CENTRE for ECONOMIC PERFORMANCE

CEP Discussion Paper No 820

August 2007

Trust-Based Trade

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E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Abstract
Weak enforcement of international contracts can substantially reduce international trade. We develop a model where agents build reputations to overcome the difficulties that this institutional failure causes in a context of incomplete information. The model describes the interplay between institutional quality, reputations and the dynamics of international trade. We find that the conditional probability that a firm will stop exporting decreases and its foreign sales increase as the firm acquires greater export experience. The reason is that the informational costs that an exporter faces fall as the exporter becomes more confident about the reliability of its distributor. An improvement in the institutional quality of a country affects its imports through several distinct channels, as it changes the incentives of both current and potential exporters. Trade liberalization induces current exporters to increase their sales. It could induce entry as well, but this will happen only when the initial tariff is high and/or the institutional quality of the country is low.

Keywords: International trade, Export dynamics, Contract enforcement
JEL Classifications: F10, F13, L14

This paper was produced as part of the Centre's Globalisation Programme. The Centre for Economic Performance is financed by the Economic and Social Research Council.

Acknowledgements
We thank Scott Baier, Daniel Ferreira, Thomas Jeitschko, Rowena Pecchenino, James Rauch, Bob Staiger, Susan Zhu, and seminar participants at Clemson, LSE, Michigan State, Penn State, W. Michigan, and the Midwest International Trade Meeting for helpful comments and suggestions. Ornelas gratefully acknowledges financial support from CNPq and from the University of Georgia through the UGARF and Terry-Sanford Research Grants.

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Published by
Centre for Economic Performance
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

ISBN 978 0 85328 080 4

1 Introduction

It has been often argued that the weakness of contract enforcement across international jurisdictions is one of the reasons that explain why countries trade so little with each other relative to what they trade with themselves.[1] Several case studies provide anecdotal support for this hypothesis,[2] and recent empirical research has confirmed its validity (Anderson and Marcouiller 2002, Ranjan and Lee 2007). It remains to understand the specific mechanisms through which institutions affect international trade. Recent research uncovers how institutional quality shapes the structure of trade through its effects on the pattern of comparative advantage across countries (Acemoglu, Antras and Helpman 2007, Antras 2005, Levchenko 2007, Nunn 2007). In this paper, we show instead how contract enforcement affects the dynamics and the levels of trade, both in aggregate and at the firm level.

We develop a two-country dynamic model where potential exporters from one country form partnerships with distributors in the other country without knowing the type of each distributor, some of which care little about the future. Incomplete information opens the possibility for opportunistic behavior by the distributors when contracts are not perfectly enforced. This induces forward-looking distributors to build reputations to differentiate themselves from those less concerned about the future. Still, since the process of reputation building is time-consuming, international trade is depressed when contracts are not properly enforced. In this sense, reputation is an imperfect substitute for adequate contract enforcement in an environment with asymmetric information.

In this context, we characterize the informational costs that firms have to incur when exporting. Informational costs depress trade volumes and re-shape trade dynamics. Moreover, they are higher, the more lenient the importing country is in enforcing contracts. On the other hand, informational costs decrease as the producer accumulates exporting experience. As a result, firms start exporting relatively little and then increase volumes overtime.[3]

The reason a producer increases exports overtime is that, the more often his distributor abides by their contract, the more convinced the producer becomes that the distributor is trustworthy and will respect contracts in the future. This can help explain the significant variation in export volumes across firms observed in micro data sets, even after controlling for country of origin, destination country and industry (Eaton, Kortum and Kramarz 2004).[4] This

[1] For example, Rodrik (2000, p. 179) argues that "Transaction costs arise from various sources, but perhaps the most obvious is the problem of contract enforcement. When one of the parties reneges on a written contract, local courts may be unwilling—and international courts unable—to enforce a contract signed between residents of two different countries. Thus, national sovereignty interferes with contract enforcement, leaving international transactions hostage to an increased risk of opportunistic behavior." Since rational agents anticipate that possibility, they trade less internationally than they do within national borders.

[2] For example, Woodruff (1998) documents the difficulties faced by exporters in Mexico's footwear industry seeking to enter foreign markets created by the high cost of taking legal actions abroad.

[3] Using surveys of manufacturing firms in transition economies, Johnson, McMillan and Woodruff (2002) find that the volume of transactions within partnerships grows steadily. This practice appears to be common also among firms entering export markets (see e.g. Egan and Mody 1992).

[4] An alternative, complementary explanation for this stylized fact is the existence of increasing marginal costs of marketing, a rationale developed by Arkolakis (2006).

learning process implies also that the conditional probability of breakdown of a partnership decreases with its duration, which is precisely what Besedes and Prusa (2006) find for trade relationships between countries at the product level.

We uncover several channels through which institutional quality matters for international trade. We find, for example, that a stricter level of contract enforcement has nontrivial effects on the export volume within each partnership between an exporter and a distributor. On the one hand, tightening the enforcement of contracts in a country raises the expected return of foreign exporters, thus boosting trade volumes within any existing partnership. On the other hand, the improved enforcement reduces the frequency of defaults, thereby slowing down the process of reputation building. As a result, the net effect on trade flows within existing partnerships depends on both the horizon of the analysis and the initial level of contract enforcement. In the short run, when reputations are given, trade increases for sure. But since better institutional quality also has the perverse effect of slowing down the learning of exporters, future trade flows could fall below its trend if the initial level of enforcement were too low.

Stricter enforcement of contracts enhances trade volumes through the extensive margin of trade as well. In steady state, a stricter legal system induces more firms to export. It also induces less turnover, implying that exporting firms will tend to acquire greater export experience. Since older exporters export more than newer ones, trade is enhanced by stricter enforcement of contract also through this channel.

When we study the effects of trade liberalization, we find that lower tariffs always lead to an increase in the volume exported by each exporter. It can also induce entry of new exporters, but this will depend on the initial level of tariffs and on the institutional quality of the country. Specifically, a reduction in tariffs is more likely to induce new firms to begin exporting when the initial tariff is high and enforcement of contracts is weak in the country. This suggests that trade policy is more likely to affect the extensive margin of trade in developing countries than in developed ones.

In our model firms are ex ante identical, but they are ex post heterogenous: some do not export while others do, and those who export sell different quantities in the foreign market. That is, ours is a model where firm heterogeneity arises endogenously, and is a result of distinct individual experiences in the export market. This contrasts with the modeling strategy in recent trade theory papers, which relies on heterogeneity across firms but where heterogeneity in productivity is assumed (see for example Melitz 2003). Naturally, we do not deny that there are differences in productivity across firms. Instead, we abstract from that source of heterogeneity to study an additional force that causes firms to behave differently in exporting markets, namely individual experiences in an environment marked with incomplete information and imperfect enforcement of contracts.

To our knowledge, this is the first formal theoretical analysis of the dynamic process in which firms engaged in international exchange build reputations as a response to the imperfect enforceability of contracts.[5] However, there are several accounts indicating that agents rely on

[5] For example, in Anderson's (2004) survey of the nascent literature on the reactions to the problems created by the lack of adequate contract enforcement in international transactions, there is no reference to formal analyses

"trust" when enforcement is lenient. For example, Egan and Mody (1992, p. 327), through a series of interviews with U.S. entrepreneurs in the bicycle and footwear industries, find that "buyers consider trust an essential adjunct to formal legal agreements, and some even use trust as a substitute." Izquierdo et al. (2003) find, in turn, that firms' reputations in third countries are an important factor in explaining bilateral trade flows. And McMillan and Woodruff (1999), analyzing Vietnam, show forcefully how relationships based on trust arise and develop in environments where contract enforcement is virtually absent.

This paper is related also to other branches of the trade literature. Anderson and Young (2006) recognize the obstacles created by ineffective enforcement of international contracts, but study instead countries' *choices* of enforcement levels. McLaren (1999) characterizes, in a static model, the circumstances under which firms *choose* to base their relationships on trust instead of on (enforceable) contracts. We abstract from the issues McLaren focuses on—industry structure and relationship-specific investments—to concentrate on the dynamics of trust within partnerships when perfectly enforceable contracts are unavailable. Greif (1993), motivated by the trading system developed by medieval merchants, also analyzes how limited contract enforceability induced the formation of coalitions based upon reputation to sustain trade. He considers, however, a complete information economy, and his main goal is to explain why merchants employed a system of collective, instead of individual, punishment for dishonest agents. In an environment with information asymmetries, Chisik (2003) examines how the perception about producers from (otherwise identical) countries can become self-fulfilling and affect their choices of qualities, thus creating "reputational comparative advantages." Finally, the practice of "start small and increase quantities over time" in a setting with asymmetric information has been explained also by Rauch and Watson (2003). However, that result arises in their model because buyers need to make irreversible investments to train foreign suppliers. In our model, firms want to "start small" even when that element is absent but contracts are not perfectly enforced. Moreover, our model allows us to analyze several features of the trade equilibrium that are not captured by Rauch and Watson's model, such as the channels through which contract enforcement shapes trade flows and the impact of trade policy on the intensive and extensive margins of trade.[6,7]

The paper proceeds as follows. Section 2 describes the environment and the equilibrium of the model when the zero-profit condition for entry does not bind. Section 3 characterizes the various channels through which institutional quality shapes international trade in that case. In Section 4 we discuss the equilibrium when the zero-profit condition binds. Section 5 analyzes the effects of trade policy. Section 6 concludes.

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of the role of reputations.

[6] In Appendix B we also qualify the practice of "start small and increase quantities over time" by incorporating demand uncertainty in the model.

[7] In a different context, the literature on sovereign debt also studies the effect of reputational concerns, but on the incentives of governments to honor international contracts (see Eaton and Fernandez 1995 for a survey).

2 Model

2.1 Main Elements

Our main goal is to study situations where the lack of contract enforcement depresses international trade. These situations arise when exporters have to conduct business with agents in an importing country but cannot rely on the legal system to prevent opportunistic behavior by those agents. We develop a model that highlights these characteristics. It is based on three main elements, which we briefly discuss in turn.

i. Contacting distributors

Contacting distributors in the importing country is a critical decision in the process of exporting. According to the Home Based Business Opportunities, for example, "The most important step in setting up your business is finding the contacts ... for commercial distribution." Similarly, the U.S. Department of Commerce (2000, p. 23) argues that once a "company is organized to handle exporting, a proper channel of distribution needs to be carefully chosen for each market," while warning potential exporters that they "should investigate potential representatives or distributors carefully before entering into an agreement." We want to study precisely these types of situations, where exporters have to establish channels of distribution in the importing country but have to do so cautiously, because distributors can behave opportunistically if they have a relatively short horizon and are not inhibited by the legal system in the country.

ii. Credit-based relationships

To study situations where export activities are subject to opportunistic behavior, we consider that exporters and distributors base their relationships on credit. In particular, we assume that in each period an exporter consigns goods to a distributor, who has the opportunity to abscond with the full proceeds from the sales of the goods. The exporter and the distributor have a contract governing their relationship, but an imperfectly functioning legal system creates uncertainty about whether the distributors will respect their formal agreements.

Commercial transactions are indeed largely based on credit,[8] but there are also other dimensions in which exporters may need to rely on agents in the importing country without full legal protection. Still, allowing distributors to "run away" with the proceeds from their sales is arguably the simplest way to capture the possibility of opportunistic/dishonest behavior by those agents.

iii. Measure of institutional quality

[8] Interestingly, transactions are often based on credit even in environments where there is virtually no legal protection, as McMillan and Woodruff's (1999) analysis of the business conditions in Vietnam exemplifies: despite widespread skepticism about the effectiveness of the judicial system, over fifty percent of the business relationships in Vietnam involve trade credit.

Naturally, the more lenient a country's legal system is in enforcing international contracts, the more easily distributors can evade contractually specified payments to exporters. Recent research typically employs a single parameter to capture institutional quality, be it to represent the proportion of activities in which investments are contractible or the proportion of contracts that the legal system enforces. In a similar fashion, we measure the quality of a legal system by the opportunities for corruption that it prevents. Specifically, we represent institutional quality with parameter $\lambda \in (0,1)$, which corresponds to the probability that a distributor will be unable to default on the contract without being penalized by the country's judicial system.

We now describe our environment in more detail.

