Chapter 3

Contracts and Export Behavior

Noble Group Limited is a global supply chain manager of agricultural and energy products, metals and minerals.[1] In January of 2004, the firm had arranged to export Brazilian soybeans to soybean crushers in China. The contracts signed in January fixed a price for the transaction, even though the delivery was only scheduled to occur in April of that same year. Unfortunately for the buyers in China, prospects for a bumper soybean crop led to a 20 percent decline in soybean prices between the months of January and April. The associated drop in the price of crushed soybeans implied that the Chinese crushers would be operating at substantial losses were they to honor the high prices fixed in their January contracts with Noble. As a result, Chinese buyers began searching for ways to nullify their January contract with Noble. Perhaps not coincidentally, that same month Chinese port authorities discovered a discoloration among a handful of red beans on a 60,000 ton soybean shipment from Brazil, which they claimed indicated the presence of carboxin, a slightly toxic fungicide. Although such discoloration (at least in small quantities) is not unusual in traded soybeans, the Chinese government proceeded to institute a ban on *all* soybean shipments from Brazil, thereby effectively voiding the contract that Noble had signed with the Chinese soybean crushers. As a result, Noble was left with millions of dollars worth of stranded cargo. Noble eventually found other buyers for its shipments, but the incident cost the company around $25 million in demurrage losses.

This unfortunate incident of Noble Group in China exemplifies the contractual insecurity that producers face in their international transactions, the

[1] The following discussion builds on Foley, Chen, Johnson and Meyer (2009).

sources of which were explained earlier in Chapter 1.[2] In the three chapters of this Part II of the book, I will discuss the implications of introducing contractual imperfections in the benchmark models developed in Chapter 2. In this chapter, I will develop simple imperfect-contracting variants of the Melitz (2003) model of exporting and will also discuss empirical evidence suggestive of the role of these frictions as determinants of the structure of international trade flows. In Chapter 4, I will introduce contractual frictions into the two-country model of global sourcing developed in Chapter 2. Finally, in Chapter 5, a multi-country version of this global sourcing model will be developed to guide an empirical analysis of the relevance of contractual factors for the global sourcing decisions of U.S. firms.

Contracting in the Melitz Model

As derived in Chapter 2, in the Melitz (2003) model firms set the volume of output sold and the price charged in each market in a profit-maximizing manner, and as a result, the profits that a firm from country i with productivity φ anticipates obtaining in country j are given by

$$\pi_{ij}(\varphi) = (\tau_{ij} w_i)^{1-\sigma} B_j \varphi^{\sigma-1} - w_i f_{ij}, \tag{3.1}$$

where

$$B_j = \frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} P_j^{\sigma-1} \beta E_j, \tag{3.2}$$

and E_j is aggregate spending in country j.

It is worth pausing to discuss some key and often overlooked assumptions needed for a firm from i with productivity φ to *actually* realize the profit flow in equation (3.1) when choosing to export in country j. First, it is necessary for the firm to have complete information regarding all variables relevant for profits, including its own productivity level φ and the level of (residual) demand implicit in the term B_j. Second, equation (3.1) implicitly assumes that the firm can expand its production in order to meet foreign demand by costlessly hiring additional labor (or the composite factor of production) at a market wage rate w_i which is independent of the firm's operational decisions. Third, the firm is assumed to be able to costlessly contract with a local

[2] Interestingly, and in line with the internalization response to contractual insecurity highlighted in Chapter 1, in 2005 Noble Group acquired four soybean processing plants in China.

distributor or importer (an agent, an employee, or a firm) that will collect the sales revenue in country j and will hand them over to the exporter in i.[3]

Some interesting recent work in the field of International Trade has been devoted to studying the implications of relaxing the first two assumptions mentioned above. On the one hand, Segura-Cayuela and Vilarrubia (2008), Albornoz, Calvo Pardo, Corcos and Ornelas (2012), and Nguyen (2012) have all fruitfully incorporated foreign demand uncertainty in heterogeneous firm frameworks.[4] On the other hand, a voluminous recent literature, which includes the work among others of Helpman, Itskhoki and Redding (2010) and Amiti and Davis (2012), has studied the implications of imperfect labor markets for the exporting decision, the structure of international trade and the effect of trade liberalization on labor markets, wage inequality and unemployment. As interesting as these contributions are, a treatment of these topics is beyond the scope of the current book. Instead, I will hereafter focus on relaxing the third of the assumptions mentioned above, namely that the contracting between exporters and local distributors or importers is frictionless and allows the exporter to capture the full surplus from the transaction.

Before discussing the implications of contractual imperfections in the Melitz (2003) framework it is necessary to introduce contracting into the framework and this requires us to be a bit more explicit about the agents involved in the model. For simplicity, in this chapter I will restrict attention to situations in which each export transaction involves only two agents, the exporting firm F in country i and the importer M in country j. One can think of the fixed cost of exporting $w_i f_{ij}$ as partly capturing the cost incurred by the exporter in order to be able to contract with importers from j. For the time being, I will also focus on discussing simple contracts taking the following form: at some initial date t_0, the exporting firm F agrees to ship an amount of goods equal to q_{ij}, and in exchange the importer simultaneously agrees to pay the exporter an amount s_{ij} at some later date t_1, perhaps corresponding to the time at which the good is received or perhaps when it has been sold and revenue has been collected. In order to avoid introducing non-essential parameters, I set the discount rate between dates t_0 and t_1 to

[3] Although I will abstract from such a possibility below, one could imagine that the fixed cost of exporting $w_i f_{ij}$ partly reflects the remuneration of the importer for his or her services.

[4] Conversely, models in which firms learn their productivity level φ over time, as in the seminal work of Jovanovic (1982), have not been extensively used in international trade environments.

0. Contracts with alternative timings of payments will be discussed below.

It simplifies the exposition to assume that the opportunity cost of the importer's time is 0, so that the net surplus associated with firm F with productivity φ exporting in country j continues to be given by

$$\pi_{ij}(\varphi) = \left(p_{ij}(\varphi) - \frac{\tau_{ij}}{\varphi} w_i \right) q_{ij}(\varphi) - w_i f_{ij}, \tag{3.3}$$

with $q_{ij}(\varphi) = \beta E_j P_j^{\sigma-1} p_j(\varphi)^{-\sigma}$ as dictated by the demand schedule faced by the exporting firm. In the absence of contractual frictions, the contract will set the quantity of goods $q_{ij}(\varphi)$ shipped to country j and the associated price $p_{ij}(\varphi)$ to maximize the joint surplus in (3.3), thereby leading to the joint profit flow given by

$$\pi_{ij}(\varphi) = (\tau_{ij} w_i)^{1-\sigma} B_j \varphi^{\sigma-1} - w_i f_{ij}, \tag{3.4}$$

which coincides with (3.1). Only when this joint profit flow is expected to be positive, will the exporter decide to invest in being able to export to j.

Even if contracting is frictionless, whether the exporter F is able to realize that entire profit flow in (3.4) will depend on the relative bargaining power of the exporter and the importer. Given the zero reservation value of importers, the equilibrium in the Melitz (2003) framework corresponds to the case in which exporters have all the bargaining power, in the sense that they are assumed to be able to credibly make a take-it-or-leave-it offer to importers when contracting with them. To see this more formally, notice that the optimal contract from the point of view of the exporter will solve the exporter's profit subject to the importer's participation constraint, or

$$\begin{aligned} \max_{q_{ij}(\varphi), s_{ij}(\varphi)} \quad & s_{ij}(\varphi) - \frac{\tau_{ij}}{\varphi} w_i q_{ij}(\varphi) - w_i f_{ij} \\ \text{s.t.} \quad & p_{ij}(q_{ij}(\varphi)) q_{ij}(\varphi) - s_{ij}(\varphi) \geq 0, \end{aligned} \tag{3.5}$$

with $p_{ij}(q_{ij}(\varphi)) = \left(\beta E_j P_j^{\sigma-1}\right)^{1/\sigma} q_{ij}(\varphi)^{-1/\sigma}$. Quite naturally, the exporter will find it optimal to make the importer's participation constraint bind, thus implying that $q_{ij}(\varphi)$ will maximize joint profits, and the exporter will end up capturing the profit flow in (3.4), as assumed in the Melitz framework.

The assumption that exporters have all the bargaining power is perhaps a natural one to make given that the model is not explicit about the role of importers in facilitating trade. If these agents have a zero opportunity

cost and add no value to exports, why should they be remunerated? In the real world, however, intermediaries serve a central role in linking demand and supply by, among others, alleviating search frictions (see Antràs and Costinot, 2011) and providing quality assurance (see Bardhan, Mookherjee and Tsumagari, 2013 or Tang and Zhang, 2012). It is therefore natural that they capture a share of the gains from international trade. Although important, a treatment of international trade intermediation is beyond the scope of this book.

Contractual Frictions in the Melitz Model

As simple as the contract discussed above is, our discussion of international contract enforcement in Chapter 1 and the above account of Noble Group's soybean misadventures in China suggests that even those simple contracts are not fully enforceable in the real world. To fix ideas, I will next develop a simple model featuring one such source of contractual insecurity, namely a limited commitment problem on the part of the importer along the lines of the seminal work of Hart and Moore (1994) and Thomas and Worrall (1994).

The lack of commitment on the part of the importer is captured by assuming that at t_1, and before he transfers the collected sale revenue to the exporter, this importer is presented with an opportunity to divert some cash flows away from the exporter. In an extreme case, this might reflect the possibility of the importer absconding with the exporter's goods and attempting to sell them on the side, perhaps at a discount. More generally, the assumption reflects the notion that the initial contract might not compel the parties to honor its terms, thereby tempting the importer to deviate from the contract by underreporting the amount of revenues actually collected, perhaps claiming that those lower revenues were due to the low quality of the goods the exporter shipped. To simplify matters, I will let the share of diverted revenues be a common constant $1 - \mu_{ij} \in [0, 1]$ for all pairs shipping goods from i to j, but I will later briefly discuss the case in which this parameter might vary with productivity.

The parameter μ_{ij} captures the extent to which the importer feels constrained in defaulting on its contractual commitments with exporters from i and thus it is natural to treat this parameter as a measure of the degree of contract enforcement in country j. The fact that the share μ_{ij} also depends on the exporting country i implies that the level of international contract enforcement is allowed to potentially be a function of the nationality of the

two agents in the transaction, reflecting perhaps the effects of legal similarity (e.g., common versus civil law countries), a common language, or proximity (cultural or geographical).

