least the level slightly better than its trading partner's. When both countries set their institutional quality simultaneously and non-cooperatively, equilibrium is characterized by the best attainable institutions.

What is remarkable about this result is that it does not depend on country characteristics. In autarky, the country may have such features that its equilibrium institutions are very bad. However, under trade those features no longer matter. Note also that the "race to the top" result is completely due to the changing preferences of the lobby groups regarding the optimality of institutions. That is, the political power of lobby groups does not change as a result of trade opening. Nonetheless, institutions improve.[3]

Though quite basic, our framework also allows us to think about the circumstances under which this logic would fail. Note that the key driving force behind institutional improvement in this model is that rents disappear as a result of trade opening if a country's institutions are inferior. Clearly, if the rents do not in fact disappear, the incentive to improve institutions is removed. In fact, when trade opening increases rents rather than decrease them, institutions will deteriorate as a result of trade opening.

Note that we do not attempt to endogenize trade opening. Endogenous trade policy has been the subject of a large literature, and remains beyond the scope of this paper.[4] Nonetheless, we believe that our exercise is still well worth pursuing. First, in many instances changes in trade openness have indeed been exogenous, driven by technological shocks or changes in colonial regimes. Second, many other factors besides ensuing institutional change contribute to the formation of trade policy. Thus, it could be that even when trade openness is endogenous, it is driven by factors unrelated to those we are modeling. The policy initiatives promoting unconditional trade liberalization in developing countries

[2] See Levchenko (2006) for a detailed analysis of this result.

[3] Thus, in order to observe institutional improvement, trade need not necessarily empower the "right" groups, as in Acemoglu, Johnson, and Robinson (2005b).

[4] See e.g. Rodrik (1995), and Grossman and Helpman (2002).

are an important example. Finally, in order to analyze trade opening and endogenous institutions simultaneously, it is important to first understand how the former affects the latter. This paper studies that question, and thus can be used as a building block for a more complete analysis. Indeed, our approach can be viewed as complementary to the trade policy literature, which endogenizes openness but assumes that institutions are exogenous and do not change with trade opening.

Having developed the main intuition regarding the effect of trade opening on institutions, we would like to take it to the data. How can we provide evidence consistent with the predictions of this model? The main theoretical result is that countries will improve institutions as a result of trade opening, out of hope that doing so will allow them to retain or attract the institutionally dependent sectors. When it comes to actual country experiences, however, it is clear that some countries do not have much hope of attracting those sectors. This could be either because their institutional gap with their trading partners is too great, or because they have a sufficient comparative disadvantage in the institutionally intensive sectors that even if they improve institutions, they would not be able to attract those sectors. In this case, the incentive to improve institutions is lost, and trade does not have a positive effect.

Based on this line of reasoning, in order to empirically analyze the effect of trade on institutions we must first understand which countries would be the most able to attract the institutionally dependent sectors under trade. We would then expect to see a positive effect of trade on institutions especially in those countries. How can we get an idea of which countries may have a comparative (dis)advantage in institutionally intensive sectors? For each country, we obtain its predicted export pattern by expanding the geography-based methodology of Frankel and Romer (1999). These authors use the gravity model to predict bilateral trade volumes between each pair of countries based on a set of geographical variables, such as bilateral distance, common border, area, and population. Summing up across trading partners then yields, for each country, its "natural openness:" the overall trade to GDP as predicted by its geography. Because we need a measure of predicted trade patterns rather than total trade volumes, our point of departure is to estimate the Frankel and Romer gravity regressions for each industry. Following their methodology, we can then obtain the predicted trade volume as a share of GDP not just in each country, but also in each sector within each country. Doing so allows us to construct each country's *predicted institutional intensity of exports*, based on its predicted trade shares in each sector.[5] In

[5] This empirical strategy is based on Do and Levchenko (2006a).

essence, this approach uses exogenous geographical variables, together with information on how those geographical variables affect industries differentially, to construct a measure of how institutionally intensive a country's export pattern is expected to be.

Our results show that a country's predicted institutional intensity of exports is indeed a robust determinant of institutions, in a cross-section of 141 countries. Countries which, due to their geography, have the potential to export in institutionally intensive sectors have better institutions, all else equal. This result is robust to the inclusion of a variety controls, use of alternative predicted institutional intensity of exports measures, and subsamples.

This paper is part of a small but growing literature on the impact of trade on domestic institutions. Acemoglu, Johnson and Robinson (2005b) argue that in some West European countries during the period 1500-1850, Atlantic trade engendered good institutions by creating a merchant class interested in establishing a system of enforceable contracts. Thus, trade expansion affected institutions by creating a powerful lobby for institutional improvement. Do and Levchenko (2006b) develop a model in which trade opening creates incentives to improve institutions, but may also lead to strengthening of elites. When the increase in the political power of elites is sufficiently strong, institutions deteriorate as a result of trade opening. Segura-Cayuela (2006) builds a model in which economic policies deteriorate as a result of trade opening in countries with weak political institutions. Stefanadis (2006) shows that institutions may improve or deteriorate after trade, depending on whether the economy starts in a good or bad institutional equilibrium. Dal Bó and Dal Bó (2004) argue that some terms of trade shocks may actually increase social conflict because they increase incentives to expropriate others.[6]

When it comes to empirical results, Ades and di Tella (1997), Rodrik, Subramanian and Trebbi (2004), and Rigobon and Rodrik (2005) find that trade has a positive effect on institutional quality in a cross-section of countries. In countries endowed with natural resources, however, has been argued that trade reduces institutional quality (Sala-i-Martin and Subramanian, 2003). Also related is the literature on the effect of trade on a particular type of institution, namely financial development. Existing papers on this topic are largely empirical and include Rajan and Zingales (2003), Braun and Raddatz (2005), and Do and Levchenko (2006a).

This paper is the first to model the effect of trade on institutions using a framework in

[6] Also related is the work which models various endogenous responses to trade which in turn affect development. In the Young (1991) model, some countries may lose because of decreased learning-by-doing. Galor and Mountford (2006a, 2006b) argue that the 19th century trade opening delayed demographic transition in developing countries, further increasing the South's relative abundance in unskilled labor.

which institutions matter for trade patterns themselves. Doing so allows us to study this question in a model which features two-way interactions between institutions and trade, and therefore use what we have learnt from the literature on institutional comparative advantage. In addition, our framework has the advantage of tractability while at the same time generating a rich set of comparative statics. The empirical contribution of this paper is in focusing on predicted institutional intensity of trade patterns, which it shows matters more than the overall trade openness.

The rest of the paper is organized as follows. Section 2 lays out the production and trade side of the model, deriving the autarky and trade equilibria at each exogenously given level of institutional quality of the trading partners. Section 3 endogenizes institutions in a political economy framework of lobbying, and presents the main analytical results in the paper. Section 4 describes the empirical methodlolgy and results. Section 5 concludes. Proofs of Propositions are collected in the Appendix.

2 The Basic Model

2.1 The Environment

The production and trade side of the model is based on Levchenko (2006). Consider an economy with two factors, capital (K) and entrepreneurs (H), and three goods. Two of the goods are produced using only one factor, and thus we call them the K-good and the H-good. The mixed good, M, is produced with both factors. Agents have identical Cobb-Douglas utility functions in the consumption of the three goods,

$$U(C_K, C_H, C_M) = C_K^{\alpha} C_H^{\beta} C_M^{\gamma}, \tag{1}$$

where α, β, and γ are positive and $\alpha + \beta + \gamma = 1$. Given the goods prices p_K, p_H, and p_M, we let the numeraire be the ideal price index associated with Cobb–Douglas utility. Consumer utility maximization then leads to the following first-order conditions:

$$p_i = \alpha \frac{C_K^{\alpha} C_H^{\beta} C_M^{\gamma}}{C_i}, \tag{2}$$

for $i = H, K, M$.

Production technology of the K-good and the H-good is linear in K and H. Suppose that one unit of capital produces a units of the K-good, and one unit of H produces b units of the H-good. Then profit maximization in the two industries implies that

$$p_K a = r \tag{3}$$

and

$$p_H b = w, \tag{4}$$

where r and w are the returns to capital and entrepreneurs respectively.

The M-good is produced with a Leontief technology which combines one unit of H and x units of K to produce y units of the M-good. This paper takes the view that institutions matter because they facilitate transactions between distinct self-interested economic parties. The M-good is the only one which requires joining of two distinct factors of production, and thus it is natural to think of the M-good as being institutionally dependent. We now describe in detail how we use the incomplete contracts framework to model imperfect institutions, and how our approach creates a source of comparative advantage: institutional differences.

To model a setting in which the quality of contract enforcement and property rights matter, we adopt the approach developed by Williamson (1985), Grossman and Hart (1986), and Hart and Moore (1990). The strategy is to posit a friction that can be alleviated by appropriately designed contracts and property rights. Following Klein, Crawford and Alchian (1978) and Williamson (1985), we assume that when two distinct parties invest in joint production, some fraction of their investment becomes specific to the production relationship. Investment irreversibility makes the parties more reluctant to enter, introducing inefficiency – the well-known holdup problem. This argument has been used to analyze many kinds of relationships: between producers within a supply chain, between managers and outside investors, between firms and workers, and others. One way to reduce the inefficiency is to write binding long-term contracts. Another is to assign property rights in a way that distributes the residual rights of control to moderate the holdup problem – this is the key idea of Grossman-Hart-Moore. Institutions – quality of contract enforcement, security of property rights, and the like – will matter a great deal for both of these solutions.

Our modeling approach follows Caballero and Hammour (1998). We focus on the case in which the parties to the production are K and H. For concreteness, H can be thought of as managers or inside capital, while K would be the outside, or unorganized capital. This interpretation would be in line with the La Porta et al. (1998) emphasis of the role of institutions in the market for external finance. However, it is important to emphasize that the arguments we are making are more general and could apply to many kinds of parties to production.

Relationship-specific investments occur in production of the M-good. In particular, we assume that a fraction ϕ of capital's investment in the M-good sector becomes specific to

the relationship. The parameter ϕ is meant to capture quality of contract enforcement and property rights, and its value will differ across countries. Better institutions thus correspond to lower values of ϕ. In other words, if contracts and property rights are well-enforced, each agent will be able to recoup its *ex ante* investment to a greater degree. This way of formalizing institutional differences is appealing because it leads to a concrete interpretation of what constitutes institutional quality: contracts are less incomplete in countries with better institutions. In the limiting case when $\phi = 0$, institutions are perfect and we are back to the standard frictionless setting.

