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NON-TECHNICAL SUMMARY

Recent empirical analyses using firm-level export data have documented that only a relatively small proportion of manufacturing firms export. In most countries, the share of exporting firms varies between 14 and 20%. This evidence reveals the importance of formal and informal trade barriers and conforts managers' experience that often put forward their difficulties to develop arms-length transactions in international trade. It supports also recent trade models with heterogeneous firms (Melitz, 2003). These models consider that firms willing to export have to pay an additional fixed cost. Consequently, exporting is profitable only for firms that are competitive enough to earn a sufficiently large market share abroad.

Among the numerous hurdles creating frictions in international trade is insecurity in a broad sense. A large body of work already documents the role of insecurity and institutional quality on international trade. Most of these papers show that countries with better institutions trade more (see Anderson 2000, Anderson and Marcoullier 2002, Dollar and Kraay 2002, François and Manchin 2006, and Levchenko 2007 ...). In most of these studies, political risk and institutional failures are assimilated to an ad-valorem trade barrier. For instance, Anderson and Marcouiller (2002) assert that "predation by thieves or by corrupt officials generates a price markup equivalent to a hidden tax or tariff". And Blomberg and Hess (2006) estimate that the impact of terrorism and wars is equivalent to a 30% tariff.

Our purpose is slightly different. Indeed, considering seriously the impact of institutional failures in an heterogeneous firms trade model, we emphasizes a major difference between tariffs and insecurity. Our major point is that tariffs (and actually all formal trade barriers) affect simultaneously and homogeneously all potential exporting firms, whereas insecurity does not. Indeed, in an insecure foreign market, all exporting firms may be hurt by a wide range of negative and costly events that are potentially a reason to give up exporting. Insecurity affects all firms since all of them face the same risk. But ex-post, some of them are not hurt. In an insecure foreign market, some exporters may for instance loose their shipments because of hijacking, they may be forced to pay a bribe, or may be expropriated because of institutional failures. However this is never true for *all* exporting firms. Only a random subset of exporting firms is subject to predation while others are lucky and export without misfortune.

That makes a serious difference. We develop an original trade model with heterogeneous firms and insecurity in the export market. Insecurity introduces a micro level uncertainty on the amount of the export sunk cost. Unlucky firms thus have two possibilities: either pay the additional sunk cost and export, or give up exporting. Then, insecurity decreases bilateral exports by reducing the number of exporters. However, in contrast with the existing literature, a higher level of insecurity may dissuade unlucky productive firms from exporting, while some lucky unproductive ones may succeed. Our model thus proposes a theoretical explanation for one empirical failure of the recent literature in international trade with heterogeneous firms. This class of models suggests that all firms which can afford to export to a relatively distant and small market should always export also to more popular destinations. This strict hierarchy of export destinations is a feature of the model in Eaton, Kortum and Kramarz (2007), however they show that it is not observed in the data.

We derive two empirically estimable implications of insecurity for international trade. First,

firm's productivity is a less important determinant of the decision to export in countries with a high level of insecurity, because the selection of firms into these export markets with respect to their productivity is weakened. Second, the intensive margin of trade (i.e. the mean value of bilateral shipments) first increases and then decreases as insecurity becomes more severe. Both predictions are confronted to the data. We use individual French firm-level export data to more than 100 destinations, together with data provided by ICRG (International Country Risk Guide) as a proxy for insecurity. Results provide clear evidence in favor of the two above propositions.

ABSTRACT

This paper proposes an original approach to investigate the influence of insecurity and institutional quality on international trade. We emphasize that insecurity is hardly comparable with other trade barriers such as tariffs because it does not affect all firms similarly. We develop a monopolistic competition trade model with insecurity as a random additional sunk cost for exporting firms. A higher level of insecurity may dissuade large firms to export, while some smaller ones may be able to enter the export market. Hence, insecurity disrupts firms' selection into export markets, and this has particular effects on trade margins. Two discriminating predictions are derived from the model and confronted to the data. Using individual French firms exports to 100 destination countries, we find clear evidence corroborating our theoretical predictions.

JEL classification: F12, D8, K4.
Key words: Insecurity, Institutions, International trade, Firm heterogeneity, trade margins.

EXPORTER VERS LES MARCHÉS RISQUÉS : UNE ANALYSE MICRO-ÉCONOMIQUE

RÉSUMÉ NON-TECHNIQUE

Les analyses micro-économiques du commerce international montrent que le nombre de firmes exportatrices est relativement faible. Selon les pays, la part des entreprises manufacturières qui déclarent des exportations varie entre 14% et 20%. Cette observation manifeste la persistance de barrières aux échanges importantes. Elle confirme les témoignages des entrepreneurs, qui mettent souvent en avant les difficultés qu'ils rencontrent pour pénétrer les marchés étrangers. Par ailleurs, la faible proportion de firmes exportatrices est parfaitement en accord avec les théories récentes du commerce international qui considèrent l'existence de firmes hétérogènes (Melitz, 2003). Ces modèles supposent que les candidats à l'exportation doivent s'acquitter d'un coût fixe spécifique (pour respecter les normes du pays étranger, pour trouver un distributeur...). Par conséquent, seules les entreprises les plus compétitives, qui peuvent espérer gagner des parts de marché suffisamment importantes pour amortir ce coût fixe, se lancent sur les marchés d'exportation.

Parmi toutes les barrières qui limitent l'accès aux marchés étrangers figure l'insécurité à laquelle peuvent faire face des exportateurs potentiels (i.e. le risque-pays lié aux défaillances institutionnelles). En effet, de nombreuses études ont montré que les pays qui bénéficient d'institutions de bonne qualité commercent davantage (Anderson 2000, Anderson et Marcoullier 2002, Dollar et Kraay 2002, François et Manchin 2006, et Levchenko 2007...). Dans la plupart de ces études, le risque politique et les défaillances institutionnelles sont assimilées à une barrière commerciale, comparable à un droit de douane. Par exemple, Blomberg et Hess (2006) estiment que le terrorisme et les guerres ont un effet équivalant à un droit de douane de 30%.