I realize that the above modeling of contractual institutions is exceedingly simplistic, with the great complexities and nuances of this type of institutions being reduced to a single parameter μ_{ij} capturing the 'stealing' possibilities of agents residing in the importing country. I will stick to this simple framework for most of this chapter, but let me briefly expand on different mechanisms that might jointly contribute to a country offering a low level of contractual security to firms exporting to it. First, in some institutional environments, agents might face more opportunities to deviate from the initial contract than in other environments. This might be partly due to social norms, but is also explained by the legal environment which might determine how complete formal contracts tend to be. Let us denote by $1-\rho_{ij}$ the probability with which a 'default' opportunity arises for a $j-$importer transacting with an i-exporter (before we assumed $\rho_{ij}=0$). When such an opportunity to default does not arise, the importer will necessarily honor the initial contract and deliver all sale revenue to the exporter. When a default opportunity arises, however, the importer will assess the legal ramifications of a contractual breach, and will optimally decide whether to default or not. The legal consequences of a default are in turn shaped by both the probability with which a court of law will rule against a misbehaving importer (denoted by λ_{ij}) and by the amount of damages that it will be required to pay in such an eventuality. It is convenient to model these damages as a multiple d_{ij} of the sale revenues the importer had diverted from the exporter.

Notice that if d_{ij} or λ_{ij} are high enough such that $d_{ij}\lambda_{ij}>1$, the importer will never default on the exporter and thus the exporter will be able to achieve the same profit flow as in the case with no contractual frictions (see equation (3.4)). Conversely, when $d_{ij}\lambda_{ij}<1$, if the exporter insisted on demanding the entire sale revenue, the importer would optimally choose to fully default on the exporter because by doing so, it could obtain an expected payoff equal to a multiple $\left(1-\rho_{ij}\right)\left(1-\lambda_{ij}d_{ij}\right)>0$ of revenue.

Below, I will focus on the more interesting scenario in which $d_{ij}\lambda_{ij}<1$. In such a case, the exporter is left, *in expectation*, with a share

$$\mu_{ij}\equiv\rho_{ij}+\left(1-\rho_{ij}\right)\lambda_{ij}d_{ij} \tag{3.6}$$

of sale revenue. This expression for μ_{ij} summarizes how the prevalence of default opportunities, the competence of courts in ruling against deviating

parties, and the size and enforceability of damages jointly shape the perceived contractual security associated with different countries. Equation (3.6) also illustrates how even in situations in which contracts include choice-of-law and forum-of-law clauses (see Chapter 1), thus potentially making ρ_{ij} and λ_{ij} insensitive to j, the importing country institutions may still matter by shaping the extent to which damages set by international courts of law or arbitrators are enforced.

Later in this chapter, I will return to the general formulation of μ_{ij} in (3.6), but for the time being I will focus on the reduced form interpretation of $1-\mu_{ij}$ as capturing the share of sale revenues that importers from j are able to divert from exporters from i.

Implications of Contractual Insecurity

How does the lack of commitment affect contracting between the exporter and the importer? The key new constraint facing the exporter when designing the initial contract, is that any remuneration to the importer lower than $\left(1-\mu_{ij}\right) p_{ij}\left(q_{ij}\left(\varphi\right)\right) q_{ij}\left(\varphi\right)$ would necessarily lead the importer to divert cash flows. As a result, the optimal contracting problem now incorporates a new incentive compatibility (IC) constraint which is necessarily tighter than the participation constraint in the previous optimal contracting program in (3.5).

Formally, and maintaining the assumption that the exporter makes a take-it-or-leave-it offer to the importer, we now have that the date-0 quantity shipped $q_{ij}\left(\varphi\right)$ and the date-1 payment $s_{ij}\left(\varphi\right)$ solve

$$\begin{aligned}\max_{q_{ij}(\varphi),s_{ij}(\varphi)} \quad & s_{ij}\left(\varphi\right)-\frac{\tau_{ij}}{\varphi}w_i q_{ij}\left(\varphi\right)-w_i f_{ij} \\ \text{s.t.} \quad & p_{ij}\left(q_{ij}\left(\varphi\right)\right) q_{ij}\left(\varphi\right)-s_{ij}\left(\varphi\right)\geq 0 \\ & p_{ij}\left(q_{ij}\left(\varphi\right)\right) q_{ij}\left(\varphi\right)-s_{ij}\left(\varphi\right)\geq \left(1-\mu_{ij}\right) p_{ij}\left(q_{ij}\left(\varphi\right)\right) q_{ij}\left(\varphi\right),\end{aligned}$$

with $p_{ij}\left(q_{ij}\left(\varphi\right)\right)=\left(\beta E_j P_j^{\sigma-1}\right)^{1/\sigma} q_{ij}\left(\varphi\right)^{-1/\sigma}$. It is straightforward to see that $s_{ij}\left(\varphi\right)$ will now be set to exactly satisfy the (tighter) incentive compatibility constraint, thus implying that the exporter will now only capture a share μ_{ij} of revenues, and will choose $q_{ij}\left(\varphi\right)$ such that

$$\pi_{ij}\left(\varphi\right)=\max_{q_{ij}(\varphi)}\left\{\mu_{ij}\left(\beta E_j P_j^{\sigma-1}\right)^{1/\sigma} q_{ij}\left(\varphi\right)^{(\sigma-1)/\sigma}-\frac{\tau_{ij}}{\varphi}w_i q_{ij}\left(\varphi\right)-w_i f_{ij}\right\}.$$

Solving this problem, the profit function for the exporter can be written as

$$\pi_{ij}(\varphi) = \mu_{ij}^{\sigma} (\tau_{ij} w_i)^{1-\sigma} B_j \varphi^{\sigma-1} - w_i f_{ij}. \tag{3.7}$$

Comparing equations (3.1) and (3.7), it is clear that imperfect contracting reduces the profitability of selling in country j, and the more so the lower is μ_{ij}. The reason for this is twofold: first, the exporter now shares part of the profits obtained in country j with an importer there, and second, the exporter naturally responds to this rent dissipation by reducing the desired amount of goods to ship to country j.

The Margins of Trade, Gravity and Welfare

We now turn to a more formal study of the effects of contract enforcement on the intensive and extensive margins of trade and on aggregate bilateral trade flows across countries. In analogy to the benchmark model with perfect contracting, from equation (3.7) we now have that only firms from i with productivity $\varphi > \tilde{\varphi}_{ij}$, where

$$\tilde{\varphi}_{ij} \equiv \tau_{ij} w_i \left(\frac{w_i f_{ij}}{\mu_{ij}^{\sigma} B_j} \right)^{1/(\sigma-1)}, \tag{3.8}$$

will find it optimal to export to country j. Clearly, for fixed w_i and B_j, the lower is μ_{ij}, the lower will be the measure of firms exporting to country j, and thus the extensive margin of trade is negatively affected by weak contract enforcement. This is illustrated in Figure 3.1 with the shift in the export productivity threshold from $\tilde{\varphi}_{ij}$ to $\tilde{\varphi}_{ij'}$.

Next, aggregating across all firms from i, we find

$$X_{ij} = N_i \int_{\tilde{\varphi}_{ij}}^{\infty} \sigma \mu_{ij}^{\sigma} (\tau_{ij} w_i)^{1-\sigma} B_j \varphi^{\sigma-1} dG_i(\varphi), \tag{3.9}$$

which, as in Chapter 2, we can decompose into an extensive margin N_{ij}, namely the measure of firms from i that export in j, and an average intensive margin $\bar{x}_{ij}$, corresponding to the average export volume across the active exporters:

$$X_{ij} = N_{ij} \cdot \bar{x}_{ij}. \tag{3.10}$$

Whenever firm-level productivity is drawn from a Pareto distribution, we can integrate equation (3.9) and use (3.8) to express $\bar{x}_{ij}$ as

$$\bar{x}_{ij} = \frac{\kappa}{\kappa - \sigma + 1} \sigma w_i f_{ij}, \tag{3.11}$$

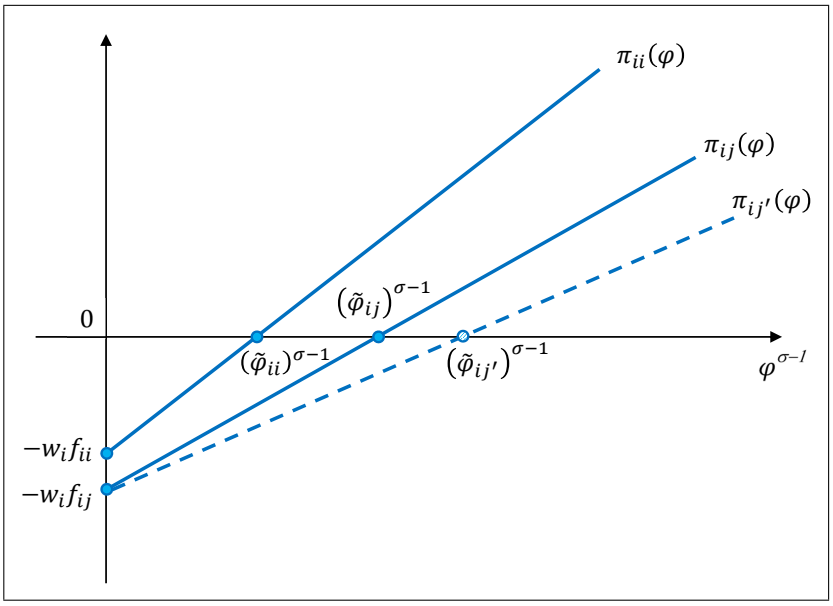

Figure 3.1: Selection into Exporting with Contractual Frictions

just as in Chapter 2. Equation (3.11) then indicates that, in the particular Pareto case, the average intensive margin turns out to be unaffected by the degree of contractual enforcement. It is important to emphasize, however, that this does not imply that the intensive margin of trade *at the firm level* is unaffected by the quality of contracting institutions μ_{ij}. In fact, if a firm were to sell in two markets that differed only in their level μ_{ij}, then the firm would necessarily sell more in the market with better contract enforcement (a higher μ_{ij}), a prediction consistent with the empirical results of Araujo, Mion and Ornelas (2012), who study the effect of the quality of contracting institutions on the cross-section of firm-level export volumes of firms based in Belgium. The insensitivity of $\bar{x}_{ij}$ to μ_{ij} in equation (3.11) is explained by the fact that countries with better contract enforcement attract a disproportionately larger set of relatively small exporters.