What are the consequences of imperfect institutions? Recall that one unit of H and x units of K are required to produce y units of M. After the production unit is formed, K can only recover a fraction $(1-\phi)$ of the investment. In order to induce K to form the production unit, it must be compensated with a share of the surplus, which is given by the revenue minus the *ex post* opportunity costs of the factors:

$$s = p_M y - w - r(1-\phi)x.$$

We adopt the assumption that *ex post* the parties reach a Nash bargaining solution and each receive one half of the surplus. Thus, K will only enter the M-good production if its individual rationality constraint

$$r(1-\phi)x + \frac{1}{2}s \geq rx$$

is satisfied. This can be rearranged to yield:

$$p_M y \geq w + (1+\phi)rx. \tag{5}$$

2.2 Autarky Equilibrium

This approach to modeling institutions is easily embedded in the general equilibrium model of this section, where prices and resource allocations are endogenously determined. Notice that in general equilibrium, condition (5) can be interpreted as a joint restriction on w, r, and p_M, and will hold with equality.

The only remaining ingredient of the closed-economy equilibrium is market clearing. It is useful to define the following notation. Let E be the share of entrepreneurs employed in the M-sector. This is convenient because the value of E completely characterizes the resource allocation in the economy. Given E and the relevant endowments K and H, productions of the M-, H-, and K-goods are yEH, $b(1-E)H$, and $a\left(\frac{K}{H} - xE\right)H$, respectively. Goods

market clearing then requires:

$$C_K = a\left(\frac{K}{H} - xE\right)H; \tag{6}$$

$$C_H = b(1-E)H; \tag{7}$$

$$C_M = yEH. \tag{8}$$

The equilibrium in an economy endowed with K units of capital and H entrepreneurs is a set of prices and the resource allocation $\{p_K, p_H, p_M, r, w, E\}$ characterized by equations (**??**) through (8).

Institutional imperfections modeled here have two key consequences. First, in general equilibrium one of the factors – H in our case – is segmented: its rewards differ across sectors. Equation (5) makes it possible to calculate the reward to a unit of H employed in the M-sector:

$$w + \frac{1}{2}\left[p_M y - w - (1-\phi)rx\right] = w + \phi rx. \tag{9}$$

It is clear from this expression that each unit of H employed in the M-sector earns rents of size ϕrx.

Second, contracting imperfections imply that the outcome is inefficient. There is underinvestment in the M-good production, and w and r are lower than in the efficient case. This result is intuitive. Imperfect institutions imply that it is harder to induce capital to enter the M-sector. Compared to the frictionless case, w and r must be pushed down, and p_M pushed up to satisfy the individual rationality condition for capital (5). This is achieved by reducing the size of the M-sector, which simultaneously pushes the factors into the K- and the H-sectors, lowering w and r and raising p_M. The effect is monotonic in ϕ: higher values of ϕ lead to lower E, w, and r. Notice also that for a given level of ϕ, increasing the size of the M-sector will raise both w and r, thereby raising welfare of all factors employed in all sectors.

2.3 Trade Equilibrium and Institutional Comparative Advantage

The model is easily adapted to an international trade setting in the presence of both factor endowment and institutional differences. Suppose that there are two countries, A and B, which can trade costlessly with each other. Following the standard notation, let $\overline{V} = (\overline{K}, \overline{H})$ be the vector of the world factor endowments, and let $(V^A, V^B) = \left[(K^A, H^A), (K^B, H^B)\right]$ be a partition of world factor endowments into the two countries, so that $\overline{K} = K^A + K^B$ and $\overline{H} = H^A + H^B$.

In order to engogenize institutions as we do in the next Section, we must first understand what happens in this model at any given level of institutional differences. Suppose, without loss of generality, that country A has better institutions: $\phi^A < \phi^B$. In A a lower fraction of K becomes specific to the M-sector production unit, or, equivalently, contracts are less incomplete there.

How can we determine the pattern of production and trade? Differences in institutional quality act in a way similar to a Ricardian productivity difference in the M-sector to generate comparative advantage and trade. It turns out that the trade equilibrium can be analyzed using an approach akin to the Davis (1995) Heckscher-Ohlin-Ricardo model. The starting point of the analysis is the integrated equilibrium, which is the resource allocation that results under perfect factor mobility. It is obtained by solving for the equilibrium of a closed economy characterized by the world factor endowment $\overline{V}$.

The key insight of the Davis model is that if one country can produce one of the goods more cheaply than the other at a common set of factor prices, in the integrated equilibrium only that country's production process will be used to produce that particular good. In the Davis model, the difference between countries is in Ricardian productivity. Here, it arises instead because country A's less incomplete contracts allow it to sell the M-good at a strictly lower price. This is immediate from equation (5): the price at which the M-good can be produced under country A's institutions is strictly less than the price when country B's institutions are used:

$$p_M y = w + (1 + \phi^A) rx < w + (1 + \phi^B) rx,$$

as $\phi^A < \phi^B$. Therefore, in the integrated equilibrium, only A's institutions will be used to produce the M-good. To complete the notation, denote by $\overline{V}(i) = \left[\overline{H}(i), \overline{K}(i)\right]$ the integrated equilibrium factor allocations in industry $i = K, H, M$.

From the integrated equilibrium production pattern we can construct a set of partitions of world factor endowments into countries called the Factor Price Equalization (FPE) set. Following Helpman and Krugman (1985) and Davis (1995), we define the FPE set as follows:

Definition: *Let η_{ij} denote the share of the integrated equilibrium production of good i that comes from country j. Then, the Factor Price Equalization (FPE) set is a set of*

partitions of the world factor endowments into countries defined by:

$$\begin{aligned} FPE \;=\; & \{\left(V^A, V^B\right) \mid \exists \eta_{K,A}, \eta_{H,A}, \eta_{K,B}, \eta_{H,B} \geq 0, \text{such that} \\ & \eta_{K,A} + \eta_{K,B} = 1,\ \eta_{H,A} + \eta_{H,B} = 1,\ \eta_{M,A} = 1, \eta_{M,B} = 0, \\ & V^j = \sum_i \overline{V}(i) \text{ for } j = A, B\}. \end{aligned}$$

This definition states that the two countries' factor endowments belong to the FPE set when i) country A has enough of both factors to produce the entire integrated equilibrium world quantity of the M-good; and ii) the integrated equilibrium production of the K- and H-goods can be allocated between the two countries while keeping all factors fully employed. The FPE set is significant because when country endowments belong to it, the integrated equilibrium world resource allocations and prices are replicated purely through trade, as we state formally in the proposition below.[7]

Proposition 1: *When $\phi^A < \phi^B$, and $\left(V^A, V^B\right) \in FPE$, the trade equilibrium world resource allocation, factor prices, and goods prices replicate those of the integrated equilibrium. Therefore, in the trade equilibrium, only country A produces the M-good.*

This result implies that in order to analyze the trade outcomes, we need to do little more than solve for the integrated equilibrium. Figure 1 illustrates the analysis. The sides of the box represent the world factor endowments. Any point in the diagram can represent a division of the world factor endowments into countries, where country A's endowments are measured from O^A, and country B's from O^B. The shaded area represents the FPE set. Since in the integrated equilibrium only A's institutional setting will be used in production of the M-good, country endowments can only belong to the FPE set if the entire integrated equilibrium production of the M-good can be accommodated in A. This is the case, for example, at point P.

Let $V^j(i) = \left[H^j(i), K^j(i)\right]$ be the trade equilibrium use of factors in industry i and country j. The pattern of production is graphically illustrated in Figure 2 for the factor endowments at point R. While in autarky the M-good was produced in both countries, under trade country B stops producing M altogether, and now its entire factor endowment is dedicated to production of the K-good and the H-good. In country A the M-sector increases to accommodate the entire world demand.

[7] We must use the term FPE with caution here. Factor rewards are equalized across countries in each sector, but in our model they differ across sectors. Thus, relative factor rewards across countries will be determined by which sectors operate in which countries. Nevertheless, the FPE set still has the useful feature that for appropriate factor endowments it allows us to analyze the trade outcomes by first constructing the integrated equilibrium.

For the purposes of endogenizing institutions, the most important result is that the M-sector disappears following trade opening in the country with inferior institutions. That implies that the rents that H was earning in the M-sector disappear upon trade opening. Returns to H in country B in autarky can be expressed as:

$$w^B H^B + \phi^B r^B x E^B H^B,$$

while under trade they are:

$$w^T H^B.$$

Note that this does not have unambiguous implications for aggregate welfare, or even overall returns to H in country B: though H formerly employed in the M-sector loses rents, the base return to H, w^T, goes up as a result of trade: $w^T > w^B$. The same can be said of the return to K: $r^T > r^B$. What matters for the purposes of this paper is that the behavior of rents in autarky and under trade has an important effect on the lobbying game. This is what we turn to next.

3 Institutional Choice

This section asks the central question of this paper: how does opening to trade affect institutional quality? We adopt a simple political economy model of institutional choice, and analyze outcomes before and after trade. To do this, we combine the model of production and trade developed in the previous section with the political economy of special interest groups framework of Grossman and Helpman (1995, 2001, ch. 7-8). We first consider equilibrium institutions in autarky, and then describe how these change when two trading countries set domestic institutions taking into account those of the trade partner.

3.1 Autarky

Suppose there is one policymaker and one interest group representing H – the factor which earns rents when institutions are imperfect.[8] The policymaker receives a nonnegative contribution of size c from the interest group, and sets institutional quality ϕ to maximize its

[8] Strictly speaking, of course, only entrepreneurs in the M-sector earn rents, thus in some sense it would be more natural to take only this subset of H to be the interest group. The problem with this choice is that the fraction of entrepreneurs employed in the M-sector is itself a function of institutions in our model, so the boundaries of the interest group change with the policy choice. To avoid this problem, we assume that the interest group represents the entire population of entrepreneurs, and choose to ignore disagreements between its different subsets.

An alternative would be to assume that the interest group represents only "inside entrepreneurs" H^I, which is the part of H that is employed in the M-sector no matter what the value of ϕ. In that case, we must put a restriction ensuring that $H^I < E_{\min} H$, where $E_{\min}$ is the smallest possible equilibrium size of the M-sector. The analysis under this alternative modeling assumption is qualitatively the same as the one

political objective function $G(\phi, c)$. We adopt the standard assumption that the policymaker maximizes a weighted sum of the aggregate welfare in the economy, $S(\phi)$, and the political contribution c:

$$G(\phi, c) = \lambda S(\phi) + (1 - \lambda)c,$$

where $\lambda \in [0, 1]$. In this formulation, λ can be thought of as parameterizing corruption, and shows the extent to which the policymaker is captive to the interest group. At one extreme, when $\lambda = 1$, the policymaker is the benevolent social planner. At the other, when $\lambda = 0$, it cares only about its political contributions, and in effect sets the policy to serve exclusively the special interest.