Notre propos est sensiblement différent. En effet, en considérant avec attention l'impact des défaillances institutionnelles dans un modèle de commerce international avec firmes hétérogènes, nous mettons en évidence une différence majeure entre l'insécurité et un droit de douane. Notre point central est que les protections commerciales affectent toutes les entreprises simultanément et de façon identique, ce qui n'est pas nécessairement le cas de l'insécurité. Sur un marché étranger risqué, tous les vendeurs potentiels peuvent subir un grand nombre de mésaventures qui sont autant de raisons de renoncer à exporter. En ce sens, tous subissent l'insécurité. Néanmoins, tous ne connaîtront pas de mésaventure. Seuls les malchanceux se retrouvent dans une situation difficile et doivent payer des pots-de-vin, font face à des clients malhonnêtes ou à des fonctionnaires particulièrement tatillons ; mais une partie des exportateurs (les chanceux) peuvent mener leurs activités sans embûches. Dès lors, l'insécurité a la particularité de comporter un certain aléa sur l'identité des victimes, contrairement à la protection commerciale ou au risque macro-économique qui affectent sans distinction tous les exportateurs.

Cette différence n'est pas sans conséquence. Dans notre modèle théorique, l'insécurité prend la forme d'un coût fixe supplémentaire, non-certain, dont doivent s'acquitter une proportion des exportateurs potentiels. Ces firmes malchanceuses ont alors deux choix possibles : soit payer ce coût fixe supplémentaire et exporter, soit renoncer. Par conséquent, le niveau de l'insécurité réduit le commerce bilatéral en diminuant le nombre d'exportateurs. Mais surtout, cela conduit certaines firmes à renoncer à exporter, alors que d'autres, a priori relativement moins compétitives, pourront s'établir sur les marchés étrangers.

Outre le fait d'expliciter les conséquences du risque-pays sur le commerce international, notre modèle propose une explication à l'un des échecs empiriques les plus notables des théories récentes du commerce avec firmes hétérogènes. Ces théories prédisent que toutes les firmes qui parviennent à exporter vers les marchés les plus difficiles (les plus petits et lointains) doivent aussi être présentes sur tous les marchés plus accessibles. Eaton, Kortum et Kramarz (2007), montent clairement que cette hiérarchie stricte des destinations n'est pas validée pas les données statistiques.
Le modèle théorique nous conduit à définir deux prédictions testables à l'aide de données microéconomiques de commerce. Tout d'abord, la productivité des firmes doit être un déterminant de la capacité à exporter moins important vers les pays à fort risque que vers les pays plus sûrs. Par ailleurs, la présence de l'insécurité doit avoir un effet particulier sur la marge intensive du commerce (i.e. la valeur moyenne exportée par les firmes). Nous vérifions ces deux predictions en utilisant des données individuelles d'exportation et les indicateurs de risque-pays de l'ICRG (International Country Risk Guide).

RÉSUMÉ COURT

Cet article propose une approche originale pour étudier l'impact du risque-pays sur le commerce international. Nous montrons que l'insécurité a un effet bien particulier, très différent de celui que peuvent avoir les barrières formelles aux échanges, ou même le risque macro-économique. Nous développons un modèle de commerce international avec firmes hétérogènes qui introduit l'insécurité comme un coût fixe supplémentaire qui affecte de façon aléatoire les différents exportateurs. En conséquence, l'insécurité peut amener certaines firmes, a priori très compétitives, à renoncer à exporter alors que d'autres, moins efficaces, parviennent à se placer sur les marchés étrangers. Dit autrement, l'insécurité perturbe la distribution des firmes sur les marchés d'exportation. Nous tirons de l'analyse théorique deux propositions testables qui, à l'aide de données individuelles de commerce international, nous permettent de confirmer la pertinence du modèle et de préciser les conséquences effectives de l'insécurité sur la structure du commerce international.

JEL classification : F12, D8, K4.
Mots Clefs : Insécurité, Institutions, Commerce international, Hétérogénéité des firmes, Marges du commerce.

EXPORTING TO INSECURE MARKETS: A FIRM-LEVEL ANALYSIS[1]

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1. Introduction

The small, whate'er the case,
With ease slip through a strait,
Where larger folks must wait.
Jean de La Fontaine (Translated by E. Wright).

Exporting is not a commonplace activity. Managers put forward a large number of difficulties to develop arms-length transactions in international trade. This finds strong support in the flourishing recent literature using micro-data to analyze firms' behavior on export markets. Empirical studies such as Roberts and Tybout (1997), Aitken et al. (1997), Bernard and Jensen (2004), Bernard et al. (2007), and Mayer and Ottaviano (2007), emphasize that the share of exporters among manufacturing firms is very small, less than 20% in most countries. Among the numerous hurdles creating frictions in international trade is insecurity of international exchanges. A large body of work in the international trade literature documents the role of insecurity and institutional quality on international trade. Anderson (2000), Anderson and Marcoullier (2002), Dollar and Kraay (2002) and Levchenko (2007), for instance, show that countries with better institutions trade more, or that differences in institutional quality deters bilateral trade. François and Manchin (2006) show that institutional quality of exporting countries has a positive influence on both the number of trading partners and the value of each bilateral trade relationship. Further, terrorist events and military conflicts have a significant negative impact on international trade (see for instance, Blomberg and Hess, 2006; Mirza and Verdier, 2006a-b; Martin et al. 2008). In most of these studies, political risk and institutional failures are assimilated to an ad-valorem trade barrier[5]; Blomberg and Hess (2006) estimate that the impact of terrorism and wars is equivalent to a 30% tariff.
The present paper emphasizes a major difference between tariffs and insecurity. Insecurity is associated with any kind of negative and costly events, related to institutional failures, that may hurt foreign firms and force them to give up exporting. In an insecure market, some firms exporting may loose their shipments because of hijacking, be forced to pay a

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[5]For instance, Anderson and Marcouiller (2002) assert page 351 that "predation by thieves or by corrupt officials generates a price markup equivalent to a hidden tax or tariff".

bribe, or be expropriated because of institutional failures. However these misfortunes never affect systematically *all* exporting firms at the same time. Whereas trade costs, tariffs and macroeconomic risk affect all exporters simultaneously and homogeneously, we stress that only a random subset of exporting firms is subject to predation while other exporters are safe. In our framework, insecurity affects all firms in the same way ex ante, because they all take into account the probability of being hit by insecurity when deciding to export. However, insecurity does not affect all firms ex post, because only a (potentially large) subset of exporters are unlucky. In this paper, we argue that insecurity and tariffs do not have a comparable impact on trade flows because the consequences of inadequate institutions has a random nature.