We can next follow the steps suggested in Melitz and Redding (2013*a*) to express aggregate sectoral exports from i to j in (3.10) in a slightly more familiar way. In particular, note first that the measure of active exporters in j is given by $N_{ij} = N_i \left(1 - G_i\left(\tilde{\varphi}_{ij}\right)\right)$. Thus plugging (3.11) and the value of the threshold in (3.8) into (3.10), and invoking the Pareto distribution, we

have

$$X_{ij} = N_i \left(\frac{\underline{\varphi}_i}{\tau_{ij} w_i} \right)^{\kappa} \left(\frac{\mu_{ij}^{\sigma} B_j}{w_i f_{ij}} \right)^{\kappa/(\sigma-1)} \frac{\kappa}{\kappa - \sigma + 1} \sigma w_i f_{ij}. \tag{3.12}$$

Next, aggregating over all markets in which firms from i sell (including their domestic market), we can express the aggregate sale revenue obtained by firms in country i as

$$Y_i = \sum_j X_{ij} = N_i \left(\frac{\underline{\varphi}_i}{w_i} \right)^{\kappa} \left(\frac{1}{w_i} \right)^{\kappa/(\sigma-1)} \frac{\kappa}{\kappa - \sigma + 1} \sigma w_i \Theta_i \tag{3.13}$$

where

$$\Theta_i \equiv \sum_j B_j^{\frac{\kappa}{\sigma-1}} \tau_{ij}^{-\kappa} f_{ij}^{-\frac{\kappa-(\sigma-1)}{(\sigma-1)}} \mu_{ij}^{\sigma\kappa/(\sigma-1)} \tag{3.14}$$

is a measure of country i's market potential (see Redding and Venables, 2004). Plugging equation (3.13) back into (3.12) finally delivers

$$X_{ij} = \frac{Y_i}{\Theta_i} B_j^{\frac{\kappa}{\sigma-1}} \tau_{ij}^{-\kappa} f_{ij}^{-\frac{\kappa-(\sigma-1)}{(\sigma-1)}} \mu_{ij}^{\sigma\kappa/(\sigma-1)}. \tag{3.15}$$

This expression is analogous to equation (2.14) in Chapter 2 except for the last term involving the parameter μ_{ij} (remember that B_j is given by eq. (3.2)).

Equation (3.15) demonstrates that even after introducing contractual frictions, the model continues to deliver a modified sectoral version of the gravity equation for trade flows. This feature can again serve to motivate the widespread use of empirical log-linear specifications of trade flows with exporter and importer fixed effects and measures of bilateral trade frictions. The main new lesson one derives from (3.15) is that such log-linear specifications should include a bilateral measure of the level of contractual security in transactions between producers in country i and country j. We will shortly refer back to equation (3.15) when we review the empirical literature on the effects of institutional quality on trade flows. But before doing so, it is worth addressing one more theoretical matter.

It may appear that the effect of contractual insecurity in the current model is isomorphic to the effect of standard variable trade costs τ_{ij} in the benchmark model without contractual frictions. In particular, if one were to define a broad, contract-inclusive measure of trade frictions as

$$\tilde{\tau}_{ij} \equiv \frac{\tau_{ij}}{\mu_{ij}^{\sigma/(\sigma-1)}} > \tau_{ij},$$

it is straightforward to verify that all the equations above exactly correspond to those derived in the benchmark model in Chapter 2 with $\tilde{\tau}_{ij}$ replacing τ_{ij}. One is thus tempted to conclude that, apart from serving to motivate the inclusion of contracting institutions in standard empirical models of export participation, the explicit modeling of contractual frictions has little bearing on the workings of the benchmark model. Such a conclusion is however not warranted because, as mentioned above, contractual frictions not only reduce the profitability of exporting for producers in country i but also transfer exporting surplus to importers from country j. In other words, contractual insecurity not only reduces the overall gains from international trade, but also shapes how those gains are distributed across countries.

This distinction has important bearings for the relationship between contract enforcement and welfare. For instance, in the special case in which there is only one sector in the economy, Demidova and Rodríguez-Clare (2013) have shown that unilateral reductions in variable trade frictions by a small open economy are always welfare enhancing, while the same would not always be true for an increase in μ_{ij} in the framework developed in this chapter. The reason for this is that, although country j would become a more attractive location for foreign exporters if it instituted a higher μ_{ij}, the share of sale proceeds accruing to producers in j would also diminish in that event. For a high enough value of μ_{ij}, the balance of these two effects can be shown to be necessarily negative. This result is analogous to that in Demidova and Rodríguez-Clare (2009) and Felbermayr, Jung and Larch (2013), who show that in a one-sector Melitz (2003) model, each country's unilaterally optimal import tariff is positive. An implication of this result is that countries have a *unilateral* incentive to create some amount of contractual insecurity for producers attempting to sell in their markets. Naturally, however, and as in the case of tariff wars, the unilateral optimality of contractual insecurity is associated with a globally inefficiently low level of contract enforcement.

Preliminary Empirical Evidence

The gravity equation has been one of the most widely-used empirical models of international trade since being introduced by Tinbergen (1962). It is thus not surprising that it has been employed to study the effect of contracting institutions on bilateral international trade flows. The work of Anderson and Marcouiller (2002) is a pioneering study in this literature. Anderson and Marcouiller (2002) start by imposing a model of bilateral trade flows very

similar to that in equation (3.15), although not derived from a theoretical model, as we have done above.[5] Following their approach, we next note that if one takes a country, say the United States, as a reference country, one can use equation (3.15), together with the definition of B_j in (3.2), to derive:

$$\frac{X_{ij}}{X_{iUS}} = \left(\frac{P_j^{\sigma-1}E_j}{P_{US}^{\sigma-1}E_{US}}\right)^{\frac{\kappa}{\sigma-1}} \left(\frac{\tau_{ij}}{\tau_{iUS}}\right)^{-\kappa} \left(\frac{f_{ij}}{f_{iUS}}\right)^{-\frac{\kappa-(\sigma-1)}{(\sigma-1)}} \left(\frac{\mu_{ij}}{\mu_{iUS}}\right)^{\sigma\kappa/(\sigma-1)}. \tag{3.16}$$

Equation (3.16) shows that the ratio of exports of country i to market j relative to the exports of this same country i to the United States is a function of the relative demand or absorption in the two importing countries, as well as different terms capturing the ratio of trade barriers associated with shipping goods from i to j relative to shipping them from i to the United States. The main advantage of this approach is that the ratio X_{ij}/X_{iUS} nets out the effect of the exporter country's term Y_i/Θ_i in (3.15) that is common for all destinations j.

Anderson and Marcouiller (2002) estimate a log-linear version of equation (3.16) in which relative bilateral traditional trade barriers (variable and fixed) are proxied by a common border ratio, a common language ratio, a distance ratio and a tariff ratio. The key contract enforcement ratio is proxied by a "composite security" index that corresponds to the average score obtained by each importing country in survey-based measures of transparency and contract enforcement relative to the average score obtained by the United States in those same measures. Note in particular, that Anderson and Marcouiller (2002) assume that the contractual security experienced by exporters in country j relative to that experienced by exporters to the U.S., is common for all exporters, regardless of their country of origin i. This seems to be a restrictive assumption given that one would imagine that differences in legal proximity could make this ratio vary with i, as allowed by (3.15), and so we will revisit this assumption shortly in this chapter. A last important hurdle in estimating equation (3.16) is finding suitable proxies for the first term involving the aggregate spending ratio E_j/E_{US} and the price index ratio P_j/P_{US}. The former ratio is proxied with relative measures of GDP, while the latter is approximated with weighted sums of the physical trade cost ra-

[5] Anderson and Marcouiller (2005) do study the theoretical links between contractual insecurity and trade flows, but their framework does not predict a gravity equation in trade flows.

tios, in analogy with the "remoteness" variable often present in gravity-style estimations. This is perhaps the least satisfactory element of their empirical design because mismeasurement of these importer-specific terms could lead to important biases in the estimates of the effects of the quality of the importer's contracting institutions on trade flows. We will return to this issue below.

Table 3.1. Importer Contracting Institutions and Relative Exports

	(1)	(2)	(3)
Log GDP ratio	0.855**	0.866**	0.911**
	(0.042)	(0.038)	(0.040)
Relative composite security		0.285**	0.279**
		(0.073)	(0.081)
Log common border ratio	0.794**	0.747**	0.665**
	(0.155)	(0.163)	(0.186)
Log common language ratio	0.327**	0.336**	0.358**
	(0.080)	(0.082)	(0.109)
Log distance ratio	-1.109**	-1.095**	-1.133**
	(0.058)	(0.056)	(0.056)
Log adjusted tariff ratio	-2.973	-4.814*	-4.699*
	(1.992)	(2.343)	(2.327)
Number observations	2135	2135	2159
R^2	.69	.70	
Log likelihood			-3865

Table reproduced from Table 5 in Anderson and Marcouiller (2002).
Robust standard errors with clustering by importer in parentheses.
The regressions also include a log of GDP per capita ratio and remoteness variables for language, border and distance.
$^{+}$, *, ** denote 10, 5, 1 % significance.

With these caveats in mind, the key results of Anderson and Marcouiller (2002), which use 1996 data for 48 importing countries, are reproduced in Table 3.1. Column (1) presents the results of a benchmark gravity equation without institutional variables. As expected, higher relative GDP levels and lower relative traditional trade barriers of any sort are all associated with higher relative export volumes into these countries. When introducing the relative "composite security" index in column (2), this variable has a large

and statistically significant effect on relative bilateral trade flows. In column (3), Anderson and Marcouiller confirm the robustness of their results to the use of a Tobit to deal with the large number of zeros in their sample. Although it is not obvious from the nonstandardized point estimates in Table 3.1, the estimates of Anderson and Marcouiller (2002) imply that the effect of weak contracting institutions on trade flows is of a similar order of magnitude as the effect of import tariffs.

As hinted above, two obvious limitations of the Anderson and Marcouiller (2002) study is the insensitivity of their contractual insecurity measure to characteristics of the exporting country and the econometric treatment of the demand terms B_j. These limitations are in fact related to each other. The standard way to address the second concern is to control for these importer-country absorption terms with importer-specific fixed effects. This approach is, however, not feasible when the key explanatory variable of interest varies only across importing countries and thus would be subsumed in the importer fixed effect. This problem clearly applies to Anderson and Marcouiller's (2002) proxy for contractual insecurity. Notice, conversely, that this is not an issue for standard measures of trade barriers, which are defined at the exporter-importer level. A potential way to address both of these limitations is thus to construct a measure of contractual security that is a function of both the exporter and importer country.

What factors might result in particularly high contractual enforcement in transactions between two specific countries i and j? A natural candidate might be a simple measure of whether the exporter and importer country share a common legal origin or not, because that legal relatedness might facilitate the resolution of contractual disputes. A few papers in the literature have explored the role of a common legal origin in affecting bilateral trade flows across countries. Below I focus on the particular contribution of Helpman, Melitz and Rubinstein (2008) because their estimation equation is derived from the Melitz (2003) model in a similar manner as we derived equation (3.15) above, and because their estimation technique allows one to disentangle the effects of particular explanatory variables on both the intensive and extensive margins of trade.