2.2 Environment

Consider an economy with two countries, Home and Foreign. In Home there is a $[0,1]$ continuum of producers of differentiated goods that are infinitely lived. Only one producer can manufacture each good. Marginal costs of production are constant at c. Producers can sell goods in their own market directly, but have no direct access to Foreign's market. To become exporters, they need to form a partnership with a distributor from Foreign. Producers have a discount factor of δ_e, where $\delta_e \in [0,1]$.

In Foreign, there is a $[0,1]$ continuum of infinitely lived agents with the ability to distribute imported goods internally. Each of those agents can distribute any imported good, but cannot distribute more than one good simultaneously. They can be either patient or myopic; the measure of myopic distributors is θ_0. A patient distributor (p) has a discount factor of $\delta_d \in (0,1]$, while a myopic distributor (m) has a discount factor of zero. The type of a distributor is his private information.

We will focus on the decision of Home producers to export to Foreign's market. Because we assume that marginal costs are constant, we can disregard the activities of producers in their domestic market in our analysis. The assumption of market segmentation is very common in analyses of trade at the firm level (see, for example, Das et al. 2007).

In every period, a producer from Home meets with an available distributor from Foreign with probability $x \in (0,1)$. When there is such a meeting, we say the producer has found a "business opportunity" in Foreign. In that case, the producer can choose to form a partnership with the distributor. If a partnership is formed, the exporter decides whether to maintain it at the beginning of each subsequent period while the partnership is active. Whenever the exporter decides to keep the partnership, he proposes a contract to the distributor.

Since distributors have incentives to build reputations only if contracts do not induce a separation between a myopic and a patient distributor, in what follows we restrict the class of contracts so that such separation is not possible during the contracting stage. More specifically, we assume that the exporter proposes a one-period contract[9] to the distributor specifying the

[9]Such short-term contracts conform well to actual businesses practices. As Egan and Mody (1992, p. 326) report, "Relationships tend to grow incrementally, with their duration and depth more evident *ex post* than *ex ante*. A relationship often begins with a short-term agreement—perhaps a one-year production contract—and continues with annual renewals ... Thus, a close, long-term relationship may arise with no more formal structure

quantity to be exported, an exogenous distribution of the revenue (the exporter and the distributor receive strictly positive fractions α and $1-\alpha$ of the revenue, respectively), and no side payments. If the contract is accepted, the exporter produces the quantity specified in the contract, bears the production costs, and pays a fixed cost $\kappa > 0$, which captures in a simple way the exporter's opportunity cost to engage in business in Foreign. Otherwise, both the exporter and the distributor earn zero profits.

In reality, exporters probably screen the reliability of foreign distributors both with contracts and with experience. We shut down the former channel because we want to focus on the mechanics of the latter. Thus, the purpose of contracts here is only to define export volumes.[10,11]

Consider then the decision of a distributor between performing according to the contract or defaulting. In each period, the distributor assesses whether he can get away with a default—e.g. by bribing a legal agent. We want to emphasize that this possibility is closely linked to the institutional quality of Foreign. We formalize this idea by assuming that each distributor finds an opportunity to default on the contract without being penalized with probability $1-\lambda$. Hence, parameter λ provides a measure of the strength of Foreign's institutions. An exporter does not observe whether his distributor has found such an opportunity, however; he observes only the outcome of the distributor's action—default or not.

Finally, at the end of each period there is an exogenous probability $1-\sigma \in (0,1)$ that an existing product will become "obsolete," causing the end of the partnership. When a partnership ends, for endogenous or exogenous reasons, the producer loses the ability to sell in Foreign's market and is replaced by a new active producer, who is not in a partnership but is able to become an exporter. Similarly, the distributor exits the market and is replaced by another one of the same type.[12] In what follows, we let $\beta_e \equiv \sigma\delta_e$ and $\beta_d \equiv \sigma\delta_d$ denote the relevant discount factors of exporters and patient distributors, respectively.

We first study an equilibrium where each producer: (1) forms a partnership whenever he finds a business opportunity; (2) when in a partnership, chooses the quantity to export in each period by maximizing current expected profit; and (3) terminates an existing partnership if

than a continuing series of renewed short-term contracts." Similarly, the U.S. Department of Commerce (2000, p. 28) points out that "some U.S. companies prefer to begin with a relatively short trial period and then extend the contract if the relationship proves satisfactory to both parties."

[10] Simple specifications for agents' types and restrictive contracts are common modeling features in the literature of reputations. For example, in Tirole's (1996) model of collective reputation, there are agents who are (always) 'honest' and others who are (always) 'dishonest.' Both types behave mechanistically. Only agents of the third type ('opportunistic') act strategically. The contract offered by the principal in Tirole's model is also very simple (the principal can offer one of two tasks) and precludes screening entirely.

[11] An alternative specification, which would keep the results of the model unaltered, is to assume that some distributors are, instead of myopic, of a behavioral type, in the sense that they always mimic the choice of patient distributors during the contractual negotiation but default afterwards whenever possible. In that case, no constraints on the form of contracts would be required, since contracts could not reveal any information about the distributor's type, which is the condition necessary for reputation to have value in equilibrium.

[12] The restriction that exporters exit the market after their partnerships end simplifies the analysis, as we do not need to keep track of the exporters' option to return to the market, but has no qualitative effect on the equilibrium of the model. The reason is that, as we will show, the pool of available distributors (weakly) deteriorates overtime, implying that starting a partnership today is never worse than waiting to start one later.

and only if the distributor defaults on their contract. In this equilibrium, a myopic distributor defaults whenever he finds an opportunity to do so without being caught, whereas a patient distributor never defaults, provided that β_d is sufficiently high. Neither type of distributor terminates a partnership voluntarily. Moreover, the frequency of myopic distributors among those who are inactive (i.e. who are not in partnerships) increases overtime.

The steps of our proof are as follows. First, to prove the behavior of the exporters, we assume that the distributors behave as indicated above and that the frequency of inactive myopic distributors is non-decreasing. Next we take the behavior of the exporters as given and prove the behavior of the distributors. Finally, we take as given the behavior of exporters and distributors to prove that, indeed, the frequency of inactive myopic distributors is non-decreasing.

The equilibrium of the economy may not be exactly as described above, however. The reason is that, depending on the parameters of the model, the expected value of initiating a partnership could eventually become non-positive. This would not affect the dynamics of trade once a producer forms a partnership, but could affect the decision of producers about forming new partnerships. We address this case in Section 4, after the discussion of the scenario where producers always form partnerships when they have the opportunity to do so.

2.3 Exporter's Behavior

Suppose then that distributors behave as proposed above. The problem of an exporter is as follows. If the exporter is not in a partnership and finds a business opportunity, he decides whether to take the opportunity and form one. If the exporter is in a partnership, he decides whether to maintain it. Finally, in each period when the exporter chooses to keep a partnership, he writes a one-period contract with the distributor establishing the volume of output to sell in Foreign. We consider first how this quantity is determined.

2.3.1 Contract

Consider a contract signed at date t and let the exporter's belief that the distributor is myopic be denoted by θ. The exporter pays the cost of production and receives a fraction α of the revenue if the distributor does not default. The exporter believes that there is a probability $1-\theta$ that the distributor is patient, in which case he never defaults. However, if he is myopic, he defaults whenever the legal system does not enforce his contract, an event with probability $1-\lambda$. Under the proposed strategy for the distributors, the exporter's expected profit when the contract establishes a production level of q is then

$$\pi(q,\theta;\lambda,\alpha,c,\kappa) = -cq + \alpha[\theta\lambda + 1 - \theta]R(q) - \kappa, \tag{1}$$

where $R(q)$ is the revenue from selling q units in Foreign.[13]

Our assumptions on the structure of the contract imply that it cannot be used to extract information about the distributor's type. Hence, when proposing a contract, the exporter

[13] We keep final consumers in the background, dealing directly with revenue functions.

chooses q to maximize $\pi(q, \theta; \lambda, \alpha, c, \kappa)$. Denoting the exporter's optimal quantity by Q, the first-order necessary condition associated with this problem when the exporter chooses to sell a strictly positive quantity is

$$-c + \alpha[\theta\lambda + 1 - \theta]R'(Q) = 0. \tag{2}$$

Condition (2) requires $R'(Q) > 0$, whereas the second-order necessary condition for Q requires $R''(Q) < 0$.

The optimal quantity Q depends on the belief θ of the exporter, on the institutional parameter λ, on the exogenous revenue sharing rule, and on the marginal cost of production: $Q = Q(\theta; \lambda, \alpha, c)$. In particular, it follows from condition (2) that

$$\frac{\partial Q}{\partial \theta} = \frac{(1-\lambda)R'(Q)}{[\theta\lambda + 1 - \theta]R''(Q)} < 0. \tag{3}$$

Thus, the optimal export quantity increases as the belief that the distributor is myopic decreases.

We want to study situations where an exporter's belief about the type of the distributor in their partnership, and as a result the institutional quality of Foreign, matter for the decision to keep or break an existing partnership. To concentrate on this case, we impose restrictions on the parameters to rule out the less interesting polar cases when producers in Home do not want to export to Foreign even in the most optimistic scenario ($\theta = 0$) and when they want to export to Foreign even in the most pessimistic scenario ($\theta = 1$). Accordingly, we assume the following conditions hold:

$$\begin{aligned} A1 &: Q(1; \lambda, \alpha, c) > 0, \\ A2 &: \pi(Q, 1; \lambda, \alpha, c, \kappa) < 0, \\ A3 &: \pi(Q, 0; \lambda, \alpha, c, \kappa) > 0. \end{aligned}$$

Assumption $A1$ implies that the quantity that maximizes current *variable* expected profits is strictly positive even when the exporter is certain that the distributor is myopic ($\theta = 1$). In that case, however, $A2$ implies that the exporter's current (total) expected profit is strictly negative. In contrast, when the exporter is certain that the distributor is patient ($\theta = 0$), his current expected profit is strictly positive.

Note that $A1$ implies a minimum level of λ, whereas $A2$ implies a maximum level for λ. Note also that, under $A2$, an exporter necessarily terminates the partnership when $\theta = 1$, since in that case the exporter is certain the his distributor is myopic and expects to make strictly negative profits in every subsequent period. However, the same reasoning need not hold for values of θ close to 1. In that case, even though current profits are still negative, it may be optimal to produce because this will generate additional information about the type of the distributor.

In what follows, we define $\theta^* = \theta(\lambda, \alpha, c, \kappa)$ as the level of θ that generates zero current profits:

$$\pi(\theta^*; \lambda, \alpha, c, \kappa) \equiv 0. \tag{4}$$

Note that, since π is a strictly decreasing function of θ, θ^* is unique.

2.3.2 Information

Whenever the exporter is in a partnership, he has to decide whether to maintain it. This decision critically depends on his belief about the type of the distributor. For example, if the exporter believes that there is a high probability that the distributor will attempt to default on the contract, he will likely prefer to terminate the partnership.

The exporter updates his belief with respect to the type of the distributor through his experience in the partnership. This experience reflects all previous decisions made by the distributor. Under the proposed strategy for the distributors, if the exporter observes a default he immediately concludes that the distributor is myopic, thus forming a posterior that $\theta = 1$. Alternatively, if the exporter does not observe a default, he adjusts his belief about the distributor's type according to the Bayes rule:

$$\theta(\{\text{no default}\}, \theta) \equiv \Pr(m \mid \{\text{no default}\} \cap \theta) = \frac{\lambda\theta}{\lambda\theta + 1 - \theta} < \theta. \tag{5}$$

Note that the adjustment in θ is downwards in this case. That is, when the exporter does not observe a default, he increases his belief that the distributor is patient.

More generally, let 0 indicate a record of no default and 1 indicate a record of default in a given experience and define $\theta_t^k(C, \theta)$ as the belief that the distributor is myopic given a prior θ and an experience h_t^k that started at date t, has size k, and cardinality C, where $C \equiv \sum_{j=t}^{t+k-1} h_j$, $h_j \in \{0, 1\}$. Under the assumed strategy for the distributor, the exporter's belief is given by

$$\theta_t^k(C, \theta) = \begin{cases} \frac{\lambda^k\theta}{\lambda^k\theta + 1 - \theta} & \text{if } C = 0 \\ 1 & \text{if } C \neq 0. \end{cases} \tag{6}$$

As long as $\theta \neq 1$, $\theta_t^k(0, .)$ decreases with k and converges to zero when k goes to infinity. That is, if a distributor never defaults and the partnership is never terminated exogenously, the exporter would eventually become fully convinced that the distributor is patient.[14] In what follows, we interpret θ as the *reputation* of the distributor. A reputation of being patient means that the belief θ of the exporter regarding the distributor in their partnership is relatively small.