We develop an original monopolistic competition trade model, based on Melitz (2003) and Chaney (2008), with heterogeneous firms in productivity and insecurity in the export market. Our interpretation of insecurity leads to introduce a micro level uncertainty in the model on the amount of the export sunk cost. We assume that firms have an exogenous probability to be directly hurt by a negative event when trying to export to an insecure market. These unlucky exporters have to pay an extra sunk cost to enter the market. Note that insecurity is modelled as an additional cost only, and has no positive effect on the decision to export.[6] Unlucky firms thus have two possibilities: either pay the additional sunk cost and export, or give up exporting. The model predicts that insecurity on the foreign market decreases bilateral exports by reducing the number of exporters. However, in contrast with the existing literature, a higher level of insecurity may dissuade unlucky productive firms from exporting, while some less productive but lucky ones may succeed. In other words, insecurity disrupts firms' selection on export markets. This in consequence influences the decomposition of bilateral trade into the intensive margin (the amount exported per firm) and the extensive margin (the number of exporters).

We derive two empirically estimable implications of insecurity for international trade. First, firm's productivity is a less important determinant of the decision to export in countries with a high level of insecurity, because the selection of firms into these export markets with respect to their productivity is weakened. Second, the intensive margin of trade first increases and then decreases as insecurity becomes more severe. Insecurity has a (log) nonlinear impact on the intensive margin. Both predictions are confronted to the data in the second part of the paper. We use individual French firm-level export data to more than 100 destinations, together with data provided by ICRG (International Country Risk Guide) as a proxy for insecurity. Results provide clear evidence in favor of the two above propositions.

The contributions of this paper are twofold. First, the model sheds new light on the role of insecurity on international trade by stressing its heterogeneous impact on exporting firms contrary to other trade barriers such as tariffs. Second, the model proposes a theoretical explanation for one empirical failure of the recent literature in international trade with heterogeneous firms. Indeed, this class of models suggests that all firms which can afford to export to a relatively distant and small market should systematically export to the more popular destinations. This strict hierarchy of export destinations is a feature of the model in

[6] In contrast, Rose-Ackerman (1999) concentrates on the role of corruption and argues that it may reduce trade costs in overregulated countries. Indeed, corruption may "grease the wheels" of international trade when bureaucracies are inefficient or trade barriers too high. Following Frisman and Wei (2004), Dutt and Traca (2007) give evidence that corruption may facilitate fiscal evasion and thus enhance trade when tariffs are high. We do not consider these possible effects of corruption in our analysis of insecurity.

Eaton, Kortum and Kramarz (2007); however they show that it is not observed in the data.
The paper is structured as follows. Section 2 develops the trade model with insecurity in the destination market. Section 3 emphasizes the two main predictions of the model to be estimated empirically. Section 4 describes the data and displays the estimation procedure and results. Section 5 concludes.

2. The Model

This section develops the theoretical model, adding insecurity into a framework largely inspired from Chaney (2008).

2.1. General assumptions

We assume a world consisting of two countries, Home (H) and Foreign (F).[7] They are populated respectively with L_H and L_F consumers, each of them supplying one unit of labor and owning a single share of a perfectly diversified portfolio of all firms in the world. The two countries produce a manufactured differentiated good and a homogenous numéraire. The numéraire good, A, is produced with one unit of labour per unit of output under constant returns to scale and perfect competition. We assume that it is freely traded, and that differences in endowments between countries are sufficiently small to ensure that it is always produced in all countries. Henceforth, A is an "outside" good which guarantees factor price equalization and offsets all trade imbalances in the other good.
The manufacturing sector, M, produces a continuum of differentiated varieties under increasing returns to scale. It is subject to monopolistic competition à la Dixit-Stiglitz. Following Chaney (2008), we consider that there is a pool of manufacturing entrepreneurs in each country, which is proportional to market size.

2.2. Utility and demand

All consumers share the same utility function given by:

$$U = C_A^{1-\mu} C_M^{\mu} \quad \text{with} \quad C_M = \left(\int_i^n c_i^{\frac{\sigma-1}{\sigma}} di \right)^{\frac{\sigma}{\sigma-1}} , \tag{1}$$

where C_M and C_A denote consumption for M and A goods, respectively. The constant elasticity of substitution between varieties of the M good is given by σ ($\sigma > 1$), μ is an exogenous parameter ranging between 0 and 1, and n is the total number of varieties of M in the world. First order conditions give the following demand function for any variety i in country $f = H, F$:

$$c_{if} = \frac{\mu E_f p_{if}^{-\sigma}}{P_f^{1-\sigma}} , \quad \text{with} \quad P_f = \left(\int_i^n p_{if}^{1-\sigma} di \right)^{\frac{1}{1-\sigma}} , \tag{2}$$

[7] We have chosen to present a two-countries framework for simplicity. However, a multi-country version of the model is available from the authors upon request. The main conclusions remain the same.

p_{if} is the price of variety i in country f, E_f is national expenditure, and P_f is the perfect (aggregate) price index.

2.3. Sunk costs, country risk and export decisions

In the following, subscripts D and X respectively denote domestic and international sales. To establish a new variety and sell its production on the domestic market, a firm i in the M sector must incur a fixed overhead labor cost C_D. Following Melitz (2003), there are then two types of trade barriers associated with selling on international markets. In order to enter the export market $f = H, F$, each firm must pay a sunk cost C_X. This sunk cost captures the expenses related to advertising, identifying local wholesalers, ensuring compliance of products to foreign regulations, etc. It is the same for all firms, and firm managers know precisely its value before deciding to export. Each shipment also involves a variable "iceberg" transport cost; Namely, $\tau > 1$ units of the good have to be shipped from a given country to ensure that one unit arrives in the export market. This variable cost multiplies the marginal cost and hence the consumer price on imported varieties.

Our model departs from Chaney (2008) in one major assumption. We assume that country F is an insecure market. Home country firms willing to export face the risk of having to pay an extra fixed cost. We do not explicitly model a particular source of insecurity, and the extra fixed cost captures a variety of institutional failures. The most obvious are corruption and theft. If they are unlucky, exporting firms can face local authorities willing to extort a bribe, or thieves hijacking a part of the shipment. Our model also encompasses more insidious obstacles to exporting. Indeed, when government regulations are not fully enforced, and when the legal system is not effective enough, the real cost of entering into arms' length business relationship may be highly aleatory. For instance, tedious officials can cause excessive delays refusing export licences or visas without explicit justification, and inefficiencies of the judiciary generate inordinate court costs and delays for very uncertain results.