The interest group influences the policymaker by making its contribution contingent on the government's choice of ϕ. In particular, the interest group confronts the government with a schedule, $c = C(\phi)$, which specifies the contribution the policymaker will receive for each level of ϕ that it might set. The objective function of the interest group is simply H's total welfare, $S_H(\phi)$, net of the contribution:

$$V(\phi, c) = S_H(\phi) - c.$$

The timing of the game can be thought of as follows: first, the interest group makes its contribution schedule known to the policymaker. Then the policymaker sets institutional quality ϕ. Given this ϕ, agents make their production and consumption decisions. This last stage is simply the equilibrium outcome of the model in the preceding section. Thus, under the assumptions we put on preferences, we know that aggregate welfare equals aggregate real income:

$$S(\phi) = r(\phi)K + [w(\phi) + \phi x r(\phi)E(\phi)]\, H.$$

$S(\phi)$ is maximized when institutions are perfect ($\phi = 0$), and decreases as institutions deteriorate ($\frac{dS}{d\phi} < 0$). This is intuitive because imperfect institutions introduce a distortion in an otherwise frictionless setting. The reward to capital, $r(\phi)$, decreases unambiguously in ϕ, as does $w(\phi)$.

Imperfect institutions can arise because the agents extracting rents can lobby the policymaker. The interest group's objective function is entrepreneurs' real income net of the contribution:

$$V(\phi, c) = [w(\phi) + \phi x r(\phi)E(\phi)]\, H - c.$$

we present in this section. Note that the inside entrepreneurs always prefer higher ϕ than an interest group which maximizes the welfare of overall H. This is because higher ϕ unambiguously hurts the entrepreneurs in the H-sector, which the inside entrepreneurs do not care about.

This function makes it apparent why H will lobby for positive ϕ: imperfect institutions allow H to earn rents equal to $\phi xr(\phi)E(\phi)H$. The interest group bribes the policymaker to increase ϕ above the socially optimal value of zero. The contribution must be large enough to compensate the government for the disutility it suffers from the resulting decrease in aggregate welfare. We now provide the basic definitions and state the main result.

Definition: *The policymaker's best-response set to a contribution function $C(\phi)$ consists of all feasible policies ϕ that maximize $G(\phi, c)$.*

Definition: *A policy ϕ^* and a contribution schedule $C(\phi)$ constitute an equilibrium in the lobbying game with a single policymaker and a single interest group if i) ϕ^* belongs to the policymaker's best-response set to $C(\phi)$; and ii) there exists no other feasible contribution function $C'(\phi)$ and policy ϕ' such that ϕ' is in the policymaker's best response set to $C'(\phi)$ and $V(\phi', C'(\phi)) > V(\phi^*, C(\phi))$.*

Proposition 2: *The autarky equilibrium institutional quality ϕ^* is given by:*

$$\phi^* = \arg \max_{\phi \in [0,1]} \left\{ \left[w(\phi) + \phi xr(\phi)E(\phi) \right] H + \lambda r(\phi) K \right\}. \tag{10}$$

There exist values of $\lambda \in [0, 1)$ for which the autarky equilibrium institutions are imperfect: $\phi^* > 0$.

This Proposition states that the equilibrium value of institutional quality maximizes a weighted sum of all agents' welfare levels, with higher weight given to those belonging to the interest group. Furthermore, for any set of parameters that characterize the production side of the model, if the power of the interest group is sufficiently high, equilibrium institutions will be imperfect. This analysis is clearly only partial, because the power of the interest groups is surely affected by institutions. However, it does capture the notion that in autarky institutions are a function of the country's characteristics, and bad institutions may arise as an equilibrium outcome.

3.2 Trade

We can now contrast these conclusions to the outcome under trade. Suppose that, just as in autarky, each country has one interest group representing H, and the policymaker's objective function is unchanged. The timing of events is similar to the autarky case. First, the countries play the contribution game simultaneously and noncooperatively. Then, production and trade take place. Under trade, the interest group in each country must take into account institutional quality of the trading partner. We now state the definitions for the trade game.

Definition: *Let ϕ^{-i} be an arbitrary institutional quality value of country i's trading partner. Then a feasible contribution schedule $C(\phi;\phi^{-i})$ and an institutional quality ϕ^i are an equilibrium response to ϕ^{-i} if i) ϕ^i is the policymaker's best response to the contribution schedule $C(\phi;\phi^{-i})$; and ii) there does not exist a feasible contribution schedule $C'(\phi;\phi^{-i})$ and a level of institutions $\phi^{i\prime}$ such that a) $\phi^{i\prime}$ is in the policymaker's best response set to $C'(\phi;\phi^{-i})$ and b) $V(\phi^{i\prime},C'(\phi;\phi^{-i}))>V(\phi^i,C'(\phi;\phi^{-i}))$.*

Definition: *A noncooperative institution-setting equilibrium consists of political contribution functions $C(\phi;\phi^{-i})$ for $i=A,B$ and a pair of institutional quality values ϕ^A and ϕ^B, such that $\left[C(\phi;\phi^B),\phi^A\right]$ is an equilibrium response to ϕ^B and $\left[C(\phi;\phi^A),\phi^B\right]$ is an equilibrium response to ϕ^A.*

The following Proposition describes the features of equilibrium.

Proposition 3: *The equilibrium institutions in the two countries under trade, ϕ^A and ϕ^B, solve two equations in two unknowns given by*

$$\phi^i(\phi^{-i})=\arg\max_{\phi^i\in[0,1]}\left\{w(\phi^i,\phi^{-i})H^i+\phi^i xr(\phi^i,\phi^{-i})E^i(\phi^i,\phi^{-i})\overline{H}+\lambda^i r(\phi^i,\phi^{-i})K^i\right\}, \quad (11)$$

$i=A,B$. In equilibrium, at least one country is characterized by perfect institutions, $\phi^i=0$, and thus the world as a whole reaches the first best allocation.

This Proposition states that institutions under trade are obtained by simultaneously solving the equilibrium response functions of the two countries. In equilibrium, one of following is the outcome: i) institutions are perfect in both countries, $\phi^A=\phi^B=0$; or, ii) institutions are perfect in one of the countries, $\phi^i=0$, while the other country is indifferent between all of the possible qualities of domestic institutions. In both cases, the world as a whole reaches the first best allocation, as the M-good is produced only using perfect institutions.

We illustrate this Proposition in Figure 3. It gives the equilibrium best responses for the two countries as a function of the trading partner's institutions. As we can see, up to a certain level of ϕ, the best response is to set domestic ϕ at a level just below the trading partner's. This allows the country to retain the M-sector, and earn rents. Beyond a certain level of ϕ, it is no longer optimal to raise it further, and thus as long as a country's institutions are better than the trading partner's, they do not depend on its ϕ. This diagram is reminiscent of the best response functions associated with the Bertrand oligopoly model. Just as in the Bertrand oligopoly, the equilibrium is to set both ϕ's to zero.

Recalling our analysis of the trade equilibrium, it is easy to see why the outcome is perfect institutional quality. The M-sector can only be located in the institutionally superior

country, and only that country's institutions matter in determining the factor prices. If ever $\phi^i \geq \phi^{-i} \geq 0$ with at least one strict inequality, all parties in country i strictly prefer to improve domestic institutions to a level just below ϕ^{-i}. Not only do $w(\phi^i, \phi^{-i})$ and $r(\phi^i, \phi^{-i})$ increase as a result, but country i also captures the worldwide rents associated with locating the M-sector at home.

The mechanisms that made it possible to observe imperfect equilibrium institutions in autarky no longer work in the presence of a trade partner. Notice that the only reason H lobbies to increase ϕ above the socially optimal level of zero is because it can earn rents in the M-sector. But under trade, H will only capture those rents so long as it is the institutionally superior country. In the institutionally inferior country, H will actually have an incentive to lobby for institutional improvement, up to a point at which it has at least slightly better institutions than its trade partner. In effect, competition to capture the rent-bearing M-sector results in a "race to the top" in institutional quality between countries.

What is remarkable about this Proposition is that under trade, the first best institutional quality outcome occurs irrespective of any country characteristics. Both countries can be entirely corrupt ($\lambda^i = 0$), so that the policymakers are completely captive to the special interest group. In autarky, these countries can have very bad institutions. Nevertheless, trade will force institutional improvement even in the most corrupt country.

3.3 Technological Differences

This paper establishes the intuitive result that when trade reduces rents, it also changes the nature of the political economy game which gives rise to those rents. In the symmetric case, this leads to institutional improvement in both countries. What are the crucial assumptions behind this result? Economically, the most important assumption is that trade opening reduces rents in the institutionally inferior country. We can use the framework in this paper to also think about what happens when trade increases rents instead. The simplest way to model this setting is to introduce productivity differences between countries. For instance, suppose that country A is more productive in the M-sector: $y_A > y_B$. Furthermore, suppose for simplicity that the technological advantage is substantial, in the sense that even if country B's institutions were the best possible, $\phi_B = 0$, country A would still have a cost advantage at producing the M-good at the common world factor prices, and the its autarky level of institutional quality:

$$\frac{w + (1 + \phi^A)rx}{y_A} < \frac{w + rx}{y_B}.$$

How do institutions change in response to trade opening in the two countries? Note that the logic behind the analysis of the trade patterns remains unchanged here: as long as country A can produce the entire integrated equilibrium world quantity of good M, it is the only country which will produce it under trade. This is because its Ricardian comparative advantage in good M is strong enough to overcome its inferior institutions.

What happens to the institutional lobbying game in this case? Since the case is no longer symmetric, it is helpful to write out the equilibrium best responses for the two countries:

$$\phi^A(\phi^B) = \arg\max_{\phi^A \in [0,1]} \left\{ w(\phi^A)H^A + \phi^A x r(\phi^A) E^A(\phi^A)\overline{H} + \lambda^A r(\phi^A) K^A \right\}, \tag{12}$$

$$\phi^B(\phi^A) = \arg\max_{\phi^B \in [0,1]} \left\{ w(\phi^A)H^B + \lambda^B r(\phi^A) K^i \right\}. \tag{13}$$

For both countries, the equilibrium best response expression no longer depends on ϕ^B, since A will produce in the rent-bearing M-sector no matter what country B does with its institutions. Therefore, the "race to the top" result disappears. Country A no longer has an incentive to improve institutions, because it will not lose the rents to country B. Furthermore, it is easy to demonstrate that institutions actually deteriorate in country A after trade opening under these circumstances. Comparing the expressions giving the autarky and trade institutions, (10) and (12), we can see that the only difference between them is the rents term, which increases from $\phi^A x r(\phi^A) E^A(\phi^A) H^A$ in autarky to $\phi^A x r(\phi^A) E^A(\phi^A)\overline{H}$ under trade. Thus, the level of ϕ^A which maximizes (12) is greater under trade than in autarky. We illustrate this outcome in Figure 4. Here, country B's equilibrium best response is irrelevant, while country A's equilibrium best response is defined by a value ϕ^A_{trade}. Note that as we discussed above, institutions deteriorate in country A: $\phi^A_{trade} > \phi^A_{aut}$.