We now take as given the function Q and the updating process described in equation (6) and look at the exporters' other decisions: (i) the decision to form a new partnership when facing a business opportunity; and (ii) the decision to maintain an ongoing partnership.

2.3.3 Partnership

Consider an ongoing partnership in which the exporter has a belief θ that the distributor is myopic. We know from expression (6) that all the relevant information about the distributor is captured by the belief θ associated with it. Given θ, the exporter computes both the optimal quantity to export and, given the assumed strategy for the distributors, the distribution of next

[14] Naturally, since in each period there is an exogenous positive probability that the exporter's product will become obsolete, causing the end of the partnership, the probability that any partnership will last until the point where the exporter becomes fully convinced that the distributor is patient is zero.

period's beliefs. These two elements affect, respectively, the flow and the continuation payoff of the exporter. The flow payoff corresponds to the current profit $\pi(\theta)$, where

$$\pi(\theta) = -cQ + \alpha[\theta\lambda + 1 - \theta]R(Q) - \kappa. \tag{7}$$

To find the continuation payoff, recall that after observing a default the exporter immediately concludes that the distributor is myopic and updates his posterior to $\theta = 1$. Assumption $A2$ then implies that the exporter terminates the partnership. Alternatively, if the exporter does not observe a default, he increases the belief that the distributor is patient and maintains the partnership.

The exporter's decision to enter a partnership depends on his prior regarding the quality of the inactive distributors. Let $\widetilde{\Theta} = \{\widetilde{\theta}_t\}_{t=0}^{\infty}$ be the set of such priors, where $\widetilde{\theta}_t$ is the belief that an inactive distributor at date t is myopic. In equilibrium, $\widetilde{\Theta}$ must be consistent with the actual composition of inactive distributors. In turn, this composition endogenously depends on the aggregate behavior of exporters and distributors. This issue will be addressed in detail in subsection (2.5). The important aspect to keep in mind at this point is that, when making their decisions, exporters must have a set of beliefs $\widetilde{\Theta}$.

We can express the exporter's decision to enter a partnership at the beginning of date t in terms of a value function

$$v_t(\widetilde{\theta}_t) = \max\left\{v(\widetilde{\theta}_t), \delta_e w_{t+1}\right\}, \tag{8}$$

where

$$v(\widetilde{\theta}_t) = \pi(\widetilde{\theta}_t) + \beta_e \Pr(0 \mid \widetilde{\theta}_t) v(\theta_t^1(0, \widetilde{\theta}_t)) \tag{9}$$

is the expected payoff of entering the partnership, and

$$w_{t+1} = x v_{t+1}(\widetilde{\theta}_{t+1}) + (1 - x)\delta_e w_{t+2} \tag{10}$$

is the expected gain of not entering and waiting for a new business opportunity in the next period.

Lemma 1 *Let $\widetilde{\theta}_t$ be non-decreasing in t. Then, there is a unique value $\overline{\theta} \in [\theta^*, 1)$ such that, for all t, a producer forms a partnership whenever he finds a business opportunity and $\widetilde{\theta}_t < \overline{\theta}$. Moreover, he chooses to maintain the partnership if and only if the distributor does not default, and exports $Q(\theta; \lambda, \alpha, c)$ in every period when the partnership is active, where θ is the current belief that the distributor is myopic.*

Proof. First, since $Q(\theta; \lambda, \alpha, c)$ maximizes $\pi(q, \theta; \lambda, \alpha, c, \kappa)$, it must be the quantity established in any contract. Now fix some date t and consider a producer who is not in a partnership and finds a business opportunity. If he decides to take this opportunity, he obtains $v(\widetilde{\theta}_t)$. Substituting for $v(\theta_t^1(0, \widetilde{\theta}_t))$ in (9), we obtain

$$v(\widetilde{\theta}_t) = \pi(\widetilde{\theta}_t) + \beta_e \Pr(0 \mid \widetilde{\theta}_t)[\pi(\theta_t^1(0, \widetilde{\theta}_t)) + \beta_e \Pr(0 \mid \theta_t^1(0, \widetilde{\theta}_t)) v(\theta_t^2(0, \widetilde{\theta}_t))]. \tag{11}$$

Repeating the same substitution, and expressing $\Pr(0 \mid .)$ in terms of primitives, we can rewrite equation (9) as

$$v(\widetilde{\theta}_t) = \pi(\widetilde{\theta}_t) + \sum_{i=1}^{\infty} \beta_e^i \pi(\theta_t^i(0, \widetilde{\theta}_t)) \prod_{j=0}^{i-1} (1 - \theta_t^j(0, \widetilde{\theta}_t) + \lambda \theta_t^j(0, \widetilde{\theta}_t)). \tag{12}$$

Note that, from expressions (6) and (7),

$$\frac{d\pi(\theta_t^i(0, \widetilde{\theta}_t))}{d\widetilde{\theta}_t} = \frac{\partial \pi(\theta_t^i(0, \widetilde{\theta}_t))}{\partial \theta_t^i(0, \widetilde{\theta}_t)} \frac{\partial \theta_t^i(0, \widetilde{\theta}_t)}{\partial \widetilde{\theta}_t} = \frac{-\alpha(1-\lambda) R[Q(\theta_t^i(0, \widetilde{\theta}_t); \lambda, \alpha, c, \kappa)] \lambda^i}{(1 - \widetilde{\theta}_t + \lambda^i \widetilde{\theta}_t)^2} < 0. \tag{13}$$

Moreover, each component of $\prod_{j=0}^{i-1} (1 - \theta_t^j(0, \widetilde{\theta}_t) + \lambda \theta_t^j(0, \widetilde{\theta}_t))$ is also a strictly decreasing function of $\widetilde{\theta}_t$. We can then conclude that $v(\widetilde{\theta}_t)$ is a strictly decreasing function of $\widetilde{\theta}_t$. Since $\widetilde{\theta}_t$ is non-decreasing in t, if it is not profitable to enter into a partnership at date t, it is not profitable to enter at any date after t either. As a result, without loss of generality we can rewrite (8) as

$$v_t(\widetilde{\theta}_t) = \max \left\{ v(\widetilde{\theta}_t), 0 \right\}. \tag{14}$$

Now, since

$$v(0) = \frac{\pi(0)}{1 - \beta_e} > 0 \tag{15}$$

by $A3$ and

$$v(1) = \frac{\pi(1)}{1 - \beta_e \lambda} < 0 \tag{16}$$

by $A2$, there is a unique value $\overline{\theta}$ such that

$$\begin{cases} v_t(\widetilde{\theta}_t) \leq 0 & \text{if } \widetilde{\theta}_t \geq \overline{\theta} \\ v_t(\widetilde{\theta}_t) > 0 & \text{if } \widetilde{\theta}_t < \overline{\theta}. \end{cases} \tag{17}$$

Therefore, it is always profitable to form a partnership as long as $\widetilde{\theta}_t < \overline{\theta}$, and to stay in the partnership as long as there is no default. Finally, since $v(\theta^*) \geq 0$, it follows that $\overline{\theta} \geq \theta^*$. ■

Throughout the paper, we assume $\theta_0 < \overline{\theta}$. Hence, at date 0 all producers want to form partnerships and become exporters.

Note that the exporter's problem is potentially rather complex. Exporters need to make a decision after every experience they face, and the set of possible experiences increases overtime. The key element in our model that avoids these complications is the assumption that "bad outcomes" from the perspective of exporters are always caused by opportunistic behavior of distributors. This implies that the construction of a good reputation takes time, whereas a bad reputation is acquired in a single period. The central advantage of this simplification is that it allows us to generate precise, clear-cut results on the relationship between the history of a partnership and its corresponding volume of trade. However, it is not necessary for our main results. In fact, in Appendix B we consider a richer environment where exporters may face bad outcomes also when distributors do not behave opportunistically. In that context, both good and bad reputations require time to be established. Still, the optimal behavior of an exporter involves as well a threshold θ^c such that a partnership is terminated if and only if the posterior θ of the exporter becomes higher than θ^c.

2.4 Distributor's Behavior

We now solve the distributor's problem. Note that, since the exporter pays the cost of production, the gain of the distributor in a partnership is always positive. Therefore, a contract never violates the distributor's participation constraint.

Consider the problem faced by a myopic distributor. By definition, he does not care about the future and therefore does not bother to build a reputation. Hence, a myopic distributor has an incentive to default and keep the whole revenue whenever he finds an opportunity to do so without being penalized by the judicial system.

A patient distributor, on the other hand, anticipates that after a default his partnership will be terminated, given the strategy of exporters. Hence, as long as he is not too impatient, he will never default. In particular, if β_d is at least as large as the exporter's share of the revenue, the distributor will not default. Lemma 2 formalizes this claim.

Lemma 2 *Assume that exporters behave as described in Lemma* 1. *Then, there is a value* $\underline{\beta_d} \in (0, \alpha]$ *such that, for all* $\beta_d > \underline{\beta_d}$, *the optimal choice of a patient distributor is to always honor his contract.*

Proof. Consider the problem of a patient distributor who entered in a partnership at some date t. At date $t+k$, he does not deviate from the strategy of never defaulting as long as

$$(1-\alpha)\sum_{s=0}^{\infty}\beta_d^s R[Q(\theta_t^{k+s}(0,\widetilde{\theta}_t);\lambda,\alpha,c)] > R[Q(\theta_t^k(0,\widetilde{\theta}_t);\lambda,\alpha,c)]. \tag{18}$$

Now, from equation (6) we have that

$$\frac{\partial\theta_t^{k+s}(0,\widetilde{\theta}_t)}{\partial(k+s)} = \frac{\lambda^{k+s}\widetilde{\theta}_t(1-\widetilde{\theta}_t)\ln(\lambda)}{(\lambda^{k+s}\widetilde{\theta}_t+1-\widetilde{\theta}_t)^2} < 0,$$

while equation (3) implies that

$$\frac{\partial R[Q(\theta_t^{k+s}(0,\widetilde{\theta}_t);\lambda,\alpha,c)]}{\partial\theta_t^{k+s}(0,\widetilde{\theta}_t)} = \frac{(1-\lambda)\{R'[Q(\theta_t^{k+s}(0,\widetilde{\theta}_t);\lambda,\alpha,c)]\}}{[1-\theta_t^{k+s}(0,\widetilde{\theta}_t)(1-\lambda)]R''[Q(\theta_t^{k+s}(0,\widetilde{\theta}_t);\lambda,\alpha,c)]} < 0.$$

Hence, $R[Q(\theta_t^k(0,\widetilde{\theta}_t);\lambda,\alpha,c)]$ is increasing in s. Therefore,

$$(1-\alpha)\sum_{s=0}^{\infty}\beta_d^s R[Q(\theta_t^{k+s}(0,\widetilde{\theta}_t));\lambda,\alpha,c)] \geq \frac{(1-\alpha)R[Q(\theta_t^k(0,\widetilde{\theta}_t);\lambda,\alpha,c)]}{1-\beta_d}.$$

A sufficient condition for inequality (18) to hold at any k is then

$$\frac{(1-\alpha)R[Q(\theta_t^k(0,\widetilde{\theta}_t);\lambda,\alpha,c)]}{1-\beta_d} > R[Q(\theta_t^k(0,\widetilde{\theta}_t);\lambda,\alpha,c)]$$

for all $\theta_t(0)$, or

$$\beta_d > \alpha.$$

Since this condition is sufficient but not necessary, there exists a $\underline{\beta_d} \in (0,\alpha]$ such that, for all $\beta_d > \underline{\beta_d}$, the optimal choice of a patient distributor is to always honor his contract. ■

If a patient distributor that expects a fixed revenue $\overline{R}$ from selling the goods chooses to always honor his contract, the present value of that strategy for the distributor would be $\left(\frac{1-\alpha}{1-\beta_d}\right)\overline{R}$. This is greater than the payoff from defaulting on the contract, which is $\overline{R}$ (given the strategy of the exporters), if $\beta_d > \alpha$. That is, if a better reputation did not generate higher future payoffs, a patient distributor would choose to always honor contracts if his relevant discount factor were greater than the share of the revenue he would appropriate by defaulting on the contract. However, since a patient distributor knows that the revenue will increase as his reputation improves, he chooses to honor contracts even when β_d is lower—but not too lower—than α.