A crucial assumption for the purpose of our paper is that these troubles only affect a random subset of potential exporters: we assume that an exogenous share $(1 - \gamma)$ ($\gamma \in (0, 1)$) of all exporters are actually victims of institutional failures.[8] Without loss of generality, the additional sunk cost related to insecurity is set to βC_X (with $\beta > 0$). The total fixed cost incurred by a victim is then $(1 + \beta)C_X$.[9] Parameter β represents the threat that jeopardizes potential exporters, so that γ and β are the two parameters that characterize insecurity on the export market F.

All probabilities and payments are known by firms, i.e. all firms have a perfect knowledge of β and γ. The decision process is thus very simple: firms decide to pay the first irreversible investment C_X to enter the export market if their expected profit from exporting is positive.[10]

[8] All firms face the same probability of being subject to insecurity, namely $(1 - \gamma)$. Assuming that firms have the idiosyncratic probability $(1 - \gamma_i)$ of being hurt by insecurity would have lead to same results, since we consider that firms know their $(1 - \gamma_i)$ when deciding to export. The idiosyncratic probability assumption would however make the model resolution more cumbersome, without improving the conclusions. This extension of the model is available upon request from the authors.

[9] As for γ, assuming β is firm-specific but independently distributed across productivity, would yield same qualificative results.

[10] Recall that firms' owners have a perfectly diversified portfolio and thus are already insured from insecurity on aggregate.

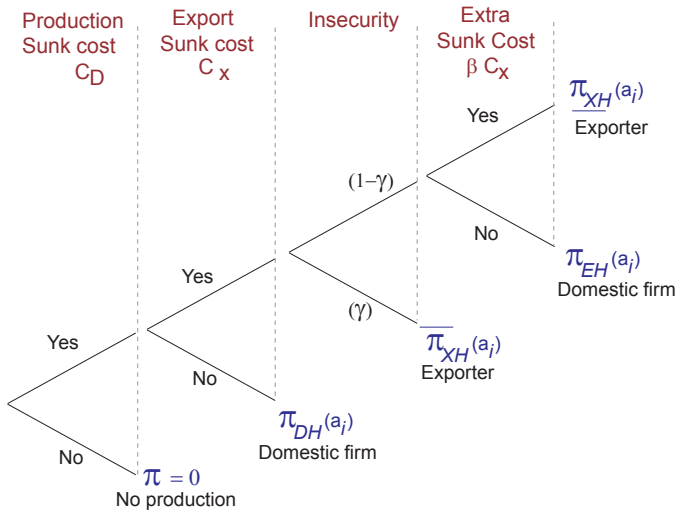

Figure 1: Decision Tree

The decision process of firms is summarized in Figure 1. Each firm i draws a marginal cost (a_i) and decides to pay the fixed cost C_D and enter the domestic market or to exit. Second, producers decide whether to export or not. If they do not, they earn a profit $\pi_{DH}(a_i)$ on the domestic market. To export they must pay the sunk export cost C_X and take into account the level of insecurity. Any entrepreneur knows that a proportion γ of firms entering the export market are not subject to bribery nor suffer from the consequences of any form of institutional failure. Those are able to supply their product safely and earn a profit $\overline{\pi_{XH}}(a_i)$. A proportion $(1-\gamma)$ of exporting firms are asked to pay an extra fixed cost caused by insecurity. Those have to choose between persisting in exporting (in which case they earn $\underline{\pi_{XH}}(a_i)$) or exiting the export market (and earn $\pi_{EH}(a_i)$). Firm i then pays the extra cost only if $\underline{\pi_{XH}}(a_i) > \pi_{EH}(a_i)$.

2.4. Profits, firms selection and real incomes

We now solve the model in order to analyze how insecurity influences the selection of exporting firms and trade patterns.

Profits

Given equations (1) and (2), the optimal price charged by a firm i is a constant mark-up over its marginal cost. A firm i with marginal cost a_i charges a *fob* price $p_i = \frac{\sigma}{\sigma-1}a_i$. If the firm exports, the *cif* price is $p_i = \tau\frac{\sigma}{\sigma-1}a_i$ on the export market.

In country F, a firm with a marginal cost a_i earns a profit $\pi_{DF}(a_i)$ if it decides to serve only the domestic market, and $\pi_{XF}(a_i)$ if it exports to country H:

$$\begin{aligned}\pi_{DF}(a_i) &= \frac{\mu}{\sigma}E_F P_F^{\sigma-1}\left(\tfrac{\sigma}{\sigma-1}\right)^{1-\sigma}a_i^{1-\sigma} - C_D \\ \pi_{XF}(a_i) &= \frac{\mu}{\sigma}\left(\tau^{1-\sigma}E_H P_H^{\sigma-1} + E_F P_F^{\sigma-1}\right)\left(\tfrac{\sigma}{\sigma-1}\right)^{1-\sigma}a_i^{1-\sigma} - (C_D + C_X)\,.\end{aligned} \tag{3}$$

Insecurity in country F complicates the selection of firms from H. There are three groups of firms: firms selling only domestically, firms trying to export but cannot afford the extra fixed cost and are finally evicted from country F, and exporting firms. The latter group is made up with both lucky firms that can export safely, and unlucky firms that prefer to pay the extra fixed cost rather than renounce to export. The corresponding profits are:

$$\begin{aligned}\pi_{DH}(a_i) &= \frac{\mu}{\sigma}E_H P_H^{\sigma-1}\left(\tfrac{\sigma}{\sigma-1}\right)^{1-\sigma}a_i^{1-\sigma} - C_D \\ \pi_{EH}(a_i) &= \pi_{DH}(a_i) - C_X \\ \pi_{XH}(a_i) &= \begin{cases}\overline{\pi_{XH}}(a_i) = \frac{\mu}{\sigma}\left(\tau^{1-\sigma}E_X P_X^{\sigma-1} + E_H P_H^{\sigma-1}\right)\left(\tfrac{\sigma}{\sigma-1}\right)^{1-\sigma}a_i^{1-\sigma} - C_D - C_X, \\ \underline{\pi_{XH}}(a_i) = \overline{\pi_{XH}}(a_i) - \beta C_X\end{cases}\end{aligned} \tag{4}$$