From a theoretical perspective, the only new feature in the framework developed by Helpman, Melitz and Rubinstein (2008) is the introduction of an upper bound in the distribution from which firms draw their productivity

level. In specific Pareto case, we now have that

$$G_i(\varphi) = \frac{1 - \left(\underline{\varphi}_i/\varphi\right)^{\kappa}}{1 - \left(\underline{\varphi}_i/\bar{\varphi}_i\right)^{\kappa}}, \quad \text{for } \bar{\varphi}_i \geq \varphi \geq \underline{\varphi}_i > 0. \tag{3.17}$$

The immediate implication of this assumption for our contracting model is that if for some exporting country i, no exporting firm draws a productivity level higher than the threshold $\tilde{\varphi}_{ij}$ defined in (3.8), then bilateral exports from i to j will be zero. This is also easy to see when writing these aggregate bilateral exports as in (3.9), but with the upper limit on the probability distribution:

$$X_{ij} = N_i \int_{\tilde{\varphi}_{ij}}^{\bar{\varphi}_i} \sigma \mu_{ij}^{\sigma} (\tau_{ij} w_i)^{1-\sigma} B_j \varphi^{\sigma-1} dG_i(\varphi).$$

Defining aggregate (sectoral) output in i as $Y_i = \sum_j X_{ij}$ and also

$$V_{ij}\left(\tilde{\varphi}_{ij}\right) \equiv \int_{\tilde{\varphi}_{ij}}^{\bar{\varphi}_i} \varphi^{\sigma-1} dG_i(\varphi),$$

bilateral exports from i to j can be expressed as

$$X_{ij} = \frac{Y_i}{\tilde{\Theta}_i} B_j \tau_{ij}^{1-\sigma} \mu_{ij}^{\sigma} V_{ij}\left(\tilde{\varphi}_{ij}\right) \tag{3.18}$$

where

$$\tilde{\Theta}_i = \sum_j \mu_{ij}^{\sigma} (\tau_{ij})^{1-\sigma} B_j V_{ij}\left(\tilde{\varphi}_{ij}\right).$$

Equation (3.18) is again a modified version of the gravity equation and it is easily verified that when $\bar{\varphi}_i \to \infty$, (3.18) coincides with (3.15) after plugging the value of $\tilde{\varphi}_{ij}$ in (3.8) into $V_{ij}\left(\tilde{\varphi}_{ij}\right)$.

Equation (3.18) nicely illustrates the existence of an omitted-variable bias in standard gravity-style estimation methods. Even when one partials out the terms $Y_i/\tilde{\Theta}_i$ and B_j with exporter and importer fixed effects, respectively, standard techniques do not take into account the term $V_{ij}\left(\tilde{\varphi}_{ij}\right)$ capturing the extensive margin of trade from i to j.[6] This omission is likely associated with

[6]The relevance of these biases is clear from the fact that the *direct* elasticity of trade flows to the index of contractual security is lower in equation (3.18) than in equation (3.15).

an upward bias in the elasticity of trade flows to institutional quality because as indicated by the threshold equation (3.8), μ_{ij} has a negative effect on the threshold $\tilde{\varphi}_{ij}$, thus reducing $V_{ij}\left(\tilde{\varphi}_{ij}\right)$.

Helpman et al. (2008) develop a two-step estimation procedure to deal with these biases. In a first stage, a Probit selection equation is derived from the model, and the estimates of this equation are used to structurally construct a control variable for the second stage, which is a log-linear model with exporter and importer fixed effects, and various measures of bilateral trade barriers.[7] For the procedure to work, one needs an explanatory variable that enters the first stage (the extensive margin of trade), but not the second stage. Helpman et al. (2008) argue that the cost of creating a business in a particular country satisfies this condition (they also suggest a common religion variable that allows estimation on a larger sample of countries in their sensitivity analysis).

For our purposes, the most relevant feature of Helpman et al.'s (2008) results is that their first and second stages include a variable which is equal to 1 whenever the exporter and importer share a common legal origin as defined by LaPorta, Lopez-de Silanes, Shleifer and Vishny (1999). These authors classify the legal origin of a large cross-section of countries as being either German, Scandinavian, British, French, or Socialist. As argued above, it seems natural that, other things being equal, producers located in countries sharing a common legal origin will perceive a higher degree of contractual security when transacting with each other than with producers located in countries with different legal origins. Despite the obvious coarseness of this variable, I will interpret the effect of this variable as reflecting the effect of the contracting institutions term μ_{ij} in specification (3.18).

Table 3.2 reproduces some of the main results in the Helpman et al. (2008) study. The trade data is for 1986 and covers 158 countries. The first column in the table reports the result of the first stage, in which a Probit model is used to predict the probability of positive trade flows from i to j. Not surprisingly, a lower distance and sharing a common language are both positively correlated with the probability that two countries trade with each other.[8] Interestingly, the same is true for the common legal origin variable,

[7] The first stage estimates are also used to include a more standard Heckman-correction term for selection in the second stage.

[8] The original regressions in Helpman et al. (2008) include six additional controls: whether both countries are islands, whether they are both landlocked, whether they have colonial ties, whether they are members of the same currency union, whether they belong

and the standardized coefficients indicate that the effect of legal institutions is almost half as large as that of a common language. Perhaps surprisingly, zero trade flows appear to be more prevalent for countries that share a land border, perhaps reflecting the incidence of wars. Regulation costs, in turn, appear to have a negative effect on the extensive margin of trade.

Table 3.2: Legal Origin and Bilateral Trade Flows

	(1) Probit	(2) Benchmark	(3) NLS
Distance	-0.213**	-1.167**	-0.813**
	(0.016)	(0.040)	(0.049)
Share a land border	-0.087	0.627**	0.871**
	(0.072)	(0.165)	(0.170)
Share a common legal origin	0.049**	0.535**	0.431**
	(0.019)	(0.064)	(0.065)
Share a common language	0.101**	0.147+	-0.030
	(0.021)	(0.075)	(0.087)
Regulation costs ($ amount)	-0.108**	-0.146	
	(0.036)	(0.100)	
Regulation costs (days & procedures)	-0.061*	-0.216+	
	(0.031)	(0.124)	
Firm heterogeneity correction term			0.840**
			(0.043)
Sample selection correction			0.240*
			(0.099)
Observations	12,198	6,602	6,602
R^2	0.573	0.693	

Table reproduced from Table II in Helpman et al. (2008).
Robust standard errors clustered by country pair (Bootstrapped for NLS).
Regressions also include exporter and importer fixed effects as well as six other controls (island, landlocked, colonial ties, currency union, FTA, religion).
Marginal effects at sample means and pseudo R^2 reported for Probit.
+, *, ** denote 10, 5, 1 % significance.

to the same FTA, and a measure of religious proximity. I do not report these coefficients to save space.

Column (2) of Table 3.2 presents the results of a benchmark gravity estimation of the intensive margin of trade that does not correct for the biases identified above. With the exception of the common border variable (which now impacts positively trade flows), the remaining coefficients have the same sign as in the Probit regressions. The effect of a common legal origin on trade flows is positive, large and highly statistically significant. One might worry, however, that the omitted-variable bias discussed above would lead us to overestimate the effects of contractual security on the intensive margin of trade. The results in column (3), which present the second stage in the Helpman et al. (2008) procedure, confirm that such biases exist but the coefficient on legal origins is reduced by only about 20% and remains large and highly significant. We can conclude from these results that, consistently with the simple model we have developed above, contractual insecurity has a significant negative effect on bilateral trade flows and that such effect operates through both an extensive margin as well as an intensive margin.

Responses to Contractual Insecurity

Our theoretical and empirical results so far illustrate that exporters will respond to the perceived contractual insecurity associated with servicing certain foreign markets by reducing their sales or by simply opting out from selling in those markets. As explained in Chapter 1, in practice firms can resort to alternative means to alleviate such contractual insecurity. We will next discuss three of these mechanisms: investing in contract enforcement, repeated interactions with importers, and demanding prepayment from importers.

Consider first the possibility of firms investing in enhancing the contractibility of their transactions. This might involve hiring legal counsel to design the initial contract in a way that makes it more likely to be enforced, or it might be associated with resorting to international arbitration, which would typically also provide the exporter with more contractual security. Without delving into the details of these different legal mechanisms, let us suppose that if a firm from i were to invest a fixed amount $w_i f_c$ of resources in improving contractibility, the share of revenues that an importer from j would be able to divert would be reduced from $1-\mu_{ij}$ to $1-\bar{\mu}_{ij}$ with $\bar{\mu}_{ij} > \mu_{ij}$. The assumption that legal expenses are independent of the volume of sales is a strong one, but the results below will continue to go through as long as there is a fixed cost component to these costs, which seems a plausible

assumption to make in this setting.

Following analogous derivations as those in the previous model, it is then straightforward to verify that firms from i will optimally choose to invest in contractibility whenever

$$\bar{\mu}_{ij}^{\sigma} \left(\tau_{ij} w_i\right)^{1-\sigma} B_j \varphi^{\sigma-1} - w_i f_c > \mu_{ij}^{\sigma} \left(\tau_{ij} w_i\right)^{1-\sigma} B_j \varphi^{\sigma-1},$$

which can alternatively be expressed as

$$\varphi^{\sigma-1} > \left(\varphi_{ij^c}\right)^{\sigma-1} \equiv \frac{w_i f_c}{\left(\bar{\mu}_{ij}^{\sigma} - \mu_{ij}^{\sigma}\right) \left(\tau_{ij} w_i\right)^{1-\sigma} B_j}.$$

In words, only the largest, most productive exporters will find it optimal to incur additional legal expenses to reduce their contractual insecurity. This might explain, for instance, why arbitration cases at the International Chamber of Commerce rarely involve disputes over amounts lower than under one million U.S. dollars (see footnote 13 in Chapter 1). The selection of exporters into enhanced contractibility is depicted in Figure 3.2. The figure also shows that the endogenously higher contractibility of large exporters will tend to lead to a more skewed distribution of exports than in the version of the model in which the parameter μ_{ij} is common for all firms within an industry.

In the previous setup in which the exporter and the importer transact only once, it is optimal for importers to divert revenue from the exporter if the contract is not perceived to be enforced. I next briefly explore how the incentives of importers to misbehave might be affected by repeated interactions with a given exporter, and how this affects the dynamics of exporting volumes. In doing so, I build on the work of Araujo, Mion and Ornelas (2012) and Antràs and Foley (2013). To emphasize the differences with the static model, let us assume that the exporter and importer perceive their business relationship to be infinitely repeated. Assume also that importers come in two types: some of them are very patient and discount the future at a very low rate, while the rest are myopic and care only about current payoffs. At the beginning of each period t, the exporter and importer sign an agreement that binds the exporter to ship an amount $q_{ijt}(\varphi)$ of output to the importer in j in exchange for a payment from the importer once the goods have been sold.