If $\beta_d \leq \underline{\beta_d}$, distributors of all types default whenever possible, making information about their types worthless. To rule this uninteresting case out, we assume throughout the text that $\beta_d > \underline{\beta_d}$.

2.5 Steady State and Equilibrium

Before characterizing an equilibrium, we need to show that the exporters' conjecture $\widetilde{\Theta}$ assumed in Lemma 1 is consistent with the aggregate behavior of exporters and distributors implied by lemmas 1 and 2. We show that the conjecture is consistent by considering a steady state in which entry and exit in Foreign's market are equalized, and the aggregate volume of trade and the frequency of inactive myopic distributors are both constant. Moreover, the sequence of exporters' conjecture about the frequency of inactive myopic distributors at any period t, $\widetilde{\theta}_t$, is increasing and converges to the steady state frequency.

To characterize the steady state, let m_t (p_t) be the measure of myopic (patient) distributors that are inactive at date t. If we assume that an exporter always wants to enter a partnership, lemmas 1 and 2 imply that these measures evolve as follows:

$$\begin{aligned} m_{t+1} &= (1 - x\sigma\lambda)m_t + (1 - \sigma\lambda)(\theta_0 - m_t), \\ p_{t+1} &= (1 - x\sigma)p_t + (1 - \sigma)(1 - \theta_0 - p_t). \end{aligned}$$

For instance, if a myopic distributor is inactive at date t, he will be in a partnership at the beginning of date $t+1$ only if he finds a business opportunity at date t (an event with probability x), there is no exogenous breakdown (and event with probability σ), and he does not default (an event with probability λ). If one of those events do not realize, the distributor remains without a partner at the beginning of date $t+1$. If the myopic distributor is in a partnership at date t, he will continue in the same partnership at the beginning of date $t+1$ as long as there is no exogenous breakdown and no default. A similar reasoning applies to the patient distributor, with the difference that he never defaults.

Rewriting m_{t+1} and p_{t+1} as

$$\begin{aligned} m_{t+1} &= (1 - x)\sigma\lambda m_t + (1 - \sigma\lambda)\theta_0 \quad \text{and} \\ p_{t+1} &= (1 - x)\sigma p_t + (1 - \sigma)(1 - \theta_0), \end{aligned} \tag{19}$$

it becomes clear that m_{t+1} and p_{t+1} are both strictly decreasing sequences, which converge respectively to

$$m^s = \frac{(1 - \sigma\lambda)\theta_0}{1 - \sigma\lambda(1 - x)} \tag{20}$$

and

$$p^s = \frac{(1-\sigma)(1-\theta_0)}{1-\sigma(1-x)}. \tag{21}$$

The measure of active partnerships in steady state is therefore $1 - m^s - p^s$. Equivalently, the frequency of inactive myopic distributors in steady state is

$$\theta^s = \frac{m^s}{m^s + p^s}.$$

This steady state will be reached, however, only if producers remain willing to enter Foreign's market whenever they find a business opportunity, which they will only if the expected return from starting a new partnership remains positive. This will be the case if

$$C1 : \theta^s < \overline{\theta},$$

which we assume until Section 4 and where $\overline{\theta}$ is defined in Lemma 2. Note that, using (20) and (21), one could express $C1$ also in terms of primitives.

Hence, under $C1$ there is no zero-profit condition characterizing the steady state. Instead, the steady state is such that entry, which is limited by search costs (i.e. the availability of business opportunities), equals exit, which is partly exogenous (due to the obsolescence of existing products) and partly endogenous (due to exporters' lack of trust on defaulting distributors).[15]

We can now show the consistency between the conjecture Θ and the actual frequency of myopic distributors who are not in a partnership. See Appendix A for the proof.

Lemma 3 *The sequence of exporters' conjectures about the frequency of inactive myopic distributors at any period t, $\widetilde{\theta}_t$, is increasing.*

Proposition 1 follows directly from lemmas 1, 2 and 3.

Proposition 1 *An exporter starts a partnership whenever he finds a business opportunity, maintains the partnership as long as he does not observe a default, and exports $Q(\theta; \lambda, \alpha, c)$ in each period, where θ is his current belief that the distributor is myopic. A myopic distributor defaults if and only if he can do so without being caught. A patient distributor never defaults. Irrespective of his type, the distributor never terminates a partnership. This strategy profile, together with the Bayesian updating described in equation* (6) *and the conjecture $\widetilde{\Theta} = \{\widetilde{\theta}_t\}_{t=0}^{\infty}$, is a sequential equilibrium.*

3 Institutional Quality and International Trade

We want to study how changes in the institutional quality of Foreign affects Home's exports. We begin by describing the dynamics of trade within a partnership and proceed to show how an institutional change alters an exporter's decisions. We then move to analyze the impact of such a change at the aggregate level.

[15] In Melitz (2003), the industry's average export profits are strictly positive in steady state as well, but because of exogenous differences in productivity. These differences imply that, while the 'marginal' exporter earns zero profits in Melitz's model, the most productive firms earn strictly positive profits. Here, in the equilibrium under $C1$, all active firms expect to earn strictly positive profits even in steady state. In the equilibrium where $C1$ does not hold, on the other hand, entrants do expect zero profits, as we show in Section 4.

3.1 Trade within a Partnership

Let us describe how the volume of trade within a partnership evolves under the equilibrium described in Proposition 1. Note first that, even though the type of a distributor is crucial to determine the probability that a partnership lasts, the actual volume of trade depends only on the distributor's reputation. This feature allows us to concentrate on the evolution of the export volume irrespective of the type of the distributor the exporter is paired with.

Note also that there is a one-to-one correspondence between the distributor's reputation and the time span of a partnership. Therefore, we can obtain a clear relationship between the export volume and the age of a partnership. Consider a partnership formed at some date t. Assume that this partnership is still in place at date $t+k$. Moreover, with some abuse of notation, let $\theta_t^k(0,\theta_t) \equiv \theta_{t,k}$. Then, since

$$\frac{\partial Q_{t+k}}{\partial \theta_{t,k}} = \frac{(1-\lambda)R'(Q_{t+k})}{[1-\theta_{t,k}(1-\lambda)]\,R''(Q_t)} < 0$$

and, from equation (6),

$$\frac{\partial \theta_{t,k}}{\partial k} = \frac{\lambda^k \theta_t(1-\theta_t)\ln(\lambda)}{(\lambda^k\theta_t + 1 - \theta_t)^2} < 0,$$

we obtain

$$\frac{dQ_{t+k}}{dk} = \frac{\partial Q}{\partial \theta_{t,k}}\frac{\partial \theta_{t,k}}{\partial k} > 0.$$

Hence, in an ongoing partnership the volume of trade increases over time.

This result captures in a clear way the idea that trust is built over time, through repeated interactions. While an exporter learns about the type of his partner, he exports less than he would if he were sure that the distributor were patient. Thus, in the first stages of a partnership relatively low quantities are exported; if the distributor appears to be reliable, the exporter then progressively improves the volume exported. This result rationalizes the practice of "start small and increase quantities over time" referred to in the Introduction and confirmed empirically by Besedes (2006). If this process continues until the exporter becomes sufficiently convinced that his distributor is patient, the lack of contract enforcement becomes effectively inconsequential. Hence, in line with the empirical findings of Johnson et al. (2002), sufficiently long-lasting partnerships overcome the problems created by informational frictions.[16]

At any time, the volume of trade within an ongoing partnership is affected by the institutional setting of the Foreign economy. We study this issue by describing how a permanent change in λ affects current and future contracts between the exporter and the distributor. Suppose that, at the beginning of date t, there is an institutional development that increases the

[16] In fact, our model makes this point too strongly. If "bad outcomes" from the perspective of exporters could be generated by factors other than the opportunistic behavior of distributors, e.g. negative but imperfectly observed demand shocks, then the export level within an active partnership would not increase monotonically over time. As we show in Appendix B, in that case an exporter could choose to maintain his partnership even after observing a bad outcome. And since in that case his prior about the type of his distributor would deteriorate, the export volume would fall in the subsequent period. Still, export volumes within surviving partnerships do increase over time also in that case, if we consider a long enough time period.

proportion of international contracts enforced in Foreign. Let the resulting institutional parameter be denoted by λ_t, where the subscript t on λ indicates that the change takes place at date t. Clearly, the immediate effect of this change is an improvement in the volume of trade, just as Johnson et al. (2002) find for partnerships in transition economies:

$$\frac{\partial Q_t}{\partial \lambda_t} = \frac{-\theta_{t,0} R'(Q_t)}{[1-\theta_{t,0}(1-\lambda_t)]\, R''(Q_t)} > 0.$$

Since the exporter anticipates that he will receive his share of the total revenue with a higher probability, he is willing to export more.

Note that the distributor's reputation at t is not affected by the increase in λ at that date. The reason is that reputation is a function of past levels of contract enforcement, not the current one. However, the change in λ affects the future reputation of the distributor. Consider his reputation at date $t+k$, $k>0$. From equation (6), we have

$$\frac{\partial \theta_{t,k}}{\partial \lambda_t} = \frac{k\lambda_t^{k-1}\theta_{t,0}(1-\theta_{t,0})}{(\lambda_t^k \theta_{t,0} + 1 - \theta_{t,0})^2} > 0.$$

Hence, a further implication of the improvement in the institutional setting of Foreign is that it *reduces* the future reputation of active distributors, relative to what it would have been under the lower λ. Intuitively, a higher λ slows down the process of reputation building because it makes it more difficult for an exporter to discern whether the distributor is complying with the contract voluntarily or motivated by the threat of a legal challenge.

As a result, the net impact of an institutional change in Foreign on future export volumes is not as transparent as its contemporaneous effect is. We have that, for all $k>0$,

$$\frac{dQ_{t+k}}{d\lambda_t} = -\frac{R'(Q_{t+k})}{[1-\theta_{t,k}(1-\lambda_t)]\, R''(Q_{t+k})}\left[\theta_{t,k} - (1-\lambda_t)\frac{\partial \theta_{t,k}}{\partial \lambda_t}\right]. \tag{22}$$

There are two opposing effects. First, an increase in λ at date t has a direct positive effect on exports in period $t+k$ for the same reason it has in date t. This effect is represented by the first element in the square bracket of expression (22). However, there is also an indirect negative effect due to the slower improvement in the distributor's reputation associated with the increase in λ, represented by the second element in the square bracket of (22). The net impact depends on the comparison between these two forces. That is, an increase in λ at date t improves exports within a partnership at date $t+k$ beyond its original trend if and only if

$$\theta_{t,k} > (1-\lambda_t)\frac{\partial \theta_{t,k}}{\partial \lambda_t}. \tag{23}$$

We can rewrite this inequality as

$$\eta(\theta_{t,k}, \lambda_t) \equiv -\frac{\partial \theta_{t,k}}{\partial(1-\lambda_t)}\frac{(1-\lambda_t)}{\theta_{t,k}} < 1,$$

where $\eta(\theta_{t,k}, \lambda_t)$ represents the date $t+k$ elasticity of the distributor's reputation with respect to a date t change in the institutional setup in Foreign. Thus, the net effect of an increase in λ on future export volumes within a partnership is positive as long as it does not induce large changes in the process of reputation building, or as long as the time $t+k$ reputation is inelastic with respect to changes in λ at time t.

Using (6), we can express inequality (23) after some manipulation also as a direct function of k, θ_t and λ_t:

$$t + k < \frac{\lambda_t}{1 - \lambda_t} \frac{1 - \theta_t(1 - \lambda_t^{2t+k})}{1 - \theta_t}. \tag{24}$$

Since the right-hand side of this expression is increasing in λ_t, it becomes clear that there is a value of λ_t for any $t+k$, say $\lambda_t(t+k)$, such that a small increase in λ at date t expands trade at date $t+k$ for all $\lambda_t > \lambda_t(t+k)$ but decreases it otherwise. In other words, there are *increasing returns to institutional quality* in terms of trade within a partnership. Intuitively, in economies with a weak enforcement structure an exporter's belief about the type of his distributor is very sensitive to changes in λ. In that case, a small tightening in the enforcement of contracts hurts the distributor's ability to increase his reputation significantly and, as a consequence, lowers the quantity exported in future periods. In contrast, in economies with stronger enforcement structures, the role of reputations is limited anyway, so when λ increases, its direct effect on trade prevails.

3.2 Aggregate Trade

Having studied the dynamics of trade within a partnership, we now consider aggregate trade flows when the economy is in its steady state.