Cutoffs

The complex procedure of firm selection is illustrated in Figure 2, which represents the population of firms in H. We report marginal cost a on the horizontal axis, and the share of firms whose marginal cost is lower than a on the vertical axis. Profits given by equations (3) and (4) allow to define the marginal cost of the least efficient firm entering its own domestic market. These are, respectively for firms in countries H and F:

$$\begin{aligned}\pi_{DH}(a_i) &\geq 0 \Leftrightarrow a_i \leq a_{DH} = \lambda_1 C_D^{\frac{1}{1-\sigma}} P_H \\ \pi_{DF}(a_i) &\geq 0 \Leftrightarrow a_i \leq a_{DF} = \lambda_2 C_D^{\frac{1}{1-\sigma}} P_F,\end{aligned} \tag{5}$$

where $\lambda_1 = \left(\frac{\mu}{\sigma}E_H\right)^{\frac{1}{\sigma-1}}\left(\frac{\sigma-1}{\sigma}\right)$ and $\lambda_2 = \left(\frac{\mu}{\sigma}E_F\right)^{\frac{1}{\sigma-1}}\left(\frac{\sigma-1}{\sigma}\right)$.
In both countries, firms with marginal costs greater than a_{DH} and a_{DF} are not productive enough to supply their own market and make a positive profit. The maximum level of marginal cost that allows to launch a new firm logically rises with the fixed cost of entry (C_D). It is also an increasing function of the aggregate price index P_f ($f = H, F$). As usual in monopolistic competition models (as shown in equation 2), price indices increase with the number of firms operating on the market and decrease with their price. In other words, P_f is low when competition is tough. Hence, as P_f decreases, a_{Df} logically declines: it becomes harder for low productivity firms to enter the market.
Firms from F also export to country H if they expect a positive profit on this market, i.e. if:

$$\pi_{XF}(a_i) - \pi_{DF}(a_i) \geq 0 \Leftrightarrow a_i \leq \overline{a}_{XF} = \lambda_1 C_X^{\frac{1}{1-\sigma}}\frac{P_H}{\tau}, \tag{6}$$

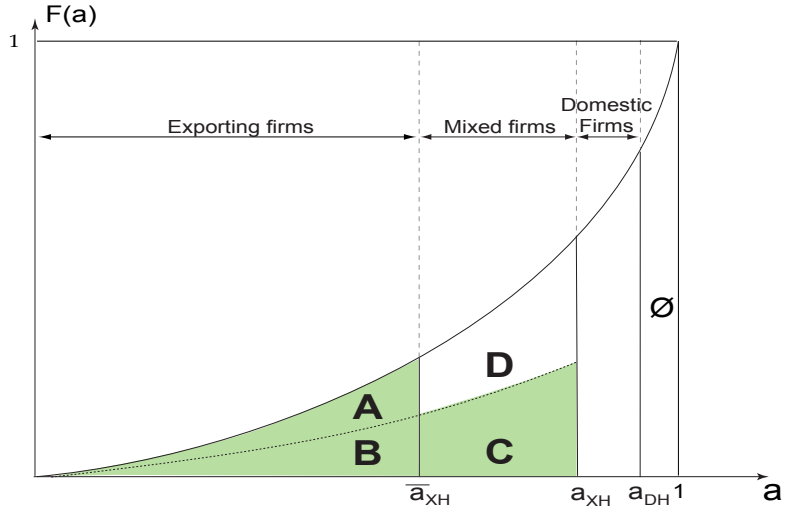

Figure 2: Cut-off levels for H country firms

Because they face insecurity, country H firms must decide whether to export considering their expected profits. Since firms are risk neutral (because of the perfectly diversified portfolio of their owners), they decide to make the first irreversible investment C_X if:

$$max \quad \{(1-\gamma)\underline{\pi_{XH}}(a_i) + \gamma\overline{\pi_{XH}}(a_i)\ ;\ (1-\gamma)\pi_{EH}(a_i) + \gamma\overline{\pi_{XH}}(a_i)\} \geq \overline{\pi_{DH}}(a_i)$$

$$\Rightarrow \qquad a_i \leq a_{XH} = \lambda_2 \left(\frac{C_X}{\gamma}\right)^{\frac{1}{1-\sigma}} \frac{P_F}{\tau}. \tag{7}$$

All firms from H with a marginal cost lower than a_{XH} try to export. Among those, a proportion γ are lucky. They are represented in Figure 2 by the shaded areas B and C. Firms in area A and D are unlucky and must pay the extra cost if they want to supply consumers in country F. For some of them, the rational decision is to give up. They exit the export market if:

$$\pi_{EH}(a_i) \geq \underline{\pi_{XH}}(a_i) \ \Rightarrow a_i \geq \overline{a}_{XH} = \lambda_2 \left(\beta C_X\right)^{\frac{1}{1-\sigma}} \frac{P_F}{\tau} \tag{8}$$

Hence, unlucky firms with a marginal cost higher than $\overline{a}_{XH}$ give up exporting and incur a deadweight loss C_X. This decision generates the disruption in firms' selection into export market. Firms who surrender are represented by area D in Figure 2. Others, represented in area A prefer to pay the extra fixed and export.[11]

The range of marginal costs $[\overline{a}_{XH}, a_{XH}]$ delimits a group of firms where there are both exporters and domestic firms. The existence of this group of mixed firms is due to insecurity. Some firms with a relatively high marginal cost are able to export while insecurity dissuades more efficient firms to enter the foreign market. This feature of the model corroborates the

[11] Assuming $\beta\gamma > 1$ ensures that $a_{XH} > \overline{a}_{XH}$.

empirical evidence presented by Eaton, Kortum and Kramarz (2007): some firms that export to a remote, small and risky market may not export to all countries that are apparently more accessible destinations. The crucial point here is that the impact of insecurity on trade is not comparable to the one of a simple additional trade cost. Contrary to trade costs, insecurity disrupts firms' selection because it does not affect all firms homogeneously.
Note finally that total profits of some unlucky firms may be negative. Firms in area D incur a deadweight loss C_X. Similarly, some firms that persist in exporting (area A) earn a revenue in F smaller than βC_x. For all these firms, trying to export was clearly a non-profitable experience ex post, and for the less efficient ones the loss may be larger than the profits earned on their domestic market.[12] However, negative profits have no consequence on the general equilibrium. Since all individuals own a perfectly diversified portfolio of each firm, these losses are always compensated by positive profits of domestic and exporting firms.