3.4 Limits to Institutional Improvement

The model can be modified to capture the notion that some countries cannot improve their institutions as efficiently as others. This could be due to inherent geographical or historical differences across countries, for instance. What happens when the best attainable level of institutional quality – let us call it $\underline{\phi}^i$ – is different between countries? The logic of the model remains unchanged, and the equilibrium is still given by equations (11), with only one modification: the arg max is over a range of $\phi^i \in \left[\underline{\phi}^i, 1\right]$ for both countries $i = A, B$. The outcomes then depend on the magnitude of the difference between $\underline{\phi}^A$ and $\underline{\phi}^B$. Suppose, without loss of generality, that $\underline{\phi}^A < \underline{\phi}^B$: country A can attain better institutions than country B. For $\underline{\phi}^B$ low enough, the outcome is depicted in Figure 5. Intuitively, if we could think of the symmetric equilibrium as a Bertrand outcome, in this case we have something

akin to limit pricing: country A will improve institutions to a level just better than $\underline{\phi}^B$. Having worse institutions than $\underline{\phi}^B$ implies that country A loses the M-sector. For low enough $\underline{\phi}^B$, having much better institutions than that does not maximize rents in A. As depicted in the Figure, trade does result in institutional improvement in country A, but to a lesser extent than in the baseline case, as A does not need to go all the way to the best attainable level of institutional quality to retain the M-sector.

It is also clear that if $\underline{\phi}^B$ is high enough, there is no institutional improvement in country A at all, in fact institutions in A may deteriorate as a result of trade opening. This is the case when $\underline{\phi}^B > \phi^A_{aut}$. Under autarky institutions in A, trade opening can never result in the loss of the M-sector, and thus there is no impetus for institutional improvement. In fact, the "limit pricing" logic implies that institutions will actually deteriorate, as under trade country A can capture more rents, an intuition similar to that in the previous subsection.

4 Empirical Evidence

The main result of the paper is that opening to trade will have a tendency to improve institutions. In taking this prediction to the data, we must be mindful that this prediction is highly conditional on country characteristics, as we just demonstrated with two simple examples. In particular, countries which for some reason cannot capture the institutionally intensive sectors simply by improving their institutions have no incentive to change. The empirical evidence presented in this section is based on this intuition.

In particular, we build a measure of how likely the country is to export in institutionally intensive sectors, and analyze how it affects institutions. We thus estimate the following equation in the cross-section of countries:

$$INST_c = \alpha + \beta IIX_c + \boldsymbol{\gamma}\mathbf{Z}_c + \varepsilon_c. \tag{14}$$

The left-hand side variable, $INST_c$, is a measure of a country's quality of institutions. The right-hand side variable of interest, IIX_c, is a measure of predicted "institutional intensity of exports:" how easy it is for the country to export in the institutionally intensive sectors under trade. Or course, we construct this variable without regard for the country's actual institutional quality, as explained below. Our hypothesis is that the effect of IIX_c on institutions is positive ($\beta > 0$). We condition on the vector of controls $\mathbf{Z}_c$.

4.1 Predicted Institutional Intensity of Exports

We must construct for each country its predicted institutional intensity of exports, IIX_c. In order to do this, we expand the geography-based approach of Frankel and Romer (1999). These authors constructed predicted trade as a share of GDP by first estimating a gravity regression on bilateral trade volumes between countries using only exogenous geographical explanatory variables, such as bilateral distance, land areas, and populations. From the estimated gravity equation, these authors predicted bilateral trade between countries based solely on geographical variables. Then for each country they summed over trade partners to obtain the predicted total trade to GDP, or "natural openness."

Our objective is to build a measure based on predicted export patterns, not aggregate trade volumes. Thus, we must extend the Frankel and Romer approach accordingly. Namely, we apply their methodology to exports at sector level, following di Giovanni, Levchenko, and Ranciere (2005). For each industry i, we run the Frankel and Romer regression:

$$\begin{aligned} LogX_{icd} &= \alpha + \eta_i^1 ldist_{cd} + \eta_i^2 lpop_c + \eta_i^3 larea_c + \eta_i^4 lpop_d + \eta_i^5 larea_d + \eta_i^6 landlocked_{cd} + \\ &\quad \eta_i^7 border_{cd} + \eta_i^8 border_{cd} * ldist_{cd} + \eta_i^9 border_{cd} * pop_c + \eta_i^{10} border_{cd} * area_c + \\ &\quad \eta_i^{11} border_{cd} * pop_d + \eta_i^{12} border_{cd} * area_d + \eta_i^{13} border_{cd} * landlocked_{cd} + \varepsilon_{cd}, \end{aligned} \tag{15}$$

where $LogX_{icd}$ is the log of exports as a share of GDP in industry i, from country c to country d. The right-hand side consists of the geographical variables. In particular, $ldist_{cd}$ is the log of distance between the two countries, defined as distance between the major cities in the two countries, $lpop_c$ is the log of population of country c, $larea_c$ log of land area, $landlocked_{cd}$ takes the value of 0, 1, or 2 depending on whether none, one, or both of the trading countries are landlocked, and $border_{cd}$ is the dummy variable for common border. The right-hand side of the specification is identical to the one Frankel and Romer (1999) use.

Having estimated equation (15) for each industry, we then obtain the predicted logarithm of industry i exports to GDP from country c to each of its trading partners indexed by d, $\widehat{LogX}_{icd}$. In order to construct the predicted overall industry i exports as a share of GDP from country c, we take the exponential of the predicted bilateral log of trade, and sum over the trading partner countries $d = 1, ..., C$, exactly as in Frankel and Romer (1999):

$$\hat{X}_{ic} = \sum_{\substack{d=1 \\ d \neq c}}^{C} e^{\widehat{LogX}_{icd}}. \tag{16}$$

That is, predicted total trade as a share of GDP for each industry and country is the sum of the predicted bilateral trade to GDP over all t

o

out-of-sample. Thus, for those observations that are zero or missing and are not used in the actual estimation, we still predict trade.[10] In the second approach, we instead estimate the gravity regression in levels using the Poisson pseudo-maximum likelihood estimator suggested by Santos Silva and Tenreyro (2006). The advantage of this procedure is that it actually includes zero observations in the estimation, and can predict both zero and non-zero trade values in-sample from the same estimated equation. Its disadvantage is that it assumes a particular likelihood function, and is not (yet) a standard way of estimating gravity equations found in the literature. It turns out that the two are quite close to each other, an indication that the zeros problem is not an important one for our empirical strategy. In the paper, we only report the results of implementing the first approach. The results of using the second one are available upon request.

We proceed by describing the data sources in the next section. We give a snapshot of our data, focusing on the patterns of predicted institutional intensity of exports that we obtain. Then, we present the results of estimating equation (14).

4.2 Data Description

The dependent variable, institutional quality, is proxied by the rule of law index from the Governance Matters database of Kaufmann, Kraay, and Mastruzzi (2005). The index is normalized to have a mean of zero and a standard deviation of 1. It therefore ranges from about -2.5 (worst) to 2.5 (best). Observations come at bi-yearly frequency, and we take the average across 1996-2000. The model in this paper is about institutions which govern economic relationships between private parties, such as enforcement of contracts and property rights. This, the rule of law subcomponent of the Governance Matters database is the most appropriate index to use.

The main right-hand side variable, IIX_c, is constructed using the estimates of $\widehat{X}_{ic}$ sourced from Do and Levchenko (2006a). That paper uses trade flows from the World Trade Database described in Feenstra et al. (2005). The database contains bilateral trade flows between more than 150 countries, accounting for 98% of world trade, for the period 1962-2000. To estimate equation (15), the bilateral trade variables X_{icd} are averaged over the period 1970-1999. This allows to smooth out any short-run variation in trade shares across sectors, and reduce the impact of zero observations. The estimation of $\widehat{X}_{ic}$ is carried out at the 3-digit ISIC revision 2 level for manufacturing trade, yielding 28 sectors. The estimates of $\widehat{X}_{ic}$ are then combined with data on institutional intensity from Nunn (2006),

[10] More precisely, for a given exporter-importer pair, we predict bilateral exports out-of-sample for all 28 sectors as long as there is any bilateral exports for that country pair in at least one of the 28 sectors.

to produce our measures of IIX_c. The list of sectors, along with their institutional intensity is presented in Appendix Table A1.

The main controls in our estimation include overall trade openness (imports plus exports as a share of GDP) and PPP-adjusted GDP per capita income, both of which come from the Penn World Tables (Heston, Summers and Aten, 2002). We also use information on countries' legal origin as defined by La Porta et al. (1998), extended to include the socialist legal system. The final sample is a cross-section of 141 countries and, unless otherwise indicated, the variables are averaged over 30 years, 1970-1999.

Appendix Table A2 presents the data on institutional quality, predicted institutional intensity of exports, and overall trade openness for the countries in our sample. Figure 6 plots institutional quality against the overall trade openness in our sample. There is some positive association between institutions and overall trade openness, but it is not strong, with the simple correlation of 0.16 and the Spearman correlation of 0.18. Figure 7 plots institutions against the predicted institutional intensity of exports instead. There appears to be a closer positive relationship between these two variables, with both simple and Spearman correlation coefficients of around 0.48. It is important to stress that the predicted institutional intensity of exports does not use any actual export data of countries. It is instead a variable which is constructed using only the exogenous geographical features of countries and their trading partners, and the same sector-level gravity coefficients applied to all countries. We now turn to a regression analysis of the relationship between these two variables.

4.3 Results

Table 1 presents the baseline results of estimating equation (14). The first column regresses institutional quality on simple trade openness. There is a positive and significant relationship, but it is not strong, with an R-squared of 0.03. When instead in column 2 we regress institutions on IIX_c, the R-squared is 0.23, and the variable of interest is significant at the 1% level, with a t-statistic of 6.3. Column 3 includes both the trade openness and the external finance need of exports. The coefficient on IIX is actually increased, while the coefficient on trade is of the "wrong" sign. Columns 4 and 5 attempt to control for other determinants of institutions. We first include the legal origin dummies from La Porta et al. (1998), and then per capita income. The latter is meant to capture a country's overall level of development. While in both of these specifications the coefficient on IIX_c is somewhat smaller, it nonetheless remains significant at the 1% level. Finally, column 6 includes both

the legal origin dummies and per capita income on the right-hand side. The coefficient on our variable of interest is further reduced somewhat, but preserves its significance at 1% level.