From (20) and (21), the measures of active myopic and patient distributors in the end of each period in the steady state are, respectively,

$$\theta_0 - m^s = \frac{x\sigma\lambda\theta_0}{1 - \sigma\lambda(1 - x)}$$

and

$$1 - \theta_0 - p^s = \frac{x\sigma(1 - \theta_0)}{1 - \sigma(1 - x)}.$$

These expressions show the determinants of the extensive margin of trade, and therefore allow us to study how changes in the institutional parameter λ impacts the measure of active partnerships. Clearly, λ does not affect the steady state measure of patient distributors, since they never default. However,

$$\frac{\partial(\theta_0 - m^s)}{\partial\lambda} = \frac{x\sigma\theta_0}{[1 - \sigma\lambda(1 - x)]^2} > 0,$$

implying that an institutional improvement in Foreign raises the number of exporters in steady state by increasing the partnerships formed by myopic distributors.

Note also that, at any point in time, there are partnerships with different ages operating in Foreign's market. Stricter enforcement of contracts in Foreign affects also the age profile of those active partnerships. This is important because, as we discussed in the previous subsection, the age of a partnership affects its export volume through the reputation of the distributor. As a partnership ages, the reputation of the distributor improves, causing an increase in export volumes.

To see this effect, let μ_k^m and μ_k^p denote, respectively, the steady state measures of partnerships with myopic and patient distributors that have been active for exactly k periods:

$$\mu_k^m = x(\sigma\lambda)^k m^s, \tag{25}$$

$$\mu_k^p = x\sigma^k p^s. \tag{26}$$

Substituting for the expressions of m^s and p^s in (20) and (21), we can write the total measure (μ_k) of active partnerships of age k as

$$\mu_k(\lambda, x, \sigma, \theta_0) = \mu_k^m + \mu_k^p = \frac{x(1-\sigma\lambda)(\sigma\lambda)^k\theta_0}{1-\sigma\lambda(1-x)} + \frac{x(1-\sigma)\sigma^k(1-\theta_0)}{1-\sigma(1-x)}.$$

Note however that, because μ_k^p does not depend on λ, we only need to compute the impact of λ on partnerships formed by myopic distributors to see how the measure of active partnerships of different ages evolves as a function of the institutional setting in Foreign:

$$\frac{d\mu_k^m}{d\lambda} = x(\sigma\lambda)^{k-1}[km^s + x(\sigma\lambda)\frac{\partial m^s}{\partial\lambda}]. \tag{27}$$

Since

$$\frac{\partial m^s}{\partial\lambda} < 0,$$

the sign of (27) can be either positive or negative. Using (20) and manipulating, we find that $d\mu_k^m/d\lambda > 0$ as long as

$$k > \frac{x^2\sigma^2\lambda}{(1-\sigma\lambda)[1-\sigma\lambda(1-x)]}. \tag{28}$$

Therefore, for given x and σ, a higher λ increases the measure of older partnerships at the expense of newer ones.

Hence, a higher λ both increases the total measure of active partnerships and shifts their distribution toward older partnerships. Since in older partnerships there is enhanced trust, and therefore more trade, both effects are associated with greater aggregate trade.

These effects correspond to the steady state impacts of stricter contract enforcement on the number and age profile of active exporters for a given belief θ^s. However, the parameter λ affects also the speed at which partnerships with myopic distributors are terminated, and therefore the prior of exporters in newly formed partnerships. Specifically, a higher λ increases the measure of active myopic distributors in steady state, thus lowering θ^s. This improved belief about the quality of inactive distributors induces new exporters to start relationships trading at a higher level, an effect that boosts trade flows for the whole life span of the partnership.

3.3 The Impact of an Institutional Improvement on Trade Flows

We have now a complete view of the impact of an institutional improvement on trade. To highlight each channel through which λ operates, we will write the (steady state) belief that a distributor is myopic in a partnership of age k as $\theta_s^k(0, \theta^s(\lambda, x, \sigma, \theta_0), \lambda)$, making explicit both the direct and indirect dependence of θ_s^k on λ. The direct dependence represents the slowdown in the process of belief update of each exporter that we discussed above. The indirect dependence reflects the impact of λ on the steady state frequency of inactive myopic distributors. We can then express the volume of trade in a partnership as $Q[\theta_s^k(0, \theta^s(\lambda, x, \sigma, \theta_0), \lambda); \lambda, \alpha, c]$, and thus the steady state aggregate volume of trade, AQ^s, as

$$AQ^s(\lambda, x, \sigma, \theta_0, \alpha, c) = \sum_{k=0}^{\infty} \mu_k(\lambda, x, \sigma, \theta_0) Q[\theta_s^k(0, \theta^s(\lambda, x, \sigma, \theta_0), \lambda); \lambda, \alpha, c]. \tag{29}$$

Expression (29) underscores the various channels through which a change in the institutional setting affects the aggregate volume of trade. Specifically, an increase in λ impacts the steady state volume of trade through five distinct mechanisms:

1. it increases the measure of active partnerships (*the extensive margin effect*);
2. it shifts the distribution of active partnerships towards older ones (*the composition effect*);
3. it improves the prior of exporters in newly formed partnerships (*the prior effect*);
4. it increases the probability that each exporter will receive his share of the total revenue (*the intensive margin effect*); and
5. it slows down the process of reputation building of the distributor (*the trust slowdown effect*).

The first two effects are reflected in the measure $\mu_k(\lambda, x, \sigma, \theta_0)$ of active partnerships of age k, for all k. The prior effect comes from the impact of λ on Q through θ^s, $Q[\theta_s^k(0, \theta^s(\lambda, .), .); .]$. The intensive margin effect affects the volume of trade within each partnership for given θ_s^k, $Q[\theta_s^k(0, \theta^s(.), .); \lambda]$. Finally, the trust slowdown effect, which is the only channel through which an improvement in institutional quality reduces international trade, affects trade within each partnership through the process of belief update, $Q[\theta_s^k(0, \theta^s(.), \lambda); .]$.

To calculate the contribution of each channel for trade flows, we proceed as follows. Suppose that λ changes from λ_0 to λ_1. This would cause a change in total trade of

$$\begin{aligned}\Delta AQ^s &= \sum_{k=0}^{\infty} \mu_k(\lambda_1, .) Q[\theta_s^k(0, \theta^s(\lambda_1, .), \lambda_1); \lambda_1, .] - \sum_{k=0}^{\infty} \mu_k(\lambda_0, .) Q[\theta_s^k(0, \theta^s(\lambda_0, .), \lambda_0); \lambda_0, .] \\ &= \sum_{k=0}^{\infty} \left\{ Q[\theta_s^k(0, \theta^s(\lambda_1, .), \lambda_1); \lambda_1, .] \Delta\mu_k + \mu_k(\lambda_0, .) \Delta Q_k \right\},\end{aligned}$$

where $\Delta\mu_k \equiv \mu_k(\lambda_1, .) - \mu_k(\lambda_0, .)$ and $\Delta Q_k \equiv Q[\theta_s^k(0, \theta^s(\lambda_1, .), \lambda_1); \lambda_1, .] - Q[\theta_s^k(0, \theta^s(\lambda_0, .), \lambda_0); \lambda_0, .]$. Denoting the total number of active partnerships in steady state with the initial and final values of λ by $M_0 \equiv \sum_{k=0}^{\infty} \mu_k(\lambda_0, .)$ and $M_1 \equiv \sum_{k=0}^{\infty} \mu_k(\lambda_1, .)$, respectively, we can rewrite ΔAQ^s as:

$$\begin{aligned}\Delta AQ^s &= \sum_{k=0}^{\infty} Q[\theta_s^k(0, \theta^s(\lambda_1, .), \lambda_1); \lambda_1, .] \left(\frac{M_1 - M_0}{M_0} \right) \mu_k(\lambda_0, .) \\ &\quad + \sum_{k=0}^{\infty} Q[\theta_s^k(0, \theta^s(\lambda_1, .), \lambda_1); \lambda_1, .] \left[\mu_k(\lambda_1, .) - \frac{M_1}{M_0} \mu_k(\lambda_0, .) \right] \\ &\quad + \sum_{k=0}^{\infty} \mu_k(\lambda_0, .) \left\{ Q[\theta_s^k(0, \theta^s(\lambda_1, .), \lambda_1); \lambda_1, .] - Q[\theta_s^k(0, \theta^s(\lambda_0, .), \lambda_1); \lambda_1, .] \right\} \quad (30) \\ &\quad + \sum_{k=0}^{\infty} \mu_k(\lambda_0, .) \left\{ Q[\theta_s^k(0, \theta^s(\lambda_0, .), \lambda_1); \lambda_1, .] - Q[\theta_s^k(0, \theta^s(\lambda_0, .), \lambda_0); \lambda_1, .] \right\} \\ &\quad + \sum_{k=0}^{\infty} \mu_k(\lambda_0, .) \left\{ Q[\theta_s^k(0, \theta^s(\lambda_0, .), \lambda_0); \lambda_1, .] - Q[\theta_s^k(0, \theta^s(\lambda_0, .), \lambda_0); \lambda_0, .] \right\}.\end{aligned}$$

The expressions in each line represent, in sequence, the extensive margin effect, the composition effect, the prior effect, the trust slowdown effect, and the intensive margin effect. With knowledge of the parameters of the model, one could then calculate the relative contribution of each force for an institutional-induced change in trade flows. To illustrate this procedure, we consider below an example with a liner demand.

3.4 Example

Suppose that each exporter faces a linear demand in Foreign of the form:

$$q = A - P,$$

where P is the price charged by the exporter in Foreign. This implies an optimal quantity of

$$Q = \frac{A\alpha[1-\theta(1-\lambda)] - c}{2\alpha[1-\theta(1-\lambda)]}.$$

Assumption $A1$ requires $\lambda > c/A\alpha$. In turn, assumption $A2$ holds if $\kappa > (A\alpha\lambda - c)^2/4\alpha\lambda$.

Consider then the following parametrization: $\{A = 5, c = 1, \alpha = 4/5, \theta_0 = 1/3, \sigma = 3/4, x = 1/5, \delta_e = 8/9, \kappa = 1.9\}$. To satisfy $A1$, we need $\lambda > 1/4$. This parametrization satisfies $A2$ up to $\lambda = 4/5$ (above this level the exporter earns positive present value profits even if $\theta = 1$). Furthermore, the steady state will be such that $\theta^s < \overline{\theta}$ for any $\lambda \geq 0.38$.

In Figure 1, we plot the total impact on trade of an institutional improvement in Foreign. Initially, $\lambda = 2/5$. We then consider a progressive increase in λ until $\lambda = 4/5$. The solid line represents the total impact of the increase in λ on trade flows in percentage terms. The other lines represent the individual channels, with the exception of the intensive margin and the trust slowdown effects, which we bundle together for visual clarity. With $\lambda = 4/5$, exports to Foreign increase by more than fifty percent relative to their initial value. Slightly over half of this increase comes from changes in the dynamics of the partnerships (i.e. the intensive margin and the trust slowdown effects[17]). Increases in the extensive margin of trade enhances trade by about 20 percentage points, which is close to forty percent of the total change. The impact on trade through changes in the prior of new exporters contributes to less than three percent of the total. Finally, changes in the composition of partnerships toward older ones contribute to slightly over one percent of the overall increase in trade flows.

Naturally, the relative magnitudes obtained in this example may not hold generally. Its main goal is to illustrate the various channels through which trade can be enhanced with improvements in the institutional setting of a country even when there are no changes in trade policies, and to indicate that they can be significant.

4 Zero-Profit Condition ($\theta^s > \overline{\theta}$)

The discussion so far has focused on an equilibrium where a producer always wants to become an active exporter. Underlying this incentive is the assumption (condition $C1$) that the frequency

[17] The former accounts for almost 65 percent of the total impact, whereas the latter drives trade down by about ten percent of the total increase.