With probability $1 - \rho_{ij}$, however, the importer is presented with an opportunity to divert all sale revenue and pay nothing to the exporter at the end of the period. We thus adopt here the probabilistic version of contract

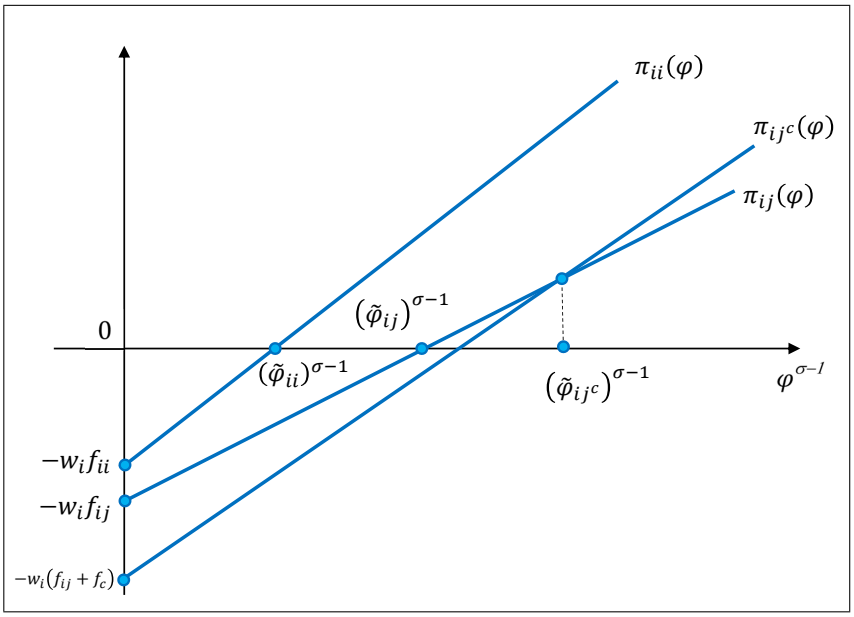

Figure 3.2: Selection into Exporting with Endogenous Contractibility

enforcement discussed earlier in the chapter and that led to expression (3.6) for μ_{ij}, but for simplicity I set $d_{ij}\lambda_{ij} = 0$, so that the exporter is left with a zero payoff in case of default. Provided that the discount rate of patient importers is sufficiently low, the folk theorem implies that a trigger-strategy equilibrium exists in which patient importers never choose to default, while myopic importers always do so when an opportunity arises.[9]

To generate nontrivial dynamics, we assume that whether an agent is patient or myopic is private information to that agent. The exporter forms beliefs on the type of the particular importer they are dealing with based on the bilateral transaction history with that importer and on a public signal reflecting the prevalence of patient importers in the population. I will denote this public signal by ξ_0 and I will treat it as an exogenous parameter, although in Araujo, Mion and Ornelas (2012) it is endogenized by specifying a process of matching between exporters and importers.

Notice that a new importer will initially be assigned a probability ξ_0 of being patient, which is associated with a probability $\xi_0 + (1-\xi_0)\,\rho_{ij}$ of the

[9] Of course, this requires that the importer obtains some positive payoff when it chooses to honor the contract. Still, for a discount factor close enough to 1, this required payoff can be made arbitrarily close to 0. This limiting case is considered here for simplicity.

contract being enforced in this initial period. With a history of no defaults, the exporter's belief on the importer's type will improve over time, while an incidence of a default will immediately reveal the importer to be a myopic type. Denoting by ξ_t the particular posterior probability assigned to the importer being patient, repeated application of Bayes' rule delivers

$$\xi_t = \frac{\xi_0}{\xi_0 + (1 - \xi_0)\left(\rho_{ij}\right)^t} \tag{3.19}$$

when there have been no defaults up to length t, and $\xi_t = 0$ otherwise. As a result, the perceived probability of the contract signed at t being enforced is given by $\xi_t + (1 - \xi_t)\,\rho_{ij}$, and naturally rises with a history of no defaults. Having determined this time-varying level of contractual insecurity, the rest of the equilibrium is analogous to that of the static model with the share of revenue accruing to exporters given by

$$\mu_{ij}(t) = \xi_t + (1 - \xi_t)\,\rho_{ij}.$$

Hence, all firm-level equilibrium expressions continue to hold with $\mu_{ij}(t)$ replacing μ_{ij} throughout.

This extension of the model delivers several empirical predictions for the effects of weak contracting institutions on firm-level exports. As in the static model developed above, the extensive margin of trade continues to be negatively impacted by low institutional quality (low ρ_{ij}). This is both because firms are less inclined to begin selling in weak institutions countries, but also because the probability of an export relationship being discontinued is higher the lower is the probability of contracts being enforced. The effects of low formal contract enforcement on the intensive margin of trade are richer. The perceived initial probability of default is given by $(1 - \xi_0)\left(1 - \rho_{ij}\right)$ and thus export relationships in weak contracting environments (countries with low ρ_{ij}) will tend to begin at low volumes. Nevertheless, the negative effect of weak contracting on the intensive margin of trade is predicted to be attenuated over time, resulting in firm-level export volumes that should rise over time.

Araujo, Mion and Ornelas (2012) study the effects of importer-country characteristics on the cross-section of firm-level exports of Belgian firms over the period 1995-2008 and find broad support for these predictions. Other things being equal, export entry is higher and export exit is lower in countries with better contracting institutions. Initial firm-level export volumes

are increasing in contract enforcement, while firm-level export growth is on average positive. Interestingly, however, this positive growth in exports appears to be faster in countries with weak contracting institutions. The simple model developed above provides a simple rationale for this fact: in countries with high default rates contractual insecurity will be lower, but the exporter will be able to learn the type of the importer at a faster rate than in an environment in which a very low default rate prevents myopic importers from defaulting. Formally, differentiation of (3.19) indicates that for a low enough t, the growth in ξ_t over time t is necessarily decreasing in ρ_{ij}.[10]

Choice of Payment Method: Exporter Institutions Matter

So far, we have discussed the role of investments in contractibility and repeated interactions in reducing the extent of contractual insecurity faced by exporters. If the *only* contractual friction in international transactions was the risk of importer default, then a simple solution to this problem would be for the exporter to demand pre-payment from the importer before shipping the goods. Formally, a simple modification of the static contract we have considered so far would suffice to resolve the inefficiencies associated with contractual insecurity: instead of the payment s_{ij} occurring at t_1, the exporter could insist that it was made at t_0. With this simple modification, the exporter would not need to worry about the payment s_{ij} satisfying an incentive compatibility constraint for the importer, and could thus choose s_{ij} to satisfy exactly the importer's participation constraint. The problem would thus reduce to that in (3.5), which we have shown above delivers payoffs identical to those in the Melitz (2003) model without contractual frictions.

Although 'cash-in-advance' transactions are not infrequent in international trade (see Antràs and Foley, 2013, for evidence from a U.S.-based exporter), the available evidence suggests that the majority of international transactions are conducted on open account (or post-shipment payment) terms.[11] These type of transactions roughly correspond to the timing of payments we have assumed so far. A natural question is then: why are cash-

[10] Araujo, Mion and Ornelas (2012) endogenize the prior ξ_0, and show that the differentially lower growth of exports in high contract enforcement countries actually holds true for all values of t in that case.

[11] For instance, using the World Bank Enterprise Survey database, Hoefele, Schmidt-Eisenlohr and Yu (2013) find that the average share of sales on open account terms for the firms in the sample is in excess of 80%.

in-advance terms not used more often if they effectively eliminate the risk of importer default?

The key for answering this question is that not only exporters but also importers are exposed to the risk of counterparty misbehavior in international transactions. In particular, a standard concern for importers in cash-in-advance transactions is that, after being paid, the exporter might no longer have the incentive to ship goods in the most advantageous manner for importers, thus intentionally or unintentionally reducing the amount of sale revenues that the importer would obtain when selling the goods in their local market. I next briefly develop a simple model of exporter misbehavior along the lines of the model of limited commitment by importers developed above.[12] The model will serve to illustrate the role of exporter-country institutions in shaping the different margins of international trade.

Suppose that the exporter and importer sign the following simple cash-in-advance contract. At t_0, the exporting firm F agrees to ship an amount of goods equal to q_{ij} in exchange for an amount s_{ij} to be paid upon signing the contract at t_0. After receiving the goods, the importer sells them in her local market and she keeps the collected sale revenue. As argued above, without any type of frictions, the exporter could set an initial payment $s_{ij}(\varphi)$ equal to the sale revenue collected by the importer at time t_1, i.e., $p_{ij}(q_{ij}(\varphi))\, q_{ij}(\varphi)$, thus attaining the frictionless profit flow in (3.4).

Imagine, however, that shortly after signing the contract at t_0, the exporter is presented with an opportunity to deviate from the initial contract in a way that would reduce its costs of production but would also reduce the expected revenues collected by the importer at t_1. Such a deviation might entail shirking in quality-enhancing investments or in the use of shipping methods that best ensure the quality of goods when they reach the importer's market. For the time being, consider the case in which exporter misbehavior takes the extreme form of the exporter incurring no variable production costs and the importer not receiving goods or receiving totally worthless goods. Below, I will consider much less extreme cases. Faced with this opportunity to misbehave, the exporter will consider the legal implications of such a deviation before cheating on the importer. Suppose that when deviating, the importer could sue the exporter in a latter's court of law and win the case with prob-

[12] Financial constraints faced by the importer might be another factor limiting the use of cash-in-advance contracts. Although not the focus of her study, Manova (2012) has found indeed that bilateral trade flows are depressed by low quality of financial institutions in importing countries.

ability λ_{ij}^{exp}, in which case the exporter would be asked to pay the importer an amount in damages equal to a multiple d_{ij}^{exp} of the payment stipulated in the initial contract, i.e., s_{ij}. When $\lambda_{ij}^{exp} d_{ij}^{exp} > 1$, the exporter would never be tempted to cheat on the importer, so we will focus below on the more interesting case in which $\lambda_{ij}^{exp} d_{ij}^{exp} < 1$. In the latter case, in order for the exporter not be tempted to misbehave, the payment stipulated in the initial contract needs to satisfy the following incentive compatibility (IC) constraint

$$s_{ij}(\varphi) - \frac{\tau_{ij}}{\varphi} w_i q_{ij}(\varphi) \geq \left(1 - \lambda_{ij}^{exp} d_{ij}^{exp}\right) s_{ij}(\varphi). \tag{3.20}$$

Note that it is in the exporter's own interest to ensure that the initial contract satisfies this IC constraint because otherwise the importer would anticipate misbehavior with probability one, and he or she would not be willing to pay *any* amount of money to the exporter in the initial period, thus leaving both agents with a zero payoff.