We next check whether the results are driven by predicted high overall trade openness or the expected institutional intensity. Examining the definition of IIX, (17), it is clear that this variable will have high values either because predicted overall trade $\widehat{X}_{ic}$ is high across all sectors – "natural openness", or because the country is predicted to export *relatively* more in the institutionally intensive sectors. Conceptually, our main index of IIX, which combines both of these, is correct: what should matter for the incentive to improve institutions is not only the relative expected export shares in the most institutionally intensive sectors, but also how much relative to GDP a country would be able to export in those sectors. Nonetheless, we would like to know that our results are not entirely driven simply by "natural openness." In order to check that, we construct an alternative index of IIX which is purged of the influence of overall predicted openness:

$$IIX\_SHARES_c = \sum_{i=1}^{I} \widehat{\omega}_{ic}^{X} * Institutional\_Intensity_i. \tag{18}$$

Here, the predicted share of total exports in industry i in country c, $\widehat{\omega}_{ic}^{X}$, is constructed from the predicted exports to GDP ratios $\widehat{X}_{ic}$ in a straightforward manner:

$$\widehat{\omega}_{ic}^{X} = \frac{\widehat{X}_{ic}}{\sum_{i=1}^{I} \widehat{X}_{ic}}. \tag{19}$$

This index is driven solely by the predicted differences in sectoral export shares across sectors. The results of using it instead of the baseline measure are presented in column 7 of Table 1. We can see that our results are robust to purging the effects of "natural openness:" the coefficient is significant, with a p-value of 5.7 percent, even if we use income, trade openness, and legal origins as controls.

We now check the robustness of our results in several ways. First, we determine whether they are driven by outliers or particular subsamples. Table 2 presents the results. In the first column we drop outliers, which are defined as countries in the top 5 and bottom 5 percent of the IIX distribution, and show that the results are robust. In the second column, we drop the OECD countries.[11] The next column drops the sub-Saharan African countries.

[11] OECD countries in our sample are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States. We thus exclude the newer members of the OECD, such as Korea and Mexico.

The results are not sensitive to the exclusion of this region. The economies sometimes called "Asian tigers" have experienced some of the fastest growth of trade and institutional improvement over the postwar period. Column 4 excludes the Asian tigers, to check that the results are not driven by these particular countries.[12] We next drop Latin America and the Caribbean, and the Middle East and North Africa regions. The results are robust to excluding these country groups. Some of the countries with the highest values of IIX are actually entrepot countries, for which the values of trade openness are high, but much of it is due to re-exports.[13] Column 6 drops these countries, and shows that the coefficient estimates are actually larger and more significant than in the full sample. Finally, Column 7 drops countries which have more than 60% of their exports in Mining and Quarrying, a sector which includes crude petroleum.[14] The results are robust to the exclusion of these countries.

In Table 3 we determine whether our results are sensitive to the inclusion of additional explanatory variables. All of the columns include the most stringent set of controls – trade openness, per capita income, and legal origin dummies – but we do not report their coefficients to conserve space. The first column controls for the level of human capital by including the average years of secondary schooling in the population from the Barro and Lee (2000) database. In the second column, we include the distance to the equator.[15] Next, we control for the fraction of the population speaking English as the first language, sourced from Hall and Jones (1999).[16] The fourth column adds the Polity2 index, which is meant to capture the strength of democratic institutions within a country. This index is sourced from the Polity IV database.[17] Column 5 includes an indicator of ethnic fractionalization, based on Easterly and Levine (1997).[18] Column 6 controls for inequality, by including the Gini coefficient of the income distribution sourced from the World Bank's World Development Indicators. Finally, the last column controls for the proportion of the population that is Catholic, Muslim, and Protestant, obtained from La Porta et al. (1999). It is clear that

[12] In our sample, we consider Asian tigers to be: Indonesia, Korea, Malaysia, Philippines, and Thailand.

[13] These countries are Bahrain, China: Hong Kong, Gyuana, Malta, and Singapore. The 1970-99 average trade as a share of GDP in these countries ranges from 156 to 340 percent.

[14] There countries are Algeria, Angola, Congo, Republic of, Gabon, Iran, I.R. of, Kuwait, Nigeria, Oman, Qatar, Saudi Arabia, Syrian Arab Republic.

[15] Alternatively, we included a tropics indicator, the average number of days with frost, and the mean temperature. The results were robust.

[16] Alternatively, we also controlled for the share of the population speaking a European language, and the indicator for "neo-Europe." The results were robust.

[17] We also used Polity IV's constraint on the executive variable, which is meant to capture the checks placed on the power of the executive branch of government. The results were unchanged.

[18] We also controlled for the ethnic, religious, and linguistic fractionalization using the variables developed by Alesina et al. (2003). The results were unchanged.

the results are robust to the inclusion of all of these additional controls.

5 Conclusion

Recent literature has highlighted the role of the quality of institutions in various aspects of countries' economic performance, including international trade. Given the emerging consensus regarding their primary importance, the crucial question is what are the forces which could drive institutional change. The main goal of this paper is to provide a simple framework for modeling the effect of trade on the political economy of institutions. The main building blocks of the analysis are the model of institutional comparative advantage of Levchenko (2006), and the lobbying framework of Grossman and Helpman (1994, 1995).

What are the main conclusions from this exercise? The key consequence of bad institutions in this framework is the presence of rents which are captured by some parties inside the country. Lobbying can give rise to imperfect institutions because the agents capturing those rents have an incentive to lobby in order to retain them. Under trade, however, those very rents disappear in the institutionally inferior country. In order to regain those rents, the country must improve its institutions vis-à-vis its trading partner. In equilibrium, a "race to the top" result obtains: both countries adopt the best attainable level of institutional quality. The framework is also flexible enough to provide counterexamples to this general result. The race to the top does not occur in the country which has such a strong technological advantage in the rent-bearing sector that it captures that sector no matter what its institutional quality. This extension is telling about the kinds of circumstances under which trade brings institutional deterioration – namely, when trade increases, rather than decreases rents – but it is also clear that these parameter values are not frequently observed in practice. Overall, this simple framework captures the key idea that bad institutions are more costly in an open world.

Is it the case empirically that trade improves institutions? We have argued that in order to take this question to the data, we must refine the model's predictions as follows: institutions will improve as a result of trade in countries which can expect to capture the institutionally intensive sectors after trade opening. Our empirical strategy relies on the notion that a country's geographical characteristics will affect its expected export patterns. Extending the approach of Frankel and Romer, we constructed for each country its predicted institutional intensity of exports, based solely on its geographical characteristics. Our empirical results show that countries which are expected to specialize in institutionally intensive sectors do in fact exhibit better institutions.

A Appendix

A.1 Proofs of Propositions

Proof of Proposition 1: The proof follows the treatment in Helpman and Krugman (1985, p. 13-14). The FPE set is defined as a partition of the world factor endowments into countries such that every country can fully employ all of its factors using the integrated equilibrium techniques of production. To prove that trade replicates the integrated equilibrium factor prices, we observe that given the integrated equilibrium factor prices, every firm employs the integrated equilibrium techniques of production. Thus, by definition of the FPE set, under the integrated equilibrium factor prices, full employment prevails in each country without movements of factors across countries. Thus, under trade in goods but not factors, the world economy can produce the integrated equilibrium quantities of all the goods. Since, under the integrated equilibrium factor prices, the aggregate world income is also equal to the integrated equilibrium world income, and consumption shares are also the same, there is goods market clearing. Thus, such a resource allocation and set of factor and goods prices under trade are an equilibrium, which by construction replicates the factor prices of the integrated equilibrium.■

Proof of Proposition 2: Grossman and Helpman (2001, ch. 7) show that the equilibrium policy is jointly efficient, that is, it maximizes the joint welfare of the policymaker and the interest group. The policymaker's outside option is not to deal with the interest group at all. Thus, the interest group must provide the policymaker with a utility level at least as great as what it would achieve without dealing with the interest group, $\overline{G}$, obtained by:

$$\overline{G} = \max_{\phi \in [0,1]} \{\lambda S(\phi)\}$$

Thus, the interest group solves

$$\max_{\phi \in [0,1]} \{W(\phi) - c\}$$

subject to

$$\lambda S(\phi) + (1-\lambda)c \geq \overline{G},$$

where $W(\phi) = [w(\phi) + \phi x r(\phi) E(\phi)]\, H$ is the total rewards to H. Because the interest group has no reason to give the policymaker a utility level higher than $\overline{G}$, the constraint will bind with equality and the political contribution can be backed out:

$$c = \frac{1}{1-\lambda}\left[\overline{G} - \lambda S(\phi)\right]$$

Therefore, the interest group in effect chooses ϕ to maximize a weighted sum of the its own welfare gross of the contribution and the aggregate welfare:

$$\max_{\phi \in [0,1]} \left\{(1-\lambda)W(\phi) + \lambda S(\phi)\right\},$$

which is the same as equation (10). Note that in general, there are many possible contribution schedules $C(\phi)$ which can be designed to achieve this outcome.

It remains to show that for high enough values of λ, institutions are imperfect in the autarky equilibrium. We can use the autarky equilibrium conditions (**??**) through (8) to establish the following result:

$$\frac{d}{d\phi}\left[w(\phi) + \phi x r(\phi) E(\phi)\right]\Big|_{\phi=0} > 0.$$

That is, H's welfare is strictly increasing in ϕ when institutions are perfect ($\phi = 0$). This is because while $w(\phi)$ does decrease in ϕ, raising ϕ allows H to earn rents in equilibrium, and for low enough ϕ the second effect dominates. Thus, the derivative of the first term of the maximand in the expression defining ϕ^*, (10), is positive. The derivative of the second term is negative, but can be made arbitrarily small as $\lambda \to 0$. Thus, there is a value of $\lambda \in [0, 1)$, such that the derivative of the maximand is positive in ϕ at $\phi = 0$. This immediately leads to the conclusion that for those parameter values, $\phi^* > 0$.■

Proof of Proposition 3: The equilibrium responses $\left[C(\phi^i; \phi^{-i}), \phi^i\right]$ at each possible value of ϕ^{-i} are constructed in a manner similar to the equilibrium in Proposition 4. In particular, Grossman and Helpman (1995) show that the equilibrium response policy vector in this game must maximize the joint welfare of the lobby group and the policy maker. The equilibrium response value of ϕ^i at each level of ϕ^{-i} is then given by:

$$\phi^i(\phi^{-i}) = \arg \max_{\phi^i \in [0,1]} \left\{ w(\phi^i, \phi^{-i}) H^i + \phi^i x r(\phi^i, \phi^{-i}) E^i(\phi^i, \phi^{-i}) \overline{H} + \lambda^i r(\phi^i, \phi^{-i}) K^i \right\}. \quad \text{(A.1)}$$

Once again, there are many contribution schedules $C(\phi; \phi^{-i})$ that generate this outcome.