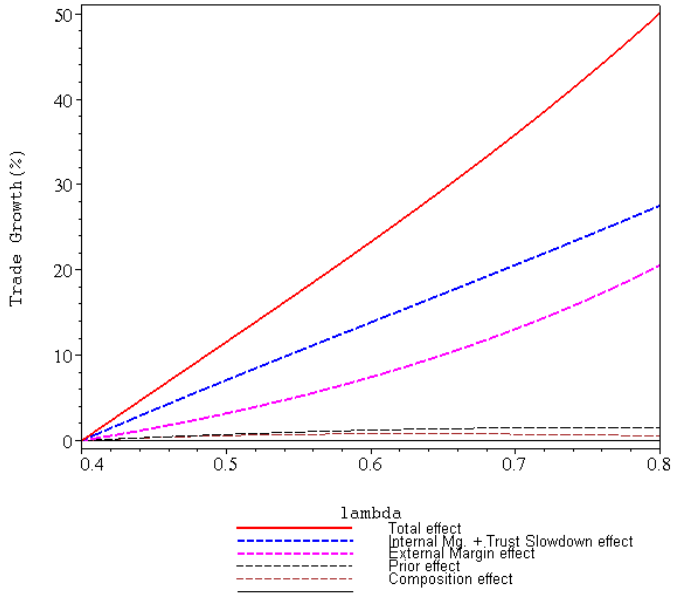

Figure 1: Impact on Trade of an Increase in λ

of inactive myopic distributors is bounded above by $\overline{\theta}$, so that the expected profit from entering into a partnership is always positive. However, the pool of available distributors could, under some circumstances, worsen to a point where the expected gain from forming a partnership becomes negative. In what follows we study how this possibility affects the producers' behavior and address its implications for trade flows.

Under the same strategy for distributors considered above, the one-period contract the producer signs with a distributor remains unchanged, i.e. the producer still chooses Q to maximize its current profits, taking as given his belief regarding the type of the distributor. However, producers' entry/exit decisions change, as they depend on the frequency of inactive myopic distributors. To distinguish this case from the one considered before, denote by $\widehat{\theta}_t$ the belief that an inactive distributor at date t is myopic when condition $C1$ does not hold, and let $\{\widehat{\theta}_t\}_{t=0}^{\infty}$ be the set of such priors.

Consider then a producer's decision on whether to take a business opportunity and form a partnership. Assume for now that $\{\widehat{\theta}_t\}_{t=0}^{\infty}$ is a non-decreasing sequence. Lemma 1 then implies that, as long as the present value of profits is positive, new partnerships form and the entry/exit process in the pool of inactive distributors is such that $\widehat{\theta}_t$ follows exactly the same dynamics as $\widetilde{\theta}_t$. However, since $\widetilde{\theta}_t$ is strictly increasing and converges to θ^s, there exists a period t' such that $\widetilde{\theta}_t = \widehat{\theta}_t < \overline{\theta}$ for all $t < t'$ but at t' the expected profit of forming a partnership is non-positive. Since $\{\widehat{\theta}_t\}_{t=0}^{\infty}$ follows a discrete dynamic, the frequency $\widehat{\theta}_{t'}$ generally oscillates around $\overline{\theta}$. As an approximation, we assume hereafter that $\widehat{\theta}_{t'} = \overline{\theta}$, as a way to provide a clear comparison with the case where the zero-profit condition does not bind.

In this context, denote by ϕ the fraction of inactive exporters that form a partnership upon

finding a business opportunity. The dynamics of inactive distributors is then given by

$$m_{t'+1} = (1-\phi)m_{t'} + (1-x\sigma\lambda)\phi m_{t'} + (1-\sigma\lambda)(\theta_0 - m_{t'}), \tag{31}$$
$$p_{t'+1} = (1-\phi)p_{t'} - (1-x\sigma)\phi p_{t'} + (1-\sigma)(1-\theta_0 - p_{t'}).$$

In the steady state, $m_{t+1} = m_t = m$, and $p_{t+1} = p_t = p$. Hence, (31) implies

$$\frac{1-\sigma\lambda+\sigma\lambda x\phi}{1-\sigma+\sigma x\phi} = \frac{(1-\sigma\lambda)\theta_0 p}{(1-\sigma)(1-\theta_0)m}. \tag{32}$$

Since $\overline{\theta} = \frac{m}{m+p}$, the fraction $\widehat{\phi}$ of inactive myopic exporters that form a partnership in the steady state where $\theta^s > \overline{\theta}$ is the solution to

$$\frac{\theta_0}{1-\theta_0}\frac{1-\overline{\theta}}{\overline{\theta}} = \frac{1-\sigma\lambda+\sigma\lambda x\widehat{\phi}}{1-\sigma+\sigma x\widehat{\phi}}\frac{1-\sigma}{1-\sigma\lambda}. \tag{33}$$

It is easy to check that $\theta^s > \overline{\theta}$ implies $\widehat{\phi} < 1$. Moreover, a sufficient condition for $\widehat{\phi} > 0$ is

$$\frac{\theta_0}{1-\theta_0}\frac{1-\theta^s}{\theta^s} > \frac{(1-\sigma)\lambda}{1-\sigma\lambda}. \tag{34}$$

After expressing θ^s in terms of primitives, one finds that this inequality holds if and only if $\lambda < 1$. Hence, $\widehat{\phi} \in (0,1)$.

Under the above dynamics, the frequency of inactive myopic distributors is strictly increasing at first and then converges to $\overline{\theta}$. Therefore, a result similar to Lemma 1 applies. The only difference is that an exporter is strictly willing to enter into a partnership at some date t if and only if $\widehat{\theta}_t < \overline{\theta}$. In the steady-state, when $\widehat{\theta}_t = \overline{\theta}$, only a fraction $\widehat{\phi}$ of producers forms a partnership upon finding a business opportunity. The behavior of the distributors, as stated in Lemma 2, is also the same. Thus, as long as we adjust the entry behavior of exporters as above and replace the set of beliefs $\{\widetilde{\theta}_t\}_{t=0}^{\infty}$ with $\{\widehat{\theta}_t\}_{t=0}^{\infty}$, Proposition 1 holds essentially unchanged.[18]

Having characterized the equilibrium, we now proceed as in Section 3 to study the interaction between institutional quality and international trade. In particular, we look at how an improvement on the institutional setting affects trade flows at the steady state $\overline{\theta}$. First, the volume of trade in an ongoing partnership follows the same dynamics as in the case where the steady state is given by θ^s. This is so because the zero profit condition only affects the producer's decision to form a partnership; it has no bearing on his decisions once a partnership has been formed. As a result, the *intensive margin effect* and the *trust slowdown effect* are the same as before. Similarly, since the probability of an endogenous breakdown falls when λ increases, there is also a positive *composition effect*.

The behavior of aggregate trade is different in this case, however, in particular because the measure of active partnerships reacts differently to changes in the institutional setting. To understand these effects, we need first to describe how an increase in λ affects $\overline{\theta}$. Note that $\overline{\theta}$ is the solution to (where, for all t, $\theta^i(\overline{\theta}) \equiv \theta_t^i(0,\overline{\theta})$)

$$v(\overline{\theta}) \equiv \pi(\overline{\theta}) + \sum_{i=1}^{\infty}\beta_e^i\pi(\theta^i(\overline{\theta}))\prod_{j=0}^{i-1}\left[\sigma(1-\theta^j(\overline{\theta}) + \lambda\theta^j(\overline{\theta}))\right] = 0. \tag{35}$$

[18] These results are a straightforward modification of lemmas 1, 2, 3, and of Proposition 1. Details are available from the authors upon request.

Clearly,

$$\frac{\partial \pi(\overline{\theta}_t)}{\partial \lambda} > 0,$$

as an institutional improvement reduces the likelihood that a myopic distributor defaults and does not affect the current reputation of the distributor. However, as discussed in Section 3, its future impact has two opposing effects. A higher λ reduces the likelihood that a myopic distributor defaults, but it also slows down the improvement of the distributor's reputation. The net impact depends on the comparison between those forces. However, as long as β_e is sufficiently small, the overall impact on the present value of the profits will necessarily be positive. Assuming that β_e is sufficiently small, then, for all θ,

$$\frac{\partial v(\theta)}{\partial \lambda} > 0.$$

As a result, an increase in λ will lead to an increase in $\overline{\theta}$.

Therefore, there will be further entry of exporters into partnerships, and this entry will continue up to the point where either one of two scenarios arise: (i) the frequency of inactive myopic distributors reaches the new value of $\overline{\theta}$, with the expected profit of new entrants being again driven back to zero; or (ii) the frequency of inactive myopic distributors reaches θ^s, in which case the expected profit of new entrants remains positive. This second scenario happens if the increase in λ is large enough to reverse the order between θ^s and $\overline{\theta}$, making $\theta^s < \overline{\theta}$.[19] Either way, there is a positive *extensive margin effect*. Hence, the four effects mentioned so far work in the same direction as in the scenario where the zero-profit condition does not bind. The only channel that works differently is the *prior effect*. This happens because, as $\overline{\theta}$ increases, the pool of inactive distributors worsens. In the steady-state, this induces producers to start new relationships trading at a lower level.

5 Trade Policy

When an exporter has to incur in an ad valorem tariff τ to sell in Foreign, his choice of how much to export is altered. In that case, the exporter's expected profit becomes

$$\pi(q, \theta; \lambda, \alpha, c, \kappa, \tau) = -cq + \alpha[\theta\lambda + 1 - \theta]\,(1-\tau)\,R(q) - \kappa. \tag{36}$$

We denote the exporter's optimal choice in this case by $Q_\tau = Q_\tau(\theta; \lambda, \alpha, c, \tau)$.

Trade is lower with the tariff, since $Q(\theta; \lambda, \alpha, c) = Q_\tau(\theta; \lambda, \alpha, c, \tau = 0)$ and

$$\frac{\partial Q_\tau}{\partial \tau} = \frac{R'(Q_\tau)}{(1-\tau)\,R''(Q_\tau)} < 0. \tag{37}$$

Using equation (37), we can then write the impact of a marginal *decrease* in the tariff rate as

$$-\frac{\partial Q_\tau}{\partial \tau} = \frac{Q_\tau}{(1-\tau)\,\epsilon(Q_\tau)} > 0,$$

where $\epsilon(Q_\tau) \equiv -\frac{Q_\tau R''(Q_\tau)}{R'(Q_\tau)}$ is the (negative of the) elasticity of the marginal revenue evaluated at $q = Q_\tau$. Thus, it is clear that lower tariffs always enhance trade volumes by inducing

[19] Recall that, since $\frac{\partial m^s}{\partial \lambda} < 0$, and $\frac{\partial p^s}{\partial \lambda} = 0$, it must be that $\frac{\partial \theta^s}{\partial \lambda} < 0$.

those producers who export to increase their foreign sales. That is, trade liberalization always promotes trade at the intensive margin.

On the other hand, the impact of trade liberalization on the extensive margin of trade depends on whether the economy reaches the steady state where entrants have prior θ^s or the one where the prior of entrants is $\overline{\theta}$. In the steady state with θ^s, entrants expect to earn strictly positive profits. Therefore, while a lower tariff enhances the expected volume of each active exporter, in that case it has no effect on the number of active exporters.

In contrast, the effect of trade liberalization on the extensive margin of trade is very different when $\overline{\theta} < \theta^s$, in which case the expected profits for entrants is zero. To show that, we first establish the relationship between the tariff τ and $\overline{\theta}$. Clearly, since Q_τ is a decreasing function of τ, the same is true for the current profit. Using the envelope theorem (and denoting expected profit by $\pi(\theta, \tau)$ to shorten the notation), we obtain

$$\frac{d\pi(\theta,\tau)}{d\tau} = -\alpha[\theta\lambda + 1 - \theta]R(Q_\tau) < 0.$$

Moreover, the value function of an active exporter corresponds to

$$v(\theta,\tau) = \pi(\theta,\tau) + \sum_{i=1}^{\infty} \beta_e^i \pi(\theta^i(\theta),\tau) \prod_{j=0}^{i-1} [1 - \theta^j(\theta) + \lambda\theta^j(\theta)]\sigma.$$

Thus,

$$\begin{aligned}\frac{dv(\theta,\tau)}{d\tau} = &-\alpha[\theta\lambda + 1 - \theta]R(Q_\tau(\theta)) \\ &- \sum_{i=1}^{\infty} [\theta^i(\theta)\lambda + 1 - \theta^i(\theta)]\alpha\beta_e^i R(Q_{\tau i}(\theta^i(\theta))) \prod_{j=0}^{i-1} [1 - \theta^j(\theta) + \lambda\theta^j(\theta)]\sigma < 0. \quad (38)\end{aligned}$$

That is, a decrease in the tariff raises the value of forming a partnership.