Price indices

In order to introduce firms heterogeneity while keeping the model tractable, we assume Pareto distribution for marginal costs, with a shape parameter rho>1 and lower and upper bounds 0 and a_0, which is further normalized to 1. The corresponding cumulative density function is $G(a) = \left(\frac{a}{a_0}\right)^{\rho}$, with $0 < a < 1$. The Pareto assumption allows closed form solutions, however the results do not depend on the specified distribution.
Equations (5) to (8) give the number of firms operating in each country and the two price indices.

$$P_H^{1-\sigma} = L_H \int_0^{a_{DH}} \left(\frac{\sigma}{\sigma-1}a\right)^{1-\sigma} dG(a)da + L_F \int_0^{a_{XF}} \left(\frac{\sigma}{\sigma-1}a\tau\right)^{1-\sigma} dG(a)da \quad (9)$$

$$P_F^{1-\sigma} = L_F \int_0^{a_{DF}} \left(\frac{\sigma}{\sigma-1}a\right)^{1-\sigma} dG(a)da + L_H \int_0^{\bar{a}_{XH}} \left(\frac{\sigma}{\sigma-1}a\tau\right)^{1-\sigma} dG(a)da + \gamma L_H \int_{\bar{a}_{XH}}^{a_{XH}} \left(\frac{\sigma}{\sigma-1}a\tau\right)^{1-\sigma} dG(a)da$$

Income

To fully characterize the equilibrium, we define income in each country (i.e E_f, $f \in H, F$). Total consumption by workers in each country is the sum of their labor income and the dividends they get from their perfectly diversified portfolio. Since wages are constant and normalized to one in all countries, we only have to compute worldwide profits Π in order to explicit expenditures in the two countries.

$$\Pi = \frac{(L_H + L_F)}{\left(\frac{1}{\frac{\mu}{\sigma}\left(\frac{\sigma-1}{\rho}\right)} - 1\right)}. \quad (10)$$

Finally, Home and Foreign incomes are:

[12] This feature may be a simple explanation for the high level of entry *and* exit into export markets for each potential exporter in the first years of exporting. A feature that has been recently explored by Eaton, Eslava, Kugler and Tybout (2007) using Columbian firm-level export data.

$$E_H = L_H + \frac{L_H \Pi}{(L_H + L_F)} = \frac{2\mu(\sigma-1)}{\sigma\rho - \mu(\sigma-1)} L_H \quad (11)$$
$$E_F = L_F + \frac{L_F \Pi}{(L_H + L_F)} = \frac{2\mu(\sigma-1)}{\sigma\rho - \mu(\sigma-1)} L_F$$

3. The distinctive impact of insecurity on international trade

Equations (2), (5)-(8), (9), (10) and (11) fully characterize the model. We now examine the consequences of insecurity on the individual export decision and firm-level trade flows, and derive estimable predictions.

3.1. Export decision

Empirical tests of the model should reveal the disruptive effect of insecurity on firms' selection. The first test we propose is directly related to the firms' export decision.

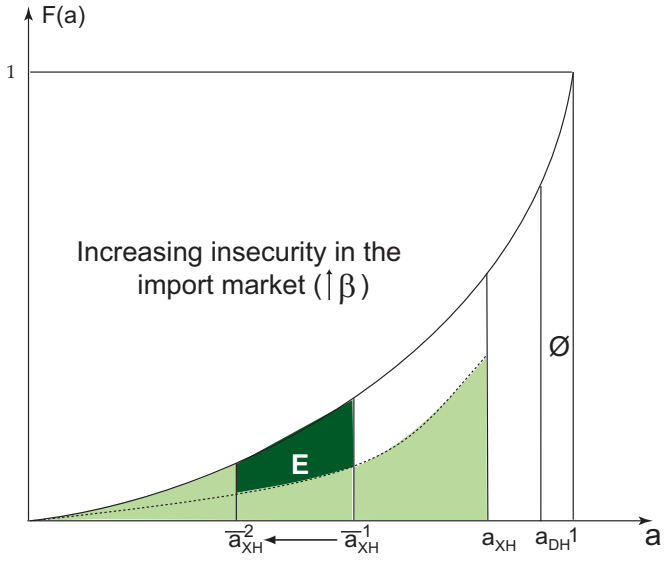

Figure 3: Impact of increasing insecurity

Figure 3 illustrates the consequence of a worsening of insecurity (i.e. an increase in β) on firms' selection. C_X and γ define the first cutoff level a_{XH}, while β determines the distance between a_{XH} and $\overline{a}_{XH}$. When insecurity increases while fixed and variable trade costs are kept unchanged, firms' selection is affected in a very specific way. If β goes up, a_{XH} does not move, but $\overline{a}_{XH}$ shifts to the left (i.e. from $\overline{a}^1_{XH}$ to $\overline{a}^2_{XH}$ in Figure 3). Hence, the group of domestic firms remains unchanged, the group of exporting firms becomes smaller, and the group of mixed firms grows. In other words, the selection pattern linking exporting firms to their productivity is weakened. This change is illustrated by the dark area labeled E. The figure shows that the firms that are evicted from exporting due to a fiercer insecurity

are indeed not the least productive exporters. To confirm empirically this specific theoretical impact of insecurity, we compute the probability that a firm i exports, conditional on the firm drawing a marginal cost $a_i < a_{XH}$. In models such as Melitz (2003) or Chaney (2008), the productivity of the firm fully determines its export status, and this conditional probability is necessarily equal to 1, whatever the levels of fixed and variable trade costs. Thus, if insecurity was associated with a trade cost affecting all exporters similarly, it would not have any effect on the conditional probability. In our setup, this conditional probability is decreasing in β:

$$P\left[x_i^{HF} > 0 \mid a_i < a_{XH}\right] = \frac{\overline{a}_{XH}^{\rho} + \gamma\left(a_{XH}^{\rho} - \overline{a}_{XH}^{\rho}\right)}{a_{XH}^{\rho}} = (1-\gamma)\left(\gamma\beta\right)^{\frac{\rho}{1-\sigma}} + \gamma, \quad (12)$$

This result gives our first testable prediction:

Proposition 1 *The marginal effect of firms' productivity on the export decision is lower on insecure markets than on safe ones.*

In our empirical analysis, we estimate the probability that a firm exports. According to our framework (see 4), the probability that a firm with a productivity a_i exports is given by:

$$P\left[x_i^{HF} > 0\right] = \gamma P\left[\overline{\pi_{XH}}(a_i) > 0\right] + (1-\gamma)P\left[\overline{\pi_{XH}}(a_i) > \beta C_X\right], \quad (13)$$