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Figure 1: The World Economy and the Factor Price Equalization Set

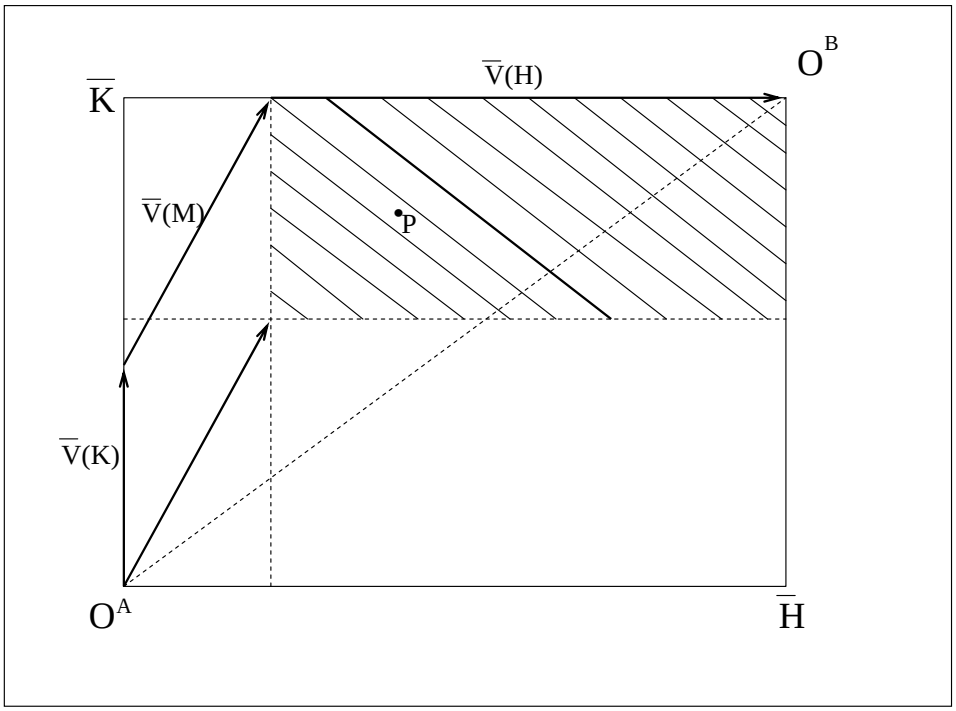

Figure 2: The Pattern of Production

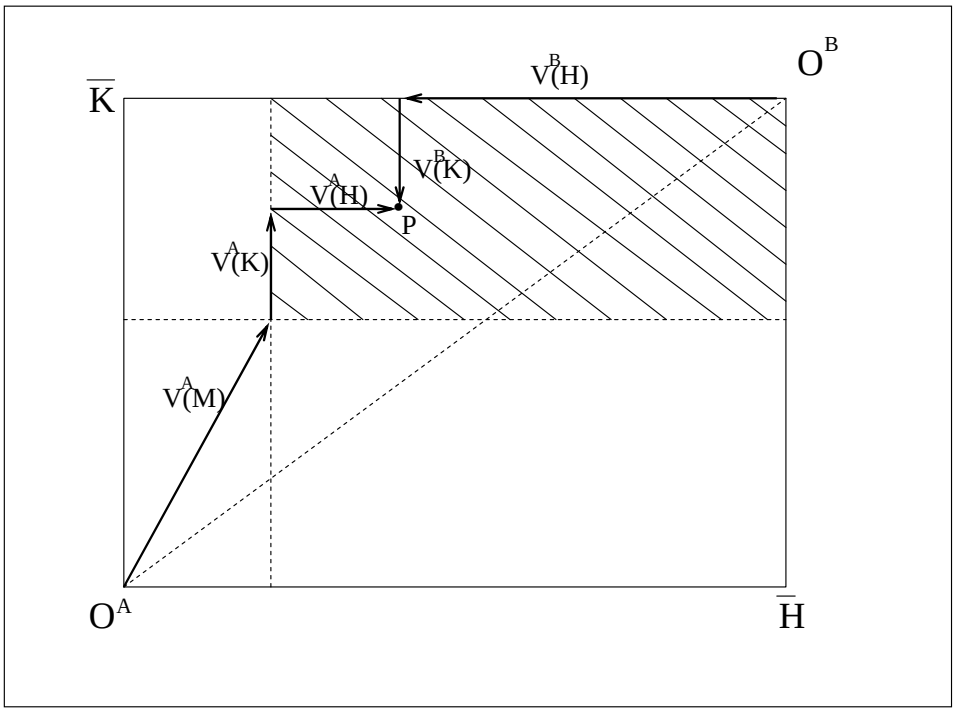

Figure 3: Institutional Choice: Symmetric Case

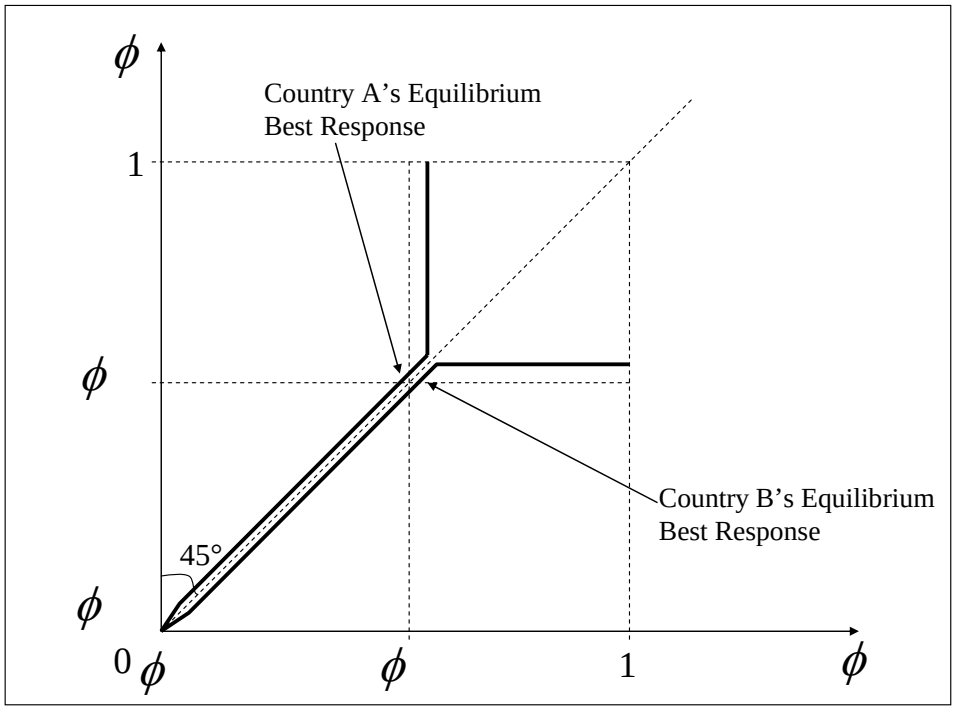

Figure 4: Institutional Choice: Country A has a Technological Advantage in the M-good