Using equation (3.4) and the fact that revenues are a multiple σ of operating profits, it is straightforward to verify that provided that $\lambda_{ij}^{exp} d_{ij}^{exp} \geq (\sigma - 1)/\sigma$, the constraint in (3.20) will be slack when evaluated at the unconstrained profit-maximizing output level $q_{ij}(\varphi)$, and thus the exporter will still be able to achieve the unconstrained profit flow in (3.4). Conversely, when courts punish deviating agents with a low enough probability or when damages are low enough or unenforceable, so that $\lambda_{ij}^{exp} d_{ij}^{exp} < (\sigma - 1)/\sigma$, the exporter will no longer be able to achieve the unconstrained profit flow in (3.4). Instead, the quantity of output being shipped will need to adjust to ensure that equation (3.20) holds, and the exporter will find it optimal to make that constraint exactly bind. Furthermore, one can show that the exporter will never find it optimal to demand an ex-ante payment lower than the total sale revenues collected by the importer at t_1, so $s_{ij}(\varphi) = p_j(q_{ij}(\varphi)) q_{ij}(\varphi)$, and from equations (3.20) we can infer that

$$p_j(q_{ij}(\varphi)) = \frac{\tau_{ij} w_i}{\lambda_{ij}^{exp} d_{ij}^{exp} \varphi}. \tag{3.21}$$

Using (3.21) together with $q_{ij}(\varphi) = \beta E_j P_j^{\sigma-1} p_j^{-\sigma}$ and the definition of B_j in (3.2), we can then express the profits of the exporter as

$$\pi_{ij}(\varphi) = \mu_{ij}^{exp} (\tau_{ij} w_i)^{1-\sigma} B_j \varphi^{\sigma-1} - w_i f_{ij}, \tag{3.22}$$

where

$$\mu_{ij}^{exp} = \begin{cases} 1 & \text{if } \lambda_{ij}^{exp} d_{ij}^{exp} \geq \frac{(\sigma-1)}{\sigma} \\ \sigma\left(1-\lambda_{ij}^{exp} d_{ij}^{exp}\right)\left(\frac{\sigma\lambda_{ij}^{exp} d_{ij}^{exp}}{\sigma-1}\right)^{\sigma-1} < 1 & \text{if } \lambda_{ij}^{exp} d_{ij}^{exp} < \frac{(\sigma-1)}{\sigma}. \end{cases} \quad (3.23)$$

Note that μ_{ij}^{exp} is (weakly) increasing in $\lambda_{ij}^{exp} d_{ij}^{exp}$, and that $\mu_{ij}^{exp} = 1$ only when $\lambda_{ij}^{exp} d_{ij}^{exp} \geq (\sigma-1)/\sigma$. Hence, in the range of parameter values in which the exporter is tempted to misbehave, the profits the exporter will end up obtaining will necessarily be lower than in the unconstrained problem.

Equation (3.22) illustrates that limited commitment problems on the part of the exporter end up affecting the profitability of exporting in a similar manner as limited commitment problems on the importer side. In fact, equation (3.21) is identical to (3.7) except for the term μ_{ij}^{exp} in (3.21) instead of μ_{ij}^{σ} in (3.7). The superscript *exp* in the contracting term in (3.21) serves to emphasize that the quality of the *exporter* country's contracting institutions is now key in shaping the profitability of exporting, the intensive and extensive margins of trade, and bilateral trade flows across countries. Of course, one could argue, as we did in the importer limited commitment case, that agents could resort to choice-of-law or choice-of-forum contractual clauses to partly isolate the security of a transaction from weak contracting institutions in the exporting country. Nevertheless, and as explained in Chapter 1, even when disputes are adjudicated by foreign courts, the enforceability of damages is ultimately an issue related to the local legal environment in the exporting country, and particularly whether that country has signed the New York convention.

I will next provide an overview of the empirical work linking bilateral trade flows to the quality of the exporter country's contracting institutions, but before doing so I should briefly address two further theoretical points. First, and although it is obvious to see that all equilibrium conditions with exporter limited commitment will be identical to those in (3.7) through (3.15) with μ_{ij}^{exp} replacing μ_{ij}^{σ}, there is one important, subtle difference in the general equilibrium implications of the two models. Because in this second model, importers always end up with a net payoff of zero, the effects of a low μ_{ij}^{exp} are not isomorphic to an import tariff in the importing country, but instead are analogous to those of an iceberg trade cost. An implication of this difference is that, at least in the one-sector version of the model, improvements in the quality of contracting institutions in a small exporting country will always

be beneficial for the importing country (see Demidova and Rodríguez-Clare, 2013). A second point worth making is that our model of exporter misbehavior can easily be extended to the case in which the exporter's temptation to deviate from the contract entails reducing marginal costs by a certain fraction ν_{ij}^{exp} where we now allow $\nu_{ij}^{exp} < 1$. In such a case, the exporter's incentive compatibility constraint becomes

$$\lambda_{ij}^{exp} d_{ij}^{exp} s_{ij}(\varphi) \geq \nu_{ij}^{exp} \frac{\tau_{ij}}{\varphi} w_i q_{ij}(\varphi),$$

and the same expressions (3.21) through (3.23) apply, but with $\lambda_{ij}^{exp} d_{ij}^{exp} / \nu_{ij}^{exp}$ replacing $\lambda_{ij}^{exp} d_{ij}^{exp}$ throughout. Clearly, exporter profits will be higher in that case, but as long as $\lambda_{ij}^{exp} d_{ij}^{exp} / \nu_{ij}^{exp} < (\sigma - 1)/\sigma$, contractual frictions continue to reduce the profitability of exporting.

Exporter-Country Institutions: Empirical Evidence

Earlier in the chapter we discussed the empirical work of Anderson and Marcouiller (2002) establishing a link between bilateral trade flows and the quality of the importer's contracting institutions. It is clear that the empirical strategy in that paper is not applicable to the study of the effects of exporter-country institutions since the relative exports specification in (3.16) effectively partials out exporter-specific variables. Berkowitz, Moenius and Pistor (2006) propose instead a more traditional log-linear gravity specification which can be motivated by a simple variant of equation (3.15) with μ_{ij}^{exp} replacing μ_{ij}^{σ}:

$$X_{ij} = \frac{Y_i}{\Theta_i} B_j^{\frac{\kappa}{\sigma-1}} \tau_{ij}^{-\kappa} f_{ij}^{-\frac{\kappa-(\sigma-1)}{(\sigma-1)}} \left(\mu_{ij}^{exp}\right)^{\kappa/(\sigma-1)}. \tag{3.24}$$

In order to control for the unobserved multilateral resistance term Θ_i and the price index implicit in B_j, Berkowitz, Moenius and Pistor (2006) introduce exporter and importer fixed effects. The author's measure of the quality of contracting institutions is an average of a country's index of rule of law, expropriation risk, corruption in government, and bureaucratic quality as computed by International Country Risk Guide. This variable is computed for the exporter and the importer in each pair of trading partners and both variables are introduced in the regression, thus allowing for both importer and exporter country institutions to affect bilateral trade flows. In order for the country fixed effects not to absorb these institutional variables, Berkowitz,

Moenius and Pistor (2006) use data from 1982 to 1992 and exploit time-series variation in both bilateral trade flows and the perceived quality of contracting institutions. Their specifications also include time fixed effects and controls for GDP, GDP per capita, and various measures of proximity between the exporter and the importer, including a measure of the remoteness related to whether a pair of countries are close to each other but distant from the rest of the world.

Table 3.3: Exporter and Importer Contracting Institutions and Bilateral Exports

	(1)	(2)	(3)	(4)
Type of Goods Included	Overall	Overall	Complex	Simple
GDP importer	0.81**	-0.15	0.08	-1.06*
	(0.02)	(0.29)	(0.30)	(0.42)
GDP exporter	0.76**	-0.19	0.32	-1.38**
	(0.02)	(0.29)	(0.30)	(0.42)
Distance	-1.16**	-1.03**	-0.98**	-1.26**
	(0.04)	(0.04)	(0.04)	(0.06)
Adjacent	0.35*	0.40**	0.44**	0.27
	(0.14)	(0.15)	(0.17)	(0.18)
Links	0.42**	0.45**	0.54**	0.18
	(0.10)	(0.10)	(0.11)	(0.15)
Language similarities	0.09	1.00**	1.28**	0.11
	(0.18)	(0.17)	(0.19)	(0.28)
Remoteness	0.58**	1.79*	0.74	6.69**
	(0.10)	(0.78)	(0.77)	(1.22)
Quality of importer legal institutions	0.61**	0.05	-0.44**	0.66**
	(0.11)	(0.10)	(0.10)	(0.15)
Quality of exporter legal institutions	0.91**	0.36**	0.93**	-0.53**
	(0.13)	(0.11)	(0.11)	(0.15)
Country dummies	No	Yes	Yes	Yes
Time dummies	No	Yes	Yes	Yes
Number of clusters (country pairs)	2792	2792	2755	2550
R^2	0.70	0.77	0.79	0.38
Number observations	23,564	23,564	22,669	18,948

Table reproduced from Table 2 and 3 in Berkowitz et al. (2006). Robust standard errors (within-group clustering) in parentheses. Regressions also include exporter and importer GDP per capita and a constant. $^{+}$,*,** denote 10, 5, 1 % significance.

The first two columns of Table 3.3 reproduce the results obtained by Berkowitz et al. (2006) when running their specification with and without the country and year fixed effects, respectively. As is clear from column (1), when ignoring these fixed effects, all variables affect bilateral trade flows in the expected way and the institutional quality variables related to both the exporter and the importer are highly statistically significant, with exporter institutions appearing to matter more than importer institutions. When introducing the exporter, importer and year fixed effects in column (2), a first noteworthy fact is that the effect of GDP on bilateral trade flows vanishes. This is not entirely surprising since the fixed effects were supposed to control for terms in the gravity equation involving GDP. More relevant for the current discussion is the fact that the variable capturing the quality of contracting institutions in the exporting country remains both positive and highly statistically significant, while the importer country institutional quality variable remains positive but loses its statistical significance.

I will shortly discuss a set of additional results in the Berkowitz et al. (2006) paper that anticipated the voluminous literature on the institutional determinants of comparative advantage. Before doing so, however, I will draw on the work of Waugh (2010) and briefly outline an alternative way to identify the potential role of contracting institutions in shaping bilateral trade flows across countries. Let us return to the modified gravity equation in (3.24), and note that we can use it to express the ratio of exports from i to j to the domestic absorption of the importing country j as:

$$\frac{X_{ij}}{X_{jj}} = \frac{Y_i/\Theta_i}{Y_j/\Theta_j} \frac{\tau_{ij}^{-\kappa}}{\tau_{jj}^{-\kappa}} \frac{f_{ij}^{-\frac{\kappa-(\sigma-1)}{(\sigma-1)}}}{f_{jj}^{-\frac{\kappa-(\sigma-1)}{(\sigma-1)}}} \frac{\left(\mu_{ij}^{exp}\right)^{\kappa/(\sigma-1)}}{\left(\mu_{jj}^{exp}\right)^{\kappa/(\sigma-1)}}. \tag{3.25}$$

Next suppose that within-country or domestic barriers to trade – technological and contractual – do not vary significantly across countries, so we can set $\tau_{jj} = \tau_d$, $f_{jj} = f_d$, and $\mu_{jj}^{exp} = \mu_d$ for all j. This is a strong assumption, so I will return to it below. Assume also that transportation barriers are symmetric across countries, so $\tau_{ij} = \tau_{ji}$ and $f_{ij} = f_{ji}$ for any two countries i and j. Conversely, and as long as $i \neq j$, let μ_{ij}^{exp} be *only* a function of the quality of the exporter-country institutions, in the spirit of our discussion above. Let us thus simply denote $\mu_{ij}^{exp} = \mu_i$. Taking logs of (3.25) then delivers

$$\ln\left(\frac{X_{ij}}{X_{jj}}\right) = \alpha + \Psi_i - \Psi_j - \kappa \ln \tau_{ij} - \frac{\kappa-(\sigma-1)}{\sigma-1} \ln f_{ij} + \frac{\kappa}{\sigma-1} \ln \mu_i, \tag{3.26}$$

where $\Psi_i = \ln(Y_i/\Theta_i)$. A key feature of equation (3.26) is that when regressing the left-hand-side on exporter and importer fixed effects, and empirical proxies for the bilateral trade costs between i and j (distance, language, and so on), the only reason for a country's fixed effect as an exporter to be different from that as an importer is for μ_i to be less than 1, i.e., for contract enforcement to be imperfect.