By applying the same reasoning used in the proof of Lemma 1, we can then conclude that there is a threshold $\overline{\theta}(\tau)$ such that an exporter enters in a partnership if and only if his prior is below $\overline{\theta}(\tau)$. Moreover, since $v(\theta, \tau)$ decreases with the tariff, a lower tariff raises $\overline{\theta}(\tau)$. Intuitively, a lower tariff increases profits at any level of exports and θ. The zero profit condition is then reached only under a more pessimistic belief about the pool of available distributors. As a result, in that case trade liberalization extends the period during which new producers enter Foreign's market, causing an increase in trade also through the extensive margin.

In fact, for a sufficiently high tariff, trade liberalization necessarily enhances trade at the extensive margin. To see that, define the *prohibitive tariff* implicitly as the minimum tariff that makes expected profits equal to zero at $\theta = \theta_0$:

$$\overline{\theta}(\tau^{proh}) \equiv \theta_0.$$

When $\tau = \tau^{proh}$, by construction no producer ever expects to gain by becoming an exporter. On the other hand, by continuity there is trade whenever $\tau < \tau^{proh}$. Moreover, if the tariff is smaller but sufficiently close to τ^{proh}, $\theta_0 < \overline{\theta} < \theta^s$ must hold. Therefore, trade liberalization necessarily enhances trade at the extensive margin while the tariff is high enough so that $\overline{\theta}(\tau)$ remains below θ^s.

Now, since $d\overline{\theta}/d\tau < 0$, $\overline{\theta}$ is highest when $\tau = 0$ (ruling out the possibility of import subsidies). However, $\overline{\theta}(\tau{=}0)$ can be either greater or smaller than θ^s. If $\overline{\theta}(\tau{=}0) < \theta^s$, then trade liberalization always enhances trade at both the intensive and extensive margins. On the other hand, if $\overline{\theta}(\tau{=}0) > \theta^s$, trade liberalization induces entry in exporting activities up to a level of the tariff $\tau' \in (0, \tau^{proh})$ such that $\overline{\theta}(\tau') = \theta^s$. Below that level, trade liberalization is ineffective to induce firms to begin exporting.

The *nature* of the tariff change also shapes the extensive margin effect. In the derivative (38), it is assumed that the tariff reduction is permanent, in which case the change alters the whole string of profits. However, if the tariff reduction were instead perceived to be temporary, it would have a smaller impact on $v(\widetilde{\theta}_t, \tau)$, since it would affect profits only until the period the lower tariff was expected to remain in place. With the smaller effect on $v(\widetilde{\theta}_t, \tau)$, the impact on $\overline{\theta}$, and therefore on the extensive margin of trade, would be less prominent as well.

The impact of trade liberalization on the extensive margin depends also on the institutional quality of the country. Recall that $d\overline{\theta}/d\lambda > 0$ and $d\theta^s/d\lambda < 0$. Thus, all else constant, $\overline{\theta} < \theta^s$ holds over a wider range of tariffs when λ is low than when λ is high. Hence, the efficacy of trade liberalization in promoting trade at the extensive margin tends to be greater in countries with more lenient enforcement of contracts. Since developing countries are generally more likely to have weaker enforcement of contracts, and to have higher tariffs than developing ones, our analysis suggests that trade liberalization tends to be particularly effective in inducing new firms to export in developing countries, but not in developed ones. This result is consistent with the findings of Feinberg and Keane (2005), who find that U.S.-Canada tariff reductions from 1984 to 1995 increased multinationals' trade almost entirely at the intensive margin.

6 Concluding Remarks

The idea that firms engaged in international trade build reputations to substitute for weak enforcement of contracts is intuitive and important empirically, but has not yet been studied formally. This paper is an initial step toward understanding the role of contract enforcement in international trade and the response of individual traders through the construction of reputations. We carry out the analysis with a model that is simple yet contains all the key ingredients to allow us to formalize the idea that inadequate enforcement of contracts matters for international trade.

We characterize the dynamics of trade and show that contract enforcement shapes international trade through several distinct channels. For example, an institutional improvement has both a positive direct effect and a negative indirect effect, through the process of reputation building, on the dynamics of the trade flows of an exporter. Stricter enforcement of contracts affects also the level of trade at which new producers begin exporting. Furthermore, firms stay longer in exporting activities and more firms export to a country if it tightens enforcement.

Trade liberalization always increases trade at the intensive margin. It further improves trade flows when it affects also the extensive margin of trade, but this does not always happen. Generally, a reduction in tariffs is more likely to induce new firms to become exporters if initial

tariffs are high and institutional quality is low, as in developing countries.

Some of the predictions of our model could arise also in distinct settings. For example, the idea that exporting firms tend to start small and increase trade volumes over time has been rationalized by Rauch and Watson (2003) in a model where buyers make irreversible investments to train foreign suppliers. The main distinguishing feature of our setup is the nontrivial relationship between exporting behavior and institutional quality. In particular, a novel testable prediction of our model is that while a firm is exporting to a country, its exports should increase overtime if the level of contract enforcement in the country is weak, particularly in the first periods of export activity to that market. Such a prediction does not arise, for example, in the recent literature on firms' export behavior (see Tybout 2003 for a survey), which does not suggest any systematic trend in the level of exports of a firm after it breaks into a new market.

Another testable prediction that is particular to our model is that there are market-specific costs to export to a country even after controlling for market size and standard trade costs due to transportation and trade policy. Our model indicates that those additional costs, caused by informational frictions, should in general be inversely related to the level of contract enforcement in the country. Weaker enforcement tends to reduce exports both at the firm level and in aggregate, as poor enforcement limits the entry of new firms.

Our model can be extended in several directions. We develop the main steps of one possible extension in Appendix B, where we consider that exporters cannot distinguish between opportunistic behavior and bad luck. This generates noise in the process of reputation building and more nuanced export dynamics. Another possibility would be to relax the assumption of identical marginal costs of production. Allowing for heterogeneous costs among producers would generate richer dynamics as well, because the zero-profit condition would become producer-specific. The reason is that higher marginal costs would be associated with lower current and future profits and, thus, with lower overall gains from forming a partnership. A direct implication would be that only the most efficient producers would export, corroborating a very robust finding in the empirical literature on plant-level export behavior.

One could enrich the model to study also firms' choices with respect to how to serve foreign markets, via exports or through foreign direct investment. The received literature on this topic typically emphasizes the trade-off between the trade costs of exporting versus the fixed costs of FDI. This paper shows that exporters have to overcome also informational costs to sell in countries where institutions are weak, of which a significant part could probably be avoided if the firms engaged in FDI. On the other hand, other institutional features, such as the probability of investment expropriation, would have to be considered in this kind of analysis as well.

Appendix A – Proof of Lemma 3

Proof of Lemma 3. The probability that a randomly chosen inactive distributor at date t is myopic is

$$\theta_t = \frac{m_t}{m_t + p_t}.$$

We will prove that $\theta_{t+1} \geq \theta_t$ by induction. First, since $m_0 = \theta_0$ and $p_0 = 1 - \theta_0$, we have that $\theta_1 \geq \theta_0$ as long as

$$m_1(1 - \theta_0) \geq p_1\theta_0. \tag{39}$$

Substituting for m_1 and p_1 using (19), we find that this inequality is always true, since $\lambda < 1$. Now assume that $\theta_t \geq \theta_{t-1}$. If we substitute for m_t and p_t using (19), we can rewrite this inequality as

$$(1 - \lambda\sigma)\theta_0 p_t \geq (1 - \lambda)p_t m_t + \lambda(1 - \sigma)(1 - \theta_0)m_t. \tag{40}$$

We need to show that (40) implies $\theta_{t+1} \geq \theta_t$, which is equivalent to

$$(1 - \lambda\sigma)\theta_0 p_t \geq (1 - x)(1 - \lambda)\sigma p_t m_t + (1 - \sigma)(1 - \theta_0)m_t. \tag{41}$$

Therefore, a sufficient condition for (41) to hold is that

$$(1 - \lambda)p_t m_t + \lambda(1 - \sigma)(1 - \theta_0)m_t \geq (1 - x)(1 - \lambda)\sigma p_t m_t + (1 - \sigma)(1 - \theta_0)m_t,$$

which simplifies to

$$[1 - \sigma(1 - x)]p_t \geq (1 - \sigma)(1 - \theta_0). \tag{42}$$

Since p_t is a strictly decreasing sequence, it is sufficient to show that

$$[1 - \sigma(1 - x)]p^s \geq (1 - \sigma)(1 - \theta_0),$$

which is true, given the expression for p^s in (21). ■

Appendix B – Uncertain Demand

In the main text we assume that "bad outcomes" from the perspective of the exporter arise only when the distributor defaults on the contract. An implication of that assumption is that, after the realization of any outcome where the exporter receives less than $\alpha R(Q)$ from the distributor, the exporter immediately updates his belief to $\theta = 1$. But while very convenient analytically, this assumption seems too strong. In this Appendix we relax that assumption.

To do so, we consider that demand is stochastic. Specifically, we assume that the demand for each product in each period can be either 'high' or 'low.' If demand is high, it generates revenue $R(q)$, just as before. If demand is low, then we normalize it so that revenue is nil. We define the probability that demand is high with parameter $\gamma \in [0, 1]$. Foreign distributors observe demand shocks, but Home exporters do not. Thus, if an exporter does not receive any revenue in a certain period, he does not know whether the demand for his product was low or whether the distributor chose to default on their contract. When an exporter does not receive any revenue, we say that he experienced a *bad outcome*.

In this context, we show that trade within each existing partnership does not increase monotonically over time anymore. However, trade levels do increase if we consider a long enough period of time. Moreover, the frequency of patient distributors within active partnerships increases monotonically and the partnerships that survive in the long run are all composed by patient distributors whose volume of trade converges to the perfect information level.

To develop this extension, we consider a partnership formed at the beginning of date 1. The same reasoning applies to a partnership formed at any other date, the only difference being the initial prior of the exporter in this partnership. To focus on the dynamics of a partnership, we consider that there are no exogenous breakdowns. Finally, we assume that a distributor must make an once and for all choice at the beginning of the partnership between always defaulting or never defaulting. At the end of this appendix we present conditions under which this assumption can be relaxed.

Consider then a scenario where a patient distributor never defaults on the contract and a myopic distributor defaults whenever he has a chance to do so. Later we show that this behavior is part of a sequential equilibrium. The exporter's current expected profit is now

$$\pi(q, \theta; \lambda, \gamma, \alpha, c, \kappa) = -cq + \alpha\gamma[\theta\lambda + 1 - \theta]R(q) - \kappa.$$

The only difference with the benchmark model is that the revenue of the exporter depends also on the probability γ that demand is high. After a contract is signed, the exporter's optimal decision is given by $Q^\gamma = Q(\theta; \lambda, \gamma, \alpha, c)$, where

$$-c + \alpha\gamma[\theta\lambda + 1 - \theta]R'(Q^\gamma) = 0.$$

Analogously to assumptions $A1$, $A2$ and $A3$, we now have

$$\begin{aligned} A1' &: Q(1; \lambda, \gamma, \alpha, c) > 0, \\ A2' &: \pi(Q^\gamma, 1; \lambda, \gamma, \alpha, c, \kappa) < 0, \\ A3' &: \pi(Q^\gamma, 0; \lambda, \gamma, \alpha, c, \kappa) > 0, \end{aligned}$$

with the interpretation of each assumption being the same as in the benchmark case.

The exporter's belief evolves over time according to his experience within the partnership. Since we focus on the dynamics of a partnership formed at date 1, we can define $\theta_t^k(C, \theta)$ simply as $\theta(C_{t-1})$, where $\theta(C_{t-1})$ is the belief that the distributor is myopic given the initial prior θ_0, and an experience h_1^t that started at date 1, has size $t-1$, and cardinality C_{t-1}, where $C \equiv \sum_{j=1}^{t-1} h_j$, $h_j \in \{0, 1\}$. Under the assumed strategy for the distributor, the exporter's belief is given by

$$\theta(C_{t-1}) = \frac{(1-\lambda\gamma)^{C_{t-1}} (\lambda\gamma)^{t-1-C_{t-1}} \theta_0}{(1-\lambda\gamma)^{C_{t-1}} (\lambda\gamma)^{t-1-C_{t-1}} \theta_0 + (1-\gamma)^{C_{t-1}} \gamma^{t-1-C_{t-1}} (1-\theta_0)}. \tag{A1}$$

Notice that $\theta(C_{t-1})$ is increasing in C_{t-1}, so an experience with more defaults leads to a higher belief that the distributor is myopic.