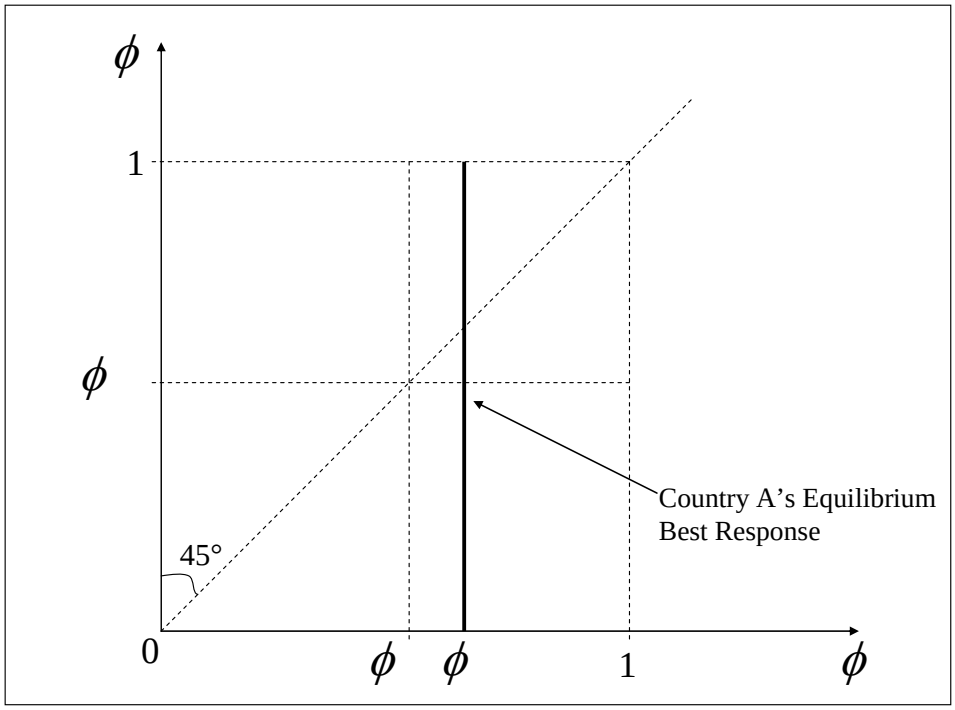

Figure 5: Institutional Choice: Limits to Instititional Improvement in Country B

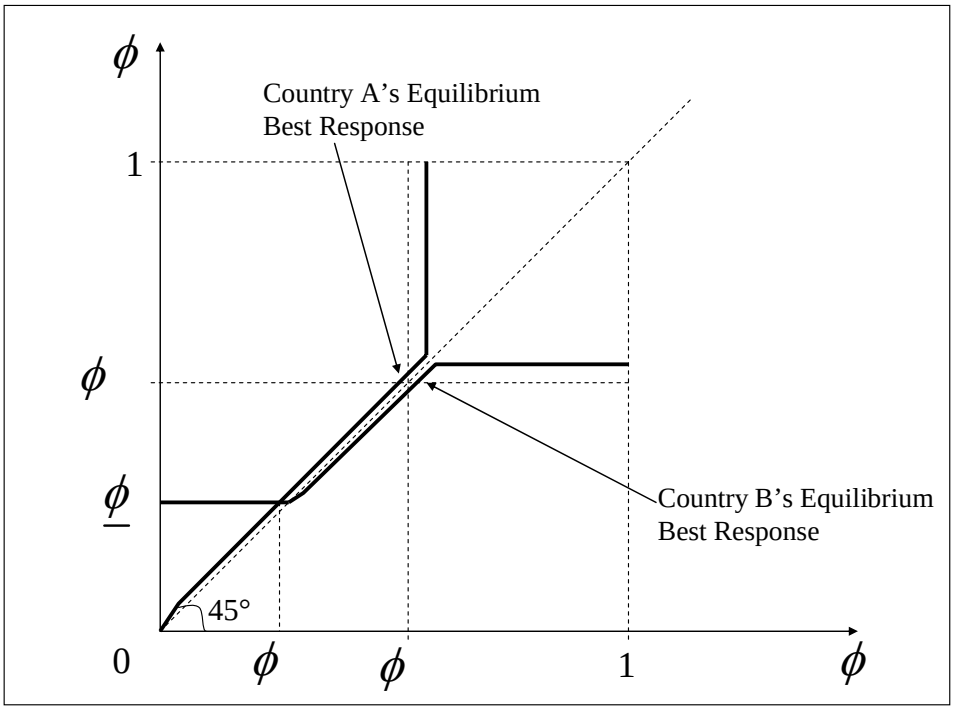

Figure 6: Institutional Quality and Trade Openness

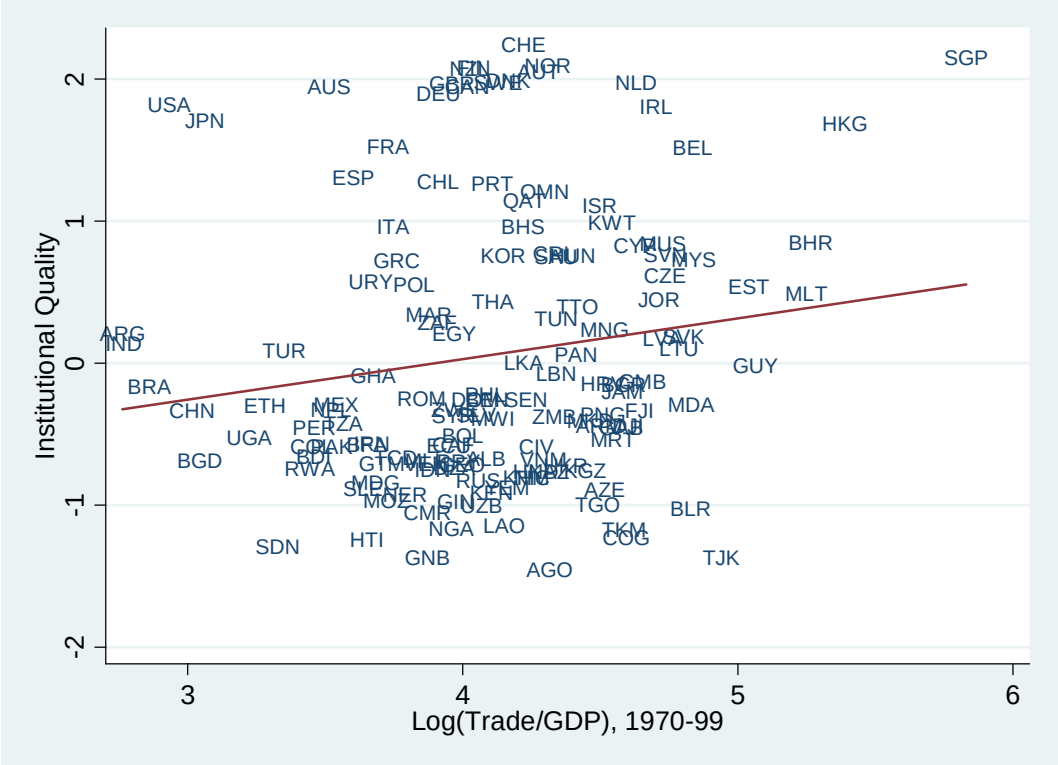

Figure 7: Institutional Quality and Predicted Institutional Intensity of Exports

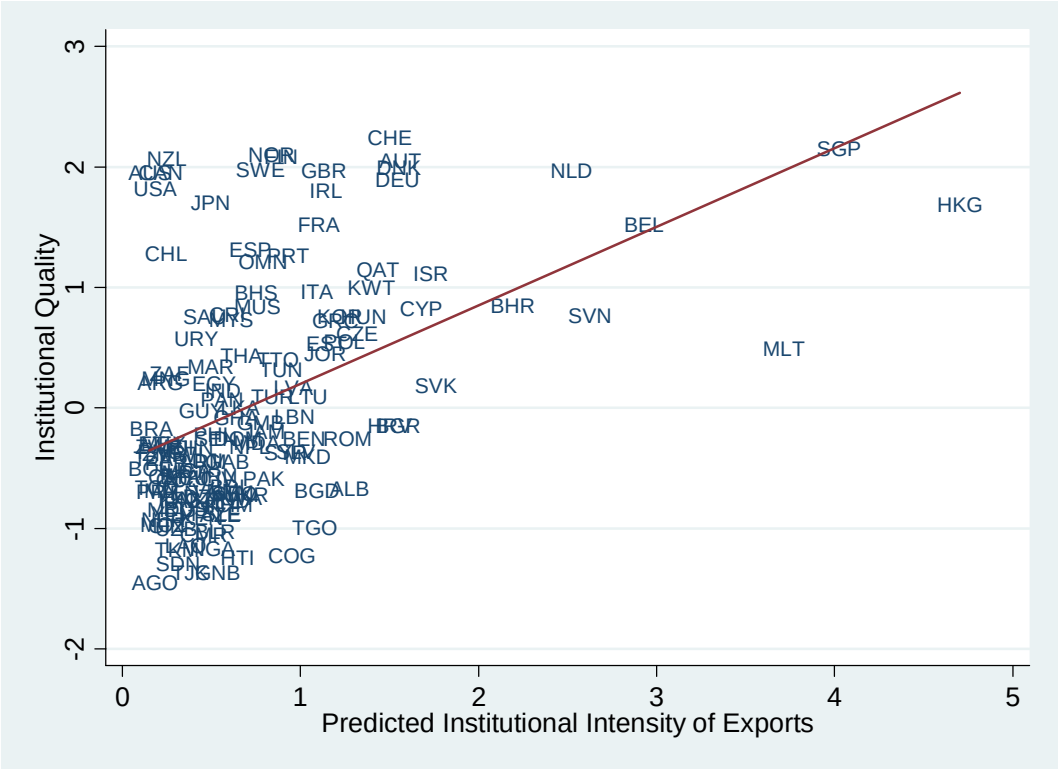

Table 1: Main Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.: Institutional Quality							
Predicted IIX		0.652***	0.756***	0.617***	0.294***	0.262***	
		(0.104)	(0.123)	(0.110)	(0.094)	(0.083)	
Predicted IIX: Shares Based							2.058*
							(1.070)
Log(Trade/GDP)	0.297*		-0.259*	-0.087	-0.271***	-0.142	0.065
	(0.154)		(0.152)	(0.153)	(0.102)	(0.097)	(0.089)
Log(Income)					0.693***	0.610***	-0.353***
					(0.058)	(0.054)	(0.106)
French Legal Origin				-0.389**		-0.373***	0.659***
				(0.194)		(0.106)	(0.048)
German Legal Origin				1.121***		0.411**	0.380**
				(0.294)		(0.177)	(0.190)
Scandinavian Legal Origin				1.603***		0.720***	0.747***
				(0.196)		(0.144)	(0.143)
Socialist Legal Origin				-0.654***		-0.663***	-0.716***
				(0.167)		(0.122)	(0.130)
Constant	-1.159*	-0.454***	0.534	0.172	-4.815***	-4.343***	-6.233***
	(0.641)	(0.109)	(0.601)	(0.679)	(0.585)	(0.567)	(0.672)
Observations	143	141	141	139	141	139	139
R-squared	0.03	0.23	0.24	0.48	0.67	0.76	0.75

Notes: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable, is the index of Rule of Law sourced from Kaufmann, Kraay, and Mastruzzi (2005); is the predicted instititional intensity of exports; is log of exports and imports as a share of GDP; is log of PPP-adjusted real per capita income from Penn World Tables; these two variables are average values over 1970-99. dummies are as defined originally by La Porta et al. (1998). Variable definitions and sources are described in detail in the text.

Table 2: Robustness: Outliers and Subsamples

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sample	No outliers	No OECD	No Sub-Saharan Africa	No Asian Tigers	No Latin America/ Caribbean	No Entrepot Countries	No Mining Exporters
Dep. Var.: Institutional Quality							
Predicted IIX	0.316**	0.322***	0.210**	0.265***	0.243***	0.366***	0.233***
	(0.134)	(0.084)	(0.087)	(0.084)	(0.086)	(0.104)	(0.084)
Log(Trade/GDP)	-0.092	-0.031	-0.099	-0.148	-0.218**	-0.142	-0.091
	(0.102)	(0.098)	(0.108)	(0.099)	(0.108)	(0.103)	(0.096)
French Legal Origin	-0.283**	-0.234**	-0.409***	-0.381***	-0.305***	-0.370***	-0.326***
	(0.112)	(0.097)	(0.126)	(0.110)	(0.112)	(0.109)	(0.110)
German Legal Origin	0.499**	0.219***	0.337*	0.538***	0.327*	0.351*	0.417**
	(0.191)	(0.078)	(0.174)	(0.146)	(0.179)	(0.178)	(0.182)
Scandinavian Legal Origin	0.814***	0	0.609***	0.724***	0.643***	0.687***	0.706***
	(0.160)	0.000	(0.148)	(0.148)	(0.146)	(0.156)	(0.149)
Socialist Legal Origin	-0.620***	-0.480***	-0.675***	-0.668***	-0.672***	-0.693***	-0.699***
	(0.129)	(0.106)	(0.130)	(0.125)	(0.128)	(0.131)	(0.124)
Log(Income)	0.576***	0.429***	0.688***	0.603***	0.644***	0.600***	0.607***
	(0.063)	(0.055)	(0.069)	(0.054)	(0.054)	(0.056)	(0.058)
Constant	-4.372***	-3.570***	-5.131***	-4.259***	-4.267***	-4.321***	-4.488***
	(0.581)	(0.547)	(0.735)	(0.575)	(0.579)	(0.591)	(0.599)
Observations	127	118	105	134	116	134	128
R-squared	0.75	0.62	0.77	0.77	0.8	0.76	0.77

Notes: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable, is the index of Rule of Law sourced from Kaufmann, Kraay, and Mastruzzi (2005); is the predicted instititional intensity of exports; is log of exports and imports as a share of GDP; is log of PPP-adjusted real per capita income from Penn World Tables; these two variables are average values over 1970-99. dummies are as defined originally by La Porta et al. (1998). Variable definitions and sources are described in detail in the text.