This probability is an increasing function of the productivity of the firm and a decreasing function of the level of insecurity. The marginal influence of β and $1/a_i$ can be estimated using a binary choice model of the form:

$$P(Export_{iFt}) = \alpha_1 \ln(TFP_{it}) + \alpha_2 \ln(Insecurity_{F,t}) + \alpha_3 A_{HFt} + \nu_{iFt}, \quad (14)$$

where ν_{iFt} is an error term, $\ln(TFP_{it})$ is the logarithm of firm's i total factor productivity at time t, $\ln(Insecurity_{F,t})$ is the level of insecurity in country F at time t. $A_{HF,t}$ is the set of usual gravity variables, capturing trading countries characteristics (e.g. market size), and bilateral variables such as transport costs. We expect α_1 to be positive and α_2 to be negative. Moreover and according to Proposition 1, the model predicts that the disruptive effect of insecurity should lead to a larger estimated value for α_1 in low insecurity countries than in very insecure ones, which would reveal the distinctive impact of insecurity and can thus be used as a first discriminating criterion.

3.2. Trade margins

The second estimable prediction relates to the impact of insecurity on the intensive and extensive margins of trade. Total exports from H to F are the sum of all individual exports:

$$\begin{aligned} X_{HF} &= \mu E_F P_F^{\sigma-1}\left(\tfrac{\sigma}{\sigma-1}\right)^{1-\sigma}\tau^{1-\sigma}\left(L_H\int_0^{\overline{a_{XH}}} a^{1-\sigma}dG(a)da + \gamma L_H\int_{\overline{a_{XH}}}^{a_{XH}} a^{1-\sigma}dG(a)da\right) \\ &= \tau^{-\rho}\tfrac{2\mu(\sigma-1)}{\sigma\rho-\mu(\sigma-1)}\frac{\mu L_H L_F\left(\beta^{1-\frac{\rho}{\sigma-1}}(1-\gamma)+\gamma^{\frac{-\rho}{\sigma-1}}\right)}{\left(L_F\left(\frac{C_D}{C_X}\right)^{1-\frac{\rho}{\sigma-1}}+\tau^{-\rho}L_H\left(\beta^{1-\frac{\rho}{\sigma-1}}(1-\gamma)+\gamma^{\frac{-\rho}{\sigma-1}}\right)\right)} \end{aligned} \quad (15)$$

This expression for bilateral trade is very comparable to the one presented by Chaney (2008), and by Melitz and Ottaviano (2007) in a different theoretical framework. This relationship shares many common features with gravity equations widely used in the international trade empirical literature. Total bilateral trade is an increasing function of expenditure in the importing country. It diminishes with the variable trade cost (τ) which is generally assumed to be captured in gravity equations by geographical distance. Besides, β has an unambiguous negative impact on bilateral trade, confirming the result obtained in the literature according to which insecurity reduces bilateral trade.[13]

Recent trade models emphasize that a reduction in trade barriers expands bilateral trade flow through two channels. It increases the value of each individual shipment (the intensive margin), but it also increases the number of exporters (the extensive margin). We now highlight the impact of insecurity on international trade by considering its impact on these two margins separately.

Let us first consider the extensive margin. The number of exporting firms from H is given by:

$$\begin{aligned} Nx_{HF} &= L_H\left[\overline{a}_{XH}^{\rho} + \gamma(a_{XH}^{\rho} - \overline{a}_{XH}^{\rho})\right] \\ &= \tau^{-\rho}\frac{2\mu(1-\sigma+\rho)}{\left[\sigma\rho-\mu\left(\sigma-1\right)\right]\rho\sigma C_X}\frac{\mu L_H L_F\left(\beta^{\frac{\rho}{1-\sigma}}\left(1-\gamma\right)+\gamma^{\frac{\rho}{\sigma-1}+1}\right)}{\left[L_F\left(\frac{C_D}{C_X}\right)^{1-\frac{\rho}{\sigma-1}}+\tau^{-\rho}L_H\left(\beta^{1-\frac{\rho}{\sigma-1}}\left(1-\gamma\right)+\gamma^{\frac{\rho}{\sigma-1}}\right)\right]} \end{aligned} \tag{16}$$

Here again, the impact of insecurity on the extensive margin is unambiguous. Both a larger β and a lower γ have a negative influence on the number of exporting firms.[14]

In contrast, the intensive margin of trade (i.e. the average value of individual exports, $\overline{x_{HF}}$) is affected by the specific nature of insecurity.

$$\begin{aligned} \overline{x_{HF}} &= \frac{X_{HF}}{Nx_H} \\ &= \frac{\sigma\rho C_X}{(1-\sigma+\rho)}\frac{\left(\beta^{1-\frac{\rho}{\sigma-1}}\left(1-\gamma\right)+\gamma^{\frac{\rho}{\sigma-1}}\right)}{\left(\beta^{\frac{\rho}{1-\sigma}}\left(1-\gamma\right)+\gamma^{\frac{\rho}{\sigma-1}+1}\right)} \end{aligned} \tag{17}$$

It appears from (17) that the relationship between β and $\overline{x_{HF}}$ is not monotonous. Indeed:

$$\text{sign}\,\frac{\partial\overline{x_{HF}}}{\partial\beta} = \text{sign}\,\left[\left(\beta^{\frac{\rho}{1-\sigma}}\left(1-\gamma\right)+\left(\frac{\rho}{\sigma-1}\right)\beta^{-1}\gamma^{\frac{\rho}{\sigma-1}}-\left(\frac{\rho}{\sigma-1}-1\right)\gamma^{\frac{\rho}{\sigma-1}+1}\right)\right].$$

The latter expression is monotonously decreasing in β. It is positive for $\beta = 1$ and negative for sufficiently large values of β. An increase in β first magnifies the intensive margin, then

[13] The derivatives showing the marginal impact of insecurity on trade margins are presented in the appendix.

[14] Recall that $\rho > (\sigma - 1)$.