Consider then an exporter at date t who needs to decide whether to maintain a partnership. The flow payoff is equal to the current profit $\pi(\theta)$, where

$$\pi(\theta) = -cQ^\gamma + \alpha\gamma[\theta\lambda + 1 - \theta]R(Q^\gamma) - \kappa.$$

After observing whether a bad outcome took place, the exporter updates his belief and faces the same problem again with a new belief that comes from the distribution of next period's

posteriors. We denote this distribution as $\theta^{(1)}(\theta)$. The elements in its support are $\theta(1,\theta)$ and $\theta(0,\theta)$, where $\theta(1,\theta)$ indicates the posterior after a default and $\theta(0,\theta)$ the posterior when there is no default. Given the assumed behavior of the distributors, we obtain

$$\theta(1,\theta) = \frac{(1-\lambda\gamma)\theta}{(1-\lambda\gamma)\theta + (1-\gamma)(1-\theta)}$$

and

$$\theta(0,\theta) = \frac{\lambda\gamma\theta}{\lambda\gamma\theta + \gamma(1-\theta)}.$$

The probability of a default is equal to the probability that the distributor is patient, times the probability of a bad outcome when the distributor is patient, plus the probability that the distributor is myopic, times the probability of a bad outcome when the distributor is myopic:

$$\Pr\left[\theta(1,\theta)\right] = (1-\theta)(1-\gamma) + \theta(1-\lambda\gamma).$$

Similarly,

$$\Pr\left[\theta(0,\theta)\right] = (1-\theta)\gamma + \theta\lambda\gamma.$$

The above reasoning implies that the exporter's present value profit can be described in terms of a value function $V(\theta)$ as follows:

$$V(\theta) = \max\{0, \pi(\theta) + \beta_e EV\left[\theta^{(1)}(\theta)\right]\}.$$

At every date, given the belief θ, the exporter maximizes $V(\theta)$. If he terminates the partnership, his net payoff is zero, since he becomes obsolete. If he keeps the partnership, he receives expected profits $\pi(\theta)$ and, through his experience, obtains additional information about the distributor's type. This problem is similar to a class of problems known as two-armed bandit.[20] In our case, one arm corresponds to terminating the partnership. This arm always gives the same return and is absorbing, i.e., if it is chosen at some date t, it has to be chosen in all dates thereafter.[21] The other arm corresponds to continuing with the partnership. That arm is stochastic and its expected return depends on the belief θ.

Lemma 4 describes the exporter's optimal decision as a function of his belief regarding the type of the distributor. The proof of this and of all other results in this Appendix are available from the authors upon request.

Lemma 4 *The problem of the producer has an unique optimal solution. First, whenever a contract is signed, the producer exports quantity Q^γ. Second, he maintains the partnership as long as his belief is greater than or equal to θ^c, where $\theta^c \in (0,1)$. Otherwise, he terminates the partnership.*

[20] Generally, "a k-armed bandit [...] is a slot machine with k arms, each yielding an unknown, possibly different distribution of payoffs. You do not know which arm gives you the greatest average return, but by playing the various arms of the slot machine you can gain information on which arm is best" [Fergusson, Optimal Stopping and Applications, chapter 7, p.1 (www.math.ucla.edu/~tom/Stopping/sr7.pdf)]. See also Rothschild (1974) for a seminal application of armed-bandit problems to economics.

[21] This feature differs from the standard two-armed bandit problem, where the deterministic arm is not assumed to be absorbing. However, it can be shown that, if an agent chooses the deterministic arm, his optimal decision is to keep choosing the same arm forever, so the assumption is actually inconsequential.

After facing an experience with a high enough number of defaults, the exporter becomes sufficiently convinced that the distributor is myopic—i.e., his belief goes above the threshold θ^c—and abandons the Foreign market. Otherwise, he keeps the partnership. Note that partnerships can now be dissolved even when a distributor is patient, since there is always a positive probability of a long sequence of events in which demand is continuously low. Throughout this Appendix, we assume that $\theta_0 \leq \theta^c$.

We have been assuming so far that a patient distributor never defaults and a myopic distributor defaults whenever possible. To prove this assertion, we need to describe first the dynamics of a partnership. Let ρ_t^m (ρ_t^p) be the probability that a partnership formed at date 1 still exists at the beginning of date t when the distributor is myopic (patient). We begin by considering the long run features of partnerships. We find that, when the distributor is patient, there is a positive probability that the partnership will go on forever. Conversely, when the distributor is myopic, there is a zero probability that a partnership continues indefinitely, just as in the benchmark model.

Proposition 2 $\lim_{t\to\infty} \rho_t^m = 0$ *and* $\lim_{t\to\infty} \rho_t^p = \rho > 0$.

We also find that the export level in an ongoing partnership approaches the perfect enforcement/perfect information level in the long run.

Proposition 3 *Let Q_t^γ be the expected volume of trade in an ongoing partnership at date t. Then,* $\lim_{t\to\infty} Q_t^\gamma = Q(0;\lambda,\gamma,\alpha,c) = Q(\theta;1,\gamma,\alpha,c)$.

A direct implication of propositions 2 and 3 is that a sufficiently patient distributor will always choose to honor the contract. The reason is that, by honoring the contract, the distributor builds a good reputation with the exporter. This reputation is beneficial for two reasons. First, it increases trade volumes in future interactions. Second, it reduces the probability that the exporter terminates the partnership. Formally, the present value profit of a patient distributor who enters in a partnership at date 1 is

$$\max\left\{\gamma(1-\alpha)\sum_{t=0}^{\infty}\beta_d^t\rho_t^p Q_t^{\gamma,p} \quad , \quad \gamma(1-\lambda\alpha)\sum_{t=0}^{\infty}\beta_d^t\rho_t^m Q_t^{\gamma,m}\right\},$$

where $Q_t^{\gamma,m}$ ($Q_t^{\gamma,p}$) is the volume of trade in an ongoing partnership at date t if the distributor chooses to default (honor the contract). If the distributor does not default, with probability γ demand is high and he receives a fraction $(1-\alpha)$ of the revenue. A similar reasoning explains the profit in the case of a default. Clearly, the distributor obtains a higher fraction of the current revenue if he defaults. However, current revenue depends on the exporter's belief. By honoring the contract, the distributor improves his reputation with the exporter and as a result future trade volumes increase. Thus we expect that, the more patient the distributor is, the higher are the odds that he prefers to honor the contract. The next lemma formalizes this claim.

Lemma 5 *There exists a value $\underline{\beta_d} \in (0,1)$ such that, for all $\beta_d > \underline{\beta_d}$, the optimal choice of a patient distributor is to honor his contract.*

An obvious implication of Lemma 5 is that a myopic distributor always defaults. Hence, as long as $\beta_d > \underline{\beta_d}$, distributors behave as claimed. We can then show that the exporter's behavior described in Lemma 4 and the distributor's behavior described in Lemma 5 are part of an equilibrium.

Proposition 4 *Consider the following strategy profile. The exporter always chooses quantity Q^γ and maintains the partnership as long as his belief is below θ^c. Conditional on the legal system not enforcing contracts, the myopic distributor always defaults. The patient distributor never defaults. Irrespective of his type, the distributor never terminates the partnership. This profile, together with the Bayesian updating described in equation (A1), is a sequential equilibrium.*

Thus, there exists a sequential equilibrium where the volume of trade in an ongoing partnership converges to the level that would arise in the absence of any information friction. Clearly, this can happen only in partnerships in which the distributor is patient. We can show in addition that the frequency of patient distributors in active partnerships increases monotonically over time. To do so, we first obtain an explicit expression for ρ_t^m and ρ_t^p. Using (A1), after a history h_1^t with cardinality C_{t-1}, the exporter's optimal decision $\theta(C_{t-1}) < \theta^c$ can be rewritten as

$$C_{t-1} < \varphi(t-1) + \xi,$$

where

$$\varphi \equiv \frac{\ln\left(\frac{1}{\lambda}\right)}{\ln\left(\frac{1-\gamma\lambda}{\lambda-\gamma\lambda}\right)} \quad \text{and} \quad \xi \equiv \frac{\ln\left(\frac{(1-\theta_0)\theta^c}{\theta_0(1-\theta^c)}\right)}{\ln\left(\frac{1-\gamma\lambda}{\lambda-\gamma\lambda}\right)}.$$

That is, the exporter stays in the partnership in period t as long as he faces an experience whose cardinality is below $\varphi(t-1)+\xi$. Note that the probability distribution across experiences depends on the actual choices made by the distributor. For example, we expect experiences with a relatively large number of defaults when the distributor is myopic.

Consider the exporter's problem at the beginning of date 2. The probability that he continues in the partnership is given by the probability that his experience during period 1 has a cardinality c_1 below $\varphi + \xi$. In the case of a myopic distributor, this probability is

$$\rho_2^m = \sum_{c_1 < \varphi+\xi} (1-\gamma\lambda)^{c_1}(\gamma\lambda)^{1-c_1}.$$

Now assume that the exporter was in the partnership during period 2 and consider his problem at the beginning of period 3. The probability that he continues in the partnership corresponds to the probability that he faces an experience with cardinality below $2\varphi + \xi$, given that his experience during period 1 had a cardinality $c_1 < \varphi + \xi$. If the distributor is myopic, this conditional probability is

$$\sum_{c_2 < (2\varphi+\xi)-c_1} (1-\gamma\lambda)^{c_2}(\gamma\lambda)^{1-c_2}.$$

We obtain the probability that a partnership still exists at the beginning of date 3 by multiplying the above conditional probability by the probability that the exporter had an experience with cardinality c_1 during period 1 and summing over all experiences satisfying $c_1 < \varphi - \xi$. That is,

$$\rho_3^m = \sum_{\substack{c_2<(2\varphi+\xi)-c_1 \\ c_1<\varphi+\xi}} (1-\gamma\lambda)^{c_1+c_2}(\gamma\lambda)^{2-(c_1+c_2)}.$$

Similarly, the probability that a partnership formed at date 1 still exists at date t is given by

$$\rho_t^m = \sum_{(c_1,...,c_{t-1})\in C_{t-1}} (1-\gamma\lambda)^{c_1+...+c_{t-1}}(\gamma\lambda)^{(t-1)-(c_1+...+c_{t-1})},$$

where

$$C_{t-1} \equiv \{(c_1,...,c_{t-1}) \mid c_\tau < (\tau\varphi+\xi)-(c_1+...+c_{\tau-1}), \text{ for } \tau = 1,...,t-1\}$$

is the set of feasible cardinalities and c_τ indicates cardinality during period τ. A similar reasoning implies that

$$\rho_t^p = \sum_{(c_1,...,c_{t-1})\in C_{t-1}} (1-\gamma)^{c_1+...+c_{t-1}}\gamma^{(t-1)-(c_1+...+c_{t-1})}.$$

Thus, let f_t^p be the frequency of patient distributors in active partnerships at date t. The next proposition shows that this frequency increases monotonically over time.

Proposition 5 *f_t^p is increasing in t.*

Hence, the frequency of patient distributors in active partnerships increases over time also in the case where bad outcomes can arise with both types of distributors. We conclude, therefore, that the nature of the equilibrium in this economy and the dynamics of trade within partnerships are broadly unaltered when we consider that bad outcomes can be due to both opportunistic behavior of one's partner and to unobserved stochastic events. Distributors behave just as in the benchmark model. The same is true for exporters, who keep their partnerships alive if their beliefs are below a certain threshold, except that the threshold is now different.

The richer model developed in this Appendix does qualify the result that surviving partnerships 'start small and grow monotonically over time,' however. Now, the trade volume within an existing partnership can oscillate up and down from period to period. Still, the frequency of patient distributors in active partnerships increases monotonically over time, and the volume of trade within surviving partnerships converges to the perfect information level of trade.

As a last remark, note that we have been assuming that, once a distributor makes a choice, he keeps the same choice over time. This assumption simplifies the analysis but precludes a study of the intertemporal incentives faced by a distributor. In particular, one can conjecture that while a patient distributor may have incentives to build a good reputation, once the good reputation is acquired he may want to deviate and default on the contract. We can show that this conjecture is false as long as the distributor is continuously faced with the need to maintain a good reputation. This can be done, for example, by introducing a small probability $\varepsilon > 0$ that the type of the distributor may change but this change is not observed by the exporter. With that addition, we can prove that, even when the distributor can change his choice at any

point in time, there exists a sequential equilibrium that replicates the behavior described in Proposition 5.[22]

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