Table 3: Robustness: Additional Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.: Institutional Quality							
Predicted IIX	0.201**	0.228**	0.327***	0.348***	0.219*	0.279***	0.303***
	(0.093)	(0.089)	(0.084)	(0.087)	(0.118)	(0.096)	(0.097)
Secondary Schooling	0.221***						
	(0.082)						
Distance to Equator		0.016***					
		(0.005)					
Fraction English-Speaking			0.659**				
			(0.264)				
Polity2 Index				0.019***			
				(0.007)			
Ethnic Fractionalization					-0.247		
					(0.194)		
Gini Coefficient						-1.540**	
						(0.599)	
Proportion Catholic							-0.360**
							(0.178)
Proportion Muslim							-0.287*
							(0.155)
Proportion Protestant							0.074
							(0.321)
Constant	-4.387***	-3.884***	-3.933***	-4.019***	-4.488***	-4.050***	-4.321***
	(0.699)	(0.594)	(0.545)	(0.576)	(0.697)	(0.694)	(0.542)
Other Controls	Log(Trade/GDP), Log(Income), Legal Origin Dummies						
Observations	96	139	138	136	110	105	136
R-squared	0.82	0.79	0.78	0.78	0.78	0.77	0.77

Notes: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable, is the index of Rule of Law sourced from Kaufmann, Kraay, and Mastruzzi (2005); is the predicted instititional intensity of exports; is log of exports and imports as a share of GDP; is log of PPP-adjusted real per capita income from Penn World Tables; these two variables are average values over 1970-99. dummies are as defined originally by La Porta et al. (1998). is the average years of secondary schooling in the total population; is an indicator of strength of democratic institutions;Variable definitions and sources are described in detail in the text.

Appendix Table A1: Institutional Intensity Measure

ISIC	Industry Name	Institutional Intensity
311	Food products	0.331
313	Beverages	0.713
314	Tobacco	0.317
321	Textiles	0.376
322	Wearing apparel, except footwear	0.745
323	Leather products	0.571
324	Footwear, except rubber or plastic	0.650
331	Wood products, except furniture	0.516
332	Furniture, except metal	0.568
341	Paper and products	0.348
342	Printing and publishing	0.713
351	Industrial chemicals	0.240
352	Other chemicals	0.490
353	Petroleum refineries	0.058
354	Misc. petroleum and coal products	0.395
355	Rubber products	0.407
356	Plastic products	0.408
361	Pottery, china, earthenware	0.329
362	Glass and products	0.557
369	Other non-metallic mineral products	0.377
371	Iron and steel	0.242
372	Non-ferrous metals	0.160
381	Fabricated metal products	0.435
382	Machinery, except electrical	0.764
383	Machinery, electric	0.740
384	Transport equipment	0.859
385	Professional & scientific equipment	0.785
390	Other manufactured products	0.547

Notes: Institutional Intensity is the share of intermediate inputs which cannot be bought on organized exchanges and is not reference-priced. Source: Nunn (2007).

Appendix Table A2: Countries and Main Variables

country	IIX	IIX (Export Share Based)	Trade/GDP	Rule of Law
Algeria	0.46	0.37	53.05	-0.74
Angola	0.18	0.36	75.00	-1.45
Argentina	0.21	0.39	15.85	0.21
Armenia	0.45	0.43	89.61	-0.44
Australia	0.15	0.33	33.57	1.95
Austria	1.56	0.45	71.91	2.06
Azerbaijan	0.55	0.43	91.53	-0.89
Bahamas, The	0.75	0.28	67.96	0.96
Bahrain, Kingdom of	2.19	0.42	193.62	0.85
Bangladesh	1.09	0.48	20.98	-0.69
Belarus	0.52	0.42	125.13	-1.03
Belgium	2.93	0.46	125.80	1.52
Benin	1.02	0.40	59.69	-0.26
Bolivia	0.15	0.36	54.61	-0.51
Brazil	0.16	0.42	17.46	-0.17
Bulgaria	1.55	0.43	97.85	-0.15
Burkina Faso	0.32	0.42	38.50	-0.57
Burundi	0.59	0.46	31.79	-0.66
Cambodia	0.60	0.40	68.73	-0.80
Cameroon	0.46	0.39	48.05	-1.05
Canada	0.22	0.35	55.47	1.95
Central African Rep.	0.26	0.34	52.74	-0.57
Chad	0.19	0.35	42.84	-0.66
Chile	0.24	0.39	49.91	1.28
China,P.R.: Mainland	0.38	0.46	20.44	-0.34
China,P.R.:Hong Kong	4.70	0.51	218.94	1.69
Colombia	0.31	0.42	31.55	-0.59
Congo, Republic of	0.95	0.37	99.17	-1.23
Costa Rica	0.59	0.39	75.22	0.77
Croatia	1.50	0.41	90.82	-0.14
Cyprus	1.68	0.35	102.07	0.83
Czech Republic	1.32	0.46	113.83	0.62
Côte d'Ivoire	0.53	0.40	71.42	-0.59
Denmark	1.55	0.43	64.47	1.99
Djibouti	0.48	0.29	99.44	-0.44
Dominican Republic	0.65	0.44	57.17	-0.26
Ecuador	0.36	0.41	51.94	-0.58
Egypt	0.52	0.43	52.83	0.21
El Salvador	0.97	0.46	57.31	-0.36
Estonia	1.15	0.34	154.56	0.53
Ethiopia	0.21	0.43	26.64	-0.30
Fiji	0.32	0.34	103.78	-0.33
Finland	0.89	0.36	56.78	2.08
France	1.10	0.45	41.58	1.52
Gabon	0.59	0.28	97.26	-0.45
Gambia, The	0.78	0.38	105.09	-0.13
Georgia	0.63	0.41	54.54	-0.72

Appendix Table A2: Countries and Main Variables (cont'd)

country	IIX	IIX (Export Share Based)	Trade/GDP	Rule of Law
Germany	1.54	0.47	50.03	1.90
Ghana	0.64	0.42	39.43	-0.09
Greece	1.20	0.43	43.02	0.73
Guatemala	0.61	0.43	40.72	-0.71
Guinea	0.25	0.36	53.21	-0.98
Guinea-Bissau	0.54	0.34	48.08	-1.37
Guyana	0.44	0.30	158.04	-0.02
Haiti	0.65	0.46	38.49	-1.24
Honduras	0.59	0.40	71.26	-0.77
Hungary	1.36	0.46	81.54	0.76
India	0.57	0.48	15.94	0.14
Indonesia	0.30	0.45	49.03	-0.75
Iran, I.R. of	0.55	0.41	39.29	-0.57
Ireland	1.14	0.39	110.18	1.81
Israel	1.73	0.45	89.91	1.11
Italy	1.09	0.47	42.44	0.96
Jamaica	0.80	0.43	97.66	-0.20
Japan	0.50	0.48	21.37	1.71
Jordan	1.14	0.37	111.52	0.45
Kazakhstan	0.32	0.35	74.79	-0.77
Kenya	0.45	0.41	60.63	-0.91
Korea	1.22	0.47	63.22	0.76
Kuwait	1.40	0.39	93.87	0.99
Kyrgyz Republic	0.39	0.37	85.19	-0.76
Lao People's Dem.Rep	0.36	0.36	63.60	-1.14
Latvia	0.96	0.37	112.91	0.17
Lithuania	1.04	0.39	119.94	0.10
Macedonia, FYR	1.04	0.43	86.73	-0.40
Madagascar	0.28	0.37	39.83	-0.84
Malawi	0.33	0.43	60.97	-0.39
Malaysia	0.61	0.41	126.54	0.73
Mali	0.22	0.36	47.23	-0.68
Malta	3.72	0.45	190.45	0.49
Mauritania	0.34	0.29	94.48	-0.54
Mauritius	0.76	0.44	113.19	0.84
Mexico	0.23	0.43	34.45	-0.29
Moldova	0.75	0.44	125.21	-0.29
Mongolia	0.25	0.30	91.45	0.24
Morocco	0.50	0.41	48.28	0.34
Mozambique	0.23	0.38	41.44	-0.97
Nepal	0.71	0.42	33.84	-0.32
Netherlands	2.52	0.47	102.64	1.97
New Zealand	0.25	0.35	55.96	2.07
Nicaragua	0.51	0.37	70.19	-0.80
Niger	0.23	0.36	44.29	-0.93
Nigeria	0.51	0.46	52.37	-1.17
Norway	0.84	0.35	74.51	2.10

Appendix Table A2: Countries and Main Variables (cont'd)

country	IIX	IIX (Export Share Based)	Trade/GDP	Rule of Law
Oman	0.79	0.31	73.54	1.21
Pakistan	0.79	0.45	33.91	-0.59
Panama	0.56	0.37	82.55	0.06
Papua New Guinea	0.21	0.33	90.82	-0.36
Paraguay	0.20	0.37	53.70	-0.69
Peru	0.25	0.39	31.84	-0.46
Philippines	0.51	0.46	59.31	-0.22
Poland	1.24	0.45	45.73	0.55
Portugal	0.93	0.44	60.76	1.27
Qatar	1.43	0.31	68.31	1.15
Romania	1.26	0.44	47.06	-0.25
Russia	0.35	0.39	57.75	-0.83
Rwanda	0.64	0.47	31.35	-0.74
Saudi Arabia	0.46	0.35	76.68	0.75
Senegal	0.52	0.40	68.85	-0.26
Sierra Leone	0.56	0.40	38.00	-0.88
Singapore	4.03	0.53	340.44	2.15
Slovak Republic	1.76	0.45	121.77	0.19
Slovenia	2.63	0.41	114.30	0.77
South Africa	0.26	0.41	49.77	0.28
Spain	0.72	0.44	36.67	1.31
Sri Lanka	0.66	0.46	68.18	0.00
Sudan	0.31	0.37	27.88	-1.29
Sweden	0.78	0.37	62.02	1.98
Switzerland	1.50	0.46	68.10	2.24
Syrian Arab Republic	0.92	0.42	52.72	-0.37
Tajikistan	0.38	0.38	139.78	-1.37
Tanzania	0.17	0.38	35.32	-0.42
Thailand	0.67	0.44	60.98	0.43
Togo	1.08	0.39	89.22	-1.00
Trinidad and Tobago	0.87	0.42	82.78	0.40
Tunisia	0.89	0.40	76.75	0.32
Turkey	0.84	0.44	28.51	0.09
Turkmenistan	0.30	0.34	98.18	-1.17
Uganda	0.37	0.44	25.14	-0.52
Ukraine	0.70	0.44	79.41	-0.72
United Kingdom	1.13	0.47	52.47	1.97
United States	0.18	0.43	18.79	1.82
Uruguay	0.41	0.38	39.04	0.57
Uzbekistan	0.30	0.40	58.44	-1.00
Venezuela, Rep. Bol.	0.31	0.40	47.79	-0.71
Vietnam	0.53	0.45	73.20	-0.68
Yemen, Republic of	0.29	0.38	64.18	-0.87
Zambia	0.23	0.37	76.20	-0.37
Zimbabwe	0.21	0.40	53.17	-0.32