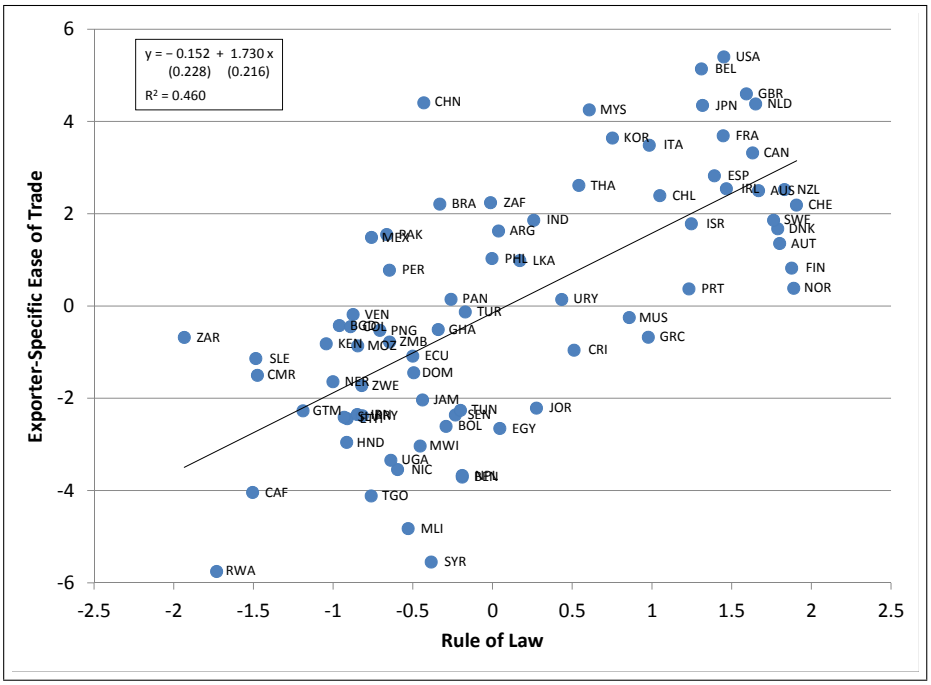

Figure 3.3: Inferred Exporter-Specific Ease of Exporting and the Rule of Law

Waugh (2010) runs the specification in (3.26) with data on bilateral trade flows and domestic absorption for 77 countries in 1996. His findings indicate the existence of very significant asymmetries in a country's fixed effect as an exporter and as an importer, and he shows that these asymmetries are correlated with income per capita. He interprets his results as suggesting that poor countries face much larger trade barriers when exporting than rich countries do. Waugh (2010) associates this asymmetry to an exporter-specific term in iceberg trade barriers (so $\tau_{ij} \neq \tau_{ji}$), while above I have ascribed these asymmetries to differences in export-country contract enforcement across countries. Admittedly, this is quite arbitrary but as Figure 3.3 indicates there exists a very significant positive correlation between the implied measure of

$\frac{\kappa}{\sigma-1} \ln \mu_i$ one backs out from the data and the 'Rule of Law' measure from the Governance Matters III Database, which is a standard proxy for contract enforcement (see Nunn, 2007, for details). Furthermore, the implied effect of contract enforcement on trade flows is remarkably large. For example, if the quality of contracting institutions in Guatemala were to increase to the level of those in Ecuador - which corresponds to an increase of 0.65 standard deviations in the rule of law measure – Guatemalan exports relative to the domestic absorption of an average importing country would increase by 118%.

In order to extract the exporter-specific trade impediment from data on trade flows and domestic absorption we have made strong assumptions. For instance, it seems reasonable that countries with poor institutions will also feature particularly weak contract enforcement in domestic transactions. It is apparent from (3.25), however, that this would tend to restore the symmetry between the fixed effect of a country as an exporter and as an importer, and thus this would presumably work to attenuate the strong positive correlation observed in Figure 3.3, rather than provide an alternative explanation for it.

Hopefully, the reader will view the evidence reviewed so far as suggestive of the relevance of contracting institutions as a determinant of bilateral trade flows across countries. It would be quite a stretch, however, to claim that the results in Table 3.3 or Figure 3.3 come anywhere close to identifying a causal effect of contracting institutions on trade flows. A particularly important concern is that we have ascribed to contractual institutions an effect that might in reality be caused by other country characteristics that happen to be correlated with the quality of this type of institutions.[13]

Berkowitz et al. (2006) acknowledge the potential existence of omitted variable biases in their estimates and suggest an ingenious identification strategy based on the notion that contracting institutions are likely to have a differential effect on different types of goods. More specifically, it seems natural to suppose that the type of contractual difficulties highlighted in this chapter are more likely to apply to complex goods than to simple goods. In fact, it is rather simple to extend the above model of exporter misbehavior to formalize this insight. For that purpose, assume that whether the exporter will be presented with an opportunity to misbehave or not occurs with a probability ρ which is a function of the type of good being traded. In par-

[13]For example, the positive relationship in Figure 3.3 remains positive but loses its statistical significance when controlling for income per capita.

ticular, assume that ρ is higher for complex, less contractible goods than for simple, homogeneous goods. Provided that both producers know whether such misbehavior is possible or not before they sign the initial contract (but not before the fixed exporting cost is incurred), it is straightforward to show that the equilibrium of the model will be identical to that above, but with

$$\tilde{\mu}_{ij}^{exp} \equiv \rho + (1-\rho)\,\mu_{ij}^{exp}$$

replacing μ_{ij}^{exp} throughout. It is then clear that the effect of better contract enforcement on profitability, firm-level exports, bilateral exports, and so on is lower, the higher is ρ, i.e., the more complex goods are.

In order to test this prediction, Berkowitz et al. (2006) employ the Rauch (1999) classification of goods into differentiated and homogeneous and run their specification on each set of goods separately. Their results are reproduced in columns (3) and (4) of Table 3.3. A striking feature of their findings is that high levels of contract enforcement in the exporting country are shown to increase exports of complex goods but at the same time they *reduce* exports of simple goods. Conversely, and somewhat puzzlingly, good contracting institutions in the importing country enhance imports of simple goods, but reduce those of complex goods!

In order to rationalize their findings, Berkowitz et al. (2006) argue that the quality of contracting institutions will not only affect the security with which international transactions are conducted, but will also shape the efficiency with which the traded goods are produced, thus becoming a source of comparative advantage. Viewed from that perspective, their results in columns (3) and (4) are less surprising. They simply might reflect that countries with strong contracting institutions gain comparative advantage in complex (contract-intensive) goods, and as a result they tend to feature disproportionately high levels of exports of these complex goods and disproportionately low levels of imports of simple goods.

Domestic Institutions and Comparative Advantage

The idea that the quality of domestic institutions may constitute a source of comparative advantage has featured prominently in the trade literature in recent years. The vast literature on the topic is reviewed in Nunn and Trefler (2013*a*), so I will only sketch a few key contributions here. The earlier papers in that literature were closest in spirit to the work of Berkowitz et al. (2006).

Nunn (2007), Levchenko (2007), and Costinot (2009) all explored how domestic contracting institutions shape productivity differentially across sectors depending on characteristics of those sectors. They each proposed a measure of contract intensity different from the dichotomous one used by Berkowitz et al. (2006), and each showed that the effect of contracting institutions on trade flows was disproportionately higher in the industries identified to be relatively contract-intensive.

I will next briefly overview Nunn's paper because it has been the most influential one in this literature. In Chapter 5, I will perform empirical tests closely related to those in Levchenko (2007), so I will provide more details on his work at that point. Nunn (2007) proposes as a proxy for contract intensity a measure of the proportion of an industry's intermediate inputs that are relationship-specific. To construct that proportion, he builds on the classification of goods developed by Rauch (1999), which distinguishes between goods sold on organized exchanges, those with reference prices in trade publications, and all residual goods, which are assumed to be differentiated or customized. More specifically, Nunn uses U.S. Input-Output Use tables to construct an industry's use of intermediate inputs provided by other industries, and then infers the extent to which these inputs are customized from Rauch's classification of goods.

Table 3.4. The Ten Least and Ten Most Contract Intensive Industries

10 Least contract intensive: lowest z_i^{rs1}		10 Most contract intensive: highest z_i^{rs1}	
0.024	Poultry processing	0.810	Photogr. & photoc. equip. manuf.
0.024	Flour milling	0.819	Air & gas compressor manuf.
0.036	Petroleum refineries	0.822	Analytic laboratory instr. manuf.
0.036	Wet corn milling	0.824	Other engine equipment manuf.
0.053	Aluminum sheet, plate & foil manuf.	0.826	Oth. electronic component manuf.
0.058	Primary aluminum production	0.831	Packaging machinery manuf.
0.087	Nitrogenous fertilizer manuf.	0.840	Book publishers
0.099	Rice milling	0.851	Breweries
0.111	Prim. nonferrous metal	0.854	Musical instrument manuf.
0.132	Tobacco stemming & redrying	0.872	Aircraft engine & parts manuf.

Note: Table reproduced from Table II in Nunn (2007)

The resulting least and most contract intensive industries according to Nunn's (2007) definition are reproduced in Table 3.4. The ordering of indus-

tries appears sensible. For instance, the two least contract-intensive industries are 'poultry processing' and 'flour milling', which indeed use highly homogeneous inputs (chickens and wheat, respectively), while the most contract-intensive industry is aircraft manufacturing, which requires the use of highly customized inputs.

With this industry measure of contract intensity at hand, Nunn (2007) then uses international trade data for 146 countries and 222 industries in 1997 to explore whether countries with better contract enforcement appear to feature disproportionately large levels of exports in contract intensive sectors. As a proxy for the level of contract enforcement in a particular country, Nunn (2007) uses the 'Rule of Law' variable from the Governance Matters III Database, which consists of a weighted average of 17 measures of judicial quality and contract enforcement. Nunn's specifications are of the form

$$\ln(X_{si}) = \alpha_s + \alpha_i + \beta_1 z_s \mu_i + \beta_2 h_s H_i + \beta_3 k_s K_i + \gamma c_s C_i + \varepsilon_{si},$$

where X_{si} denotes total exports in industry s from country i to all other countries in the world, z_s is contract intensity in industry s, μ_i is a measure of the quality of contract enforcement in (the exporting) country i, H_i and K_i denote country i's endowments of skilled labor and capital, and h_s and k_s are the skill and capital intensities of production in industry s. The term $c_s C_i$ represents a vector of control interactions of industry and country characteristics, while α_s and α_i denote industry fixed effects and country fixed effects, respectively.

Table 3.5 reproduces the benchmark results in Nunn (2007). The first two columns demonstrate that the interaction of contract intensity and judicial quality has a positive and statistically significant effect on exports, which is suggestive of the importance of contracting variables for the structure of international trade flows. Column (2) features a lower number of observations than column (1) because the sample is restricted to those countries and industries for which suitable proxies for factor abundance and intensities are available. The addition of these Heckscher-Ohlin interactions in column (3) has a negligible impact on the estimate of β_1, while the standardized beta coefficients in that column indicate that the effect that judicial quality has on the pattern of trade is greater than the combined effects of both capital and skilled labor. The inclusion of additional controls in column (4) has little impact on these conclusions. Nunn (2007) presents several robustness tests and also attempts to deal with endogeneity concerns by using legal origin as an instrument for judicial quality and by using propensity score techniques.

Table 3.5: The Determinants of Comparative Advantage

	(1)	(2)	(3)	(4)
Judicial quality interaction	0.289**	0.318**	0.326**	0.296**
	(0.013)	(0.020)	(0.023)	(0.024)
Skill interaction			0.085**	0.063**
			(0.017)	(0.017)
Capital interaction			0.105**	0.074^{+}
			(0.031)	(0.041)
Log income × value added				-0.137*
				(0.067)
Log income × intra-industry trade				0.546**
				(0.056)
Log income × TFP growth				-0.010
				(0.049)
Log income × capital				0.021
				(0.018)
Log income × input variety				0.522**
				(0.103)
R^2	0.72	0.76	0.76	0.76
Number of observations	22,598	10,976	10,976	10,816

Table reproduced from Table IV in Nunn (2007). Regressions also include country and industry fixed effects. Standardized beta coefficients reported. Standard errors in parentheses.$^{+}$, *, ** denote 10, 5, 1 % significance.

Building on the insights of this empirical literature on the effects of contracting institutions, other researchers have explored the role of other types of institutions in shaping comparative advantage across sectors. Manova (2008, 2012), for instance, explores the role of the quality of financial institutions in shaping the extensive and intensive margin of trade. Her empirical strategy builds on the seminal work of Rajan and Zingales (1998), who categorized sectors into more or less financially dependent depending on their external finance requirements. Relatedly, Cuñat and Melitz (2012) study how differences in the flexibility of labor market institutions across countries affect comparative advantage by building an industry-level measure of the importance of within-sectoral reallocations of labor as a response to shocks. In a very nicely executed study, Chor (2010) attempts to disentangle the partial

effect of each of these institutional determinants of comparative advantage in a unified empirical model.

Despite the recent focus in the literature on the role of *domestic* contracting institutions in shaping trade flows, it is not a warranted conclusion from these studies that *international* contract enforcement is irrelevant for explaining trade flows across countries. First, the aforementioned findings of Helpman et al. (2008) regarding the effect of having a common legal origin on aggregate bilateral trade flows are hard to rationalize in models in which international contract enforcement is perfect. Second, apart from their results discussed above, Berkowitz et al. (2006) also found that the effects of exporter and importer legal quality appear to be significantly affected by whether countries have ratified the New York convention or not. For instance, their estimates indicate that for the case of complex goods, the quality of exporter institutions matters disproportionately more when the export partner has not yet signed the New York convention and thus international enforcement of damages is more doubtful. For a third illustration of the importance of imperfect international contract enforcement, I next briefly return to the choice of payment-method decision faced by exporters and importers when negotiating their initial contracts.

Back to Trade Finance

So far we have illustrated how the quality of importer country institutions shapes the profitability and structure of exports whenever contracts are associated with post-shipment payment (or simply, open account) terms, while the quality of exporter country institutions plays a similar role in cash-in-advance transactions. Obviously, this constitutes a simplistic description of the effect of institutions on exporting. It seems natural, for instance, that exporter country institutions will matter even in open account terms to the extent that the consequences of exporter misbehavior might manifest themselves long after the goods have been received by the importer, or even after these goods have been sold to local consumers. Similarly, importer country institutions might affect the profitability of cash-in-advance transactions to the extent that they shape the financing costs faced by exporters. Intuitively, in countries where defaults are not sufficiently punished, not only exporters but also banks will shy away from extending credit to importers.

An active literature in international trade has explored the determinants of the choice of payment mode in international transactions, with a special

emphasis on the role of weak contracting institutions. This literature includes among others, the work of Amiti and Weinstein (2011), Antràs and Foley (2013), Ahn (2011), Hoefele, Schmidt-Eisenlohr and Yu (2013), Olsen (2013), and Schmidt-Eisenlohr (2013). Antràs and Foley (2013), in particular, focus on the role of importer country institutions, while allowing these to affect the profitability of both open account transactions (via default risk) as well as cash-in-advance transactions (via financing costs). Their key theoretical finding is that in the plausible case in which local banks in the importing country are better able than exporters to pursue financial claims against importers, one would expect exports to locations characterized by weak contractual enforcement to be more likely to occur on cash-in-advance as opposed to open account terms.[14]

One of the main challenges in studying the financing arrangements used to support international trade is that detailed data on how different types of transactions are financed are not readily available. Antràs and Foley (2013) overcome this dearth of data by analyzing detailed transaction-level data from a single U.S.-based firm that exports frozen and refrigerated food products, primarily poultry. The data cover roughly $7 billion in sales to more than 140 countries over the 1996-2009 period and contain comprehensive information on the financing terms used in each transaction. A key advantage of the dataset is that by focusing on the sales of a single exporter based in the U.S., any institution-driven variation in the choice of payment mode must be ascribed to importer-country institutions or, following our broader interpretation of the parameter μ_{ij} in (3.6), to legal proximity between the U.S. and the importing country.

Antràs and Foley (2013) find robust evidence that variation in importer country contract enforcement has a strong effect on the method of payment offered to importers. Figure 3.4 reproduces the results in Figure 3 of their paper. For each of the proxies of contractual enforcement in the figure, the share of transactions occurring on cash-in-advance share is strikingly lower in strong contract enforcement countries than in weak contract enforcement countries. For instance, in common law countries, 4.0% of sales occur on cash-in-advance terms and 79.8% of sales occur on open account terms, while in civil law countries these shares are 63.8% and 20.4%. Similarly stark differ-

[14] Antràs and Foley (2013) also consider the possibility of exporters and importers resorting to letters of credit, but these financial instruments mediate a small share of world trade in modern times (see also Olsen, 2013, for more on letters of credit).

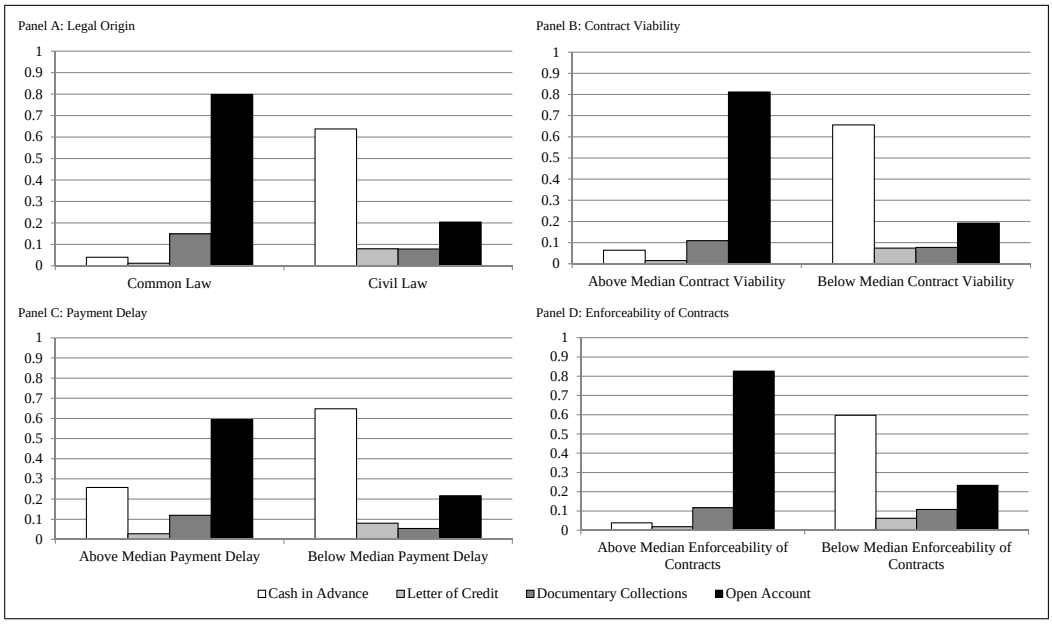

Figure 3.4: Financing Terms and the Enforcement of Contracts

ences appear when the sample is split using measures of contract viability from International Country Risk Guide (ICRG), payment delay (also from ICRG), and the enforceability of contracts (from Knack and Keefer, 1995). Antràs and Foley (2013) show that these patterns persist after controlling for several country-level variables as well as product fixed effects. Consistently with the results of the dynamic model of repeated interactions developed earlier in this chapter, they also find that first-time buyers are disproportionately more likely to be demanded to prepay for their purchases, but that as the exporter establishes a relationship with an importer, the share of cash-in-advance transactions falls smoothly over time.

In a recent paper, Hoefele, Schmidt-Eisenlohr and Yu (2013) have employed information from the World Bank Enterprise Survey to study the effects of variation in *exporting* country institutions on the choice of trade finance by firms. Consistently with the models developed in this chapter, Hoefele, Schmidt-Eisenlohr and Yu (2013) find that the use of cash-in-advance terms is more prevalent in exporting countries with strong contracting institutions, in which exporter misbehavior is less of a concern.

The Road Ahead

This chapter has explored both theoretically as well as empirically the significance of weak contract enforcement for the export decisions of firms and, more broadly, for the structure of international trade flows. The focus, however, has been on how contractual frictions affect the international *exchange* of goods. As explained in Chapter 1, the rapid growth in intermediate input trade has been one of the most prominent developments in the world economy in recent years. At the same time, the contractual relationships that support the phenomenon of offshoring are much more intricate than those that support the mere shipment of goods across countries. Thus, weak contract enforcement has the potential to affect the global organization of production in more profound ways than we have studied so far. In the next chapter, we will begin to explore these more complex contractual aspects of global sourcing.