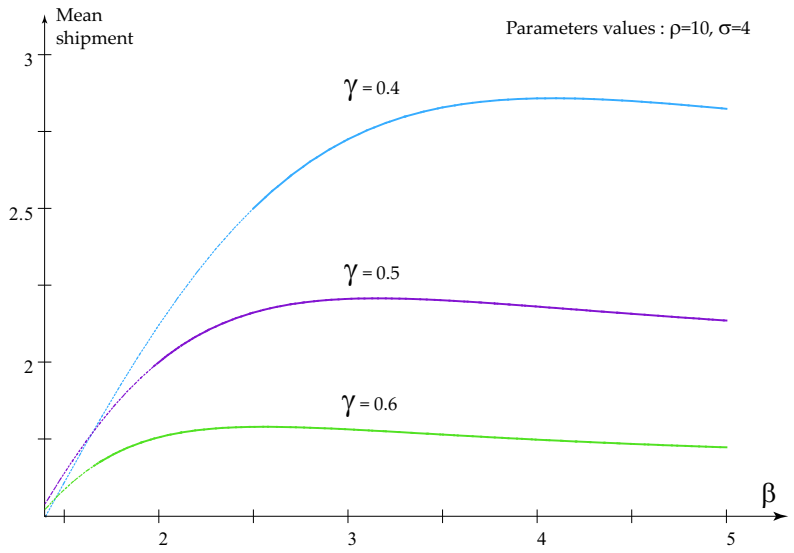

Figure 4: Intensive margin

dampens it. Figure 4 presents numerical simulations of equation 17.[15] The relationship between β and $\overline{x_{HF}}$ always exhibits an inverted U-shape, because a higher insecurity magnifies the disruption of firms' selection. The intuition for this result is the following. A marginal increase in β induces a marginal expansion of area D to the left in Figure 2. If the level of insecurity is low, i.e β and area D are small, a marginal increase in β pushes some firms out of the export market that are less productive than the average productivity of exporters, and thus have smaller export sales than the average. The mean shipment thus increases. On the other side, if the level of insecurity is large, i.e β and area D are large, a marginal increase in β pushes out of the export market some firms that are more productive than the average productivity of exporters, and thus have larger export sales than the average. This result induces the following proposition:

Proposition 2 *In contrast to other trade barriers that affect all exporters similarly, insecurity has an inverted U-shaped influence on the intensive margin of trade.*

Proposition 2 is a very specific outcome of the model. The non-linearity is clearly the consequence of the imperfect selection of exporters due to insecurity. Neither a fixed or variable cost can produce this result. Indeed, these trade barriers, which affect all exporters similarly, unambiguously increase the mean shipment. Proposition 2 therefore represents another discriminating criterion to validate empirically our model.
It can be tested using reduced forms of equations (15), (16) and (17):

$$M_{H,F,t} = \eta_1 \ln(Insecurity_{Ft}) + \eta_2 A_{H,F,t} + \varepsilon, \tag{18}$$

where ε is an error term and $M_{H,F,t}$ is either the intensive or the extensive margin of exports from H to F at year t. Equation (18) is actually a gravity equation estimated separately

[15] The parameters used for simulations are σ=4, ρ=6, L_F=1 and μ=0.8.

on aggregate exports and each trade margins, very much in the line of the one estimated by Bernard et al. (2007) and Hillberry and Hummels (2008).[16]

4. Data and empirical evidence

Our model provides several predictions that are summed-up by Propositions 1 and 2. This section presents the data, the estimation procedure and the econometric results.

4.1. The data

Our database contains firm-level exports from France which are collected by the French Customs and available at the Institut National de la Statistique et des Etudes Economiques (INSEE). It gives information on the value exported by all French firms to each destination country, between 1986 and 1992. We restrict the sample to manufacturing firms of more than 20 employees because data on individual production, employment, and main sectoral activity are not available for smaller ones.

We mainly use ICRG data to proxy political insecurity. ICRG provides long series of annual indices of political stability, which matches with our period of estimation. Moreover, the data cover a very large set of countries, and offer a great variance over time and importing countries. The indices are ranging from 0 to 100. They account for institutional failures, closely related to our theoretical β: political stability (measured by socioeconomic conditions, democracy, and ethnic tensions or military conflicts) and determinants of business climate, such as contract viability and payment delays, corruption, efficiency of the bureaucracy and legal system.[17]

Finally, we use variables that are usual inputs of gravity equations. GDP, populations and GDP per capita come from the World Development Indicators database, and distances and other geographical and cultural data from CEPII.[18]

Restricting our data to countries which are surveyed by ICRG, we analyze French exports on a balanced panel of 110 destinations countries and 7 years (1986-1992). For this sample, we have export, production and employment data for 27578 firms over the period, belonging to 21 manufacturing industries. The annual number of firms ranges from 15414 in 1986 to 17189 in 1992. Table 6 reports, for each country, the mean values of ICRG indices for political stability, the total exports from France, and the number of French exporters.

[16] Note that the structural equation for the mean shipment (equation 17) is actually far from a gravity equation. It does not depend either on trade costs or market sizes. This is due to some specificities of our model: the Pareto distribution and the CES utility. First, an increase in trade costs raises the price of imported varieties and reduces all individual shipments; but it also eliminates the least productive exporters and therefore increases the mean shipment. When the distribution of firm productivity is assumed to be drawn from a Pareto, these two effects cancel out (see Lawless and Whelan, 2007). Second, the mean shipment does not depend on the market sizes because free entry in both markets systematically equalizes competition between countries, whatever the extent of market size asymmetries. The source of this effect comes from the CES functional form of preferences, that leads to constant mark-ups over marginal costs. Our empirical specification departs from the structural forms, considering a less restricting setting.

[17] http://www.prsgroup.com/.

[18] This database is available online at *www.cepii.fr*.

4.2. Empirical results

4.2.1. Export decision

We start by presenting results on our firm-level predictions. We estimate, at the individual level, the export decision of each firm on each of the 110 countries in our sample. As summarized in Proposition 1, the model predicts that insecurity on a foreign market lowers the probability that a firm exports to this country. Above all, it predicts that a higher insecurity loosens firms' selection, so that the influence of TFP of export status should be lesser on insecure markets than on safe ones.

We use our firm-level data to perform probit estimations of equation (14). To get a proxy for the productivity of each firm i for all years t of presence in the sample, we regress, for each industry separately, the log of firm's value added on their total employment, and compute the exponential of the residuals of the estimated equation. Since all firms in the database belong to the same country, vector A does not contain any variables specific to the exporting country. In accordance with the plentiful literature on gravity equations, we proxy importing country's demand by its GDP. Trade costs are proxied by bilateral distance with France, dummies denoting French border countries, countries using French as an official language, former French colonies, EU-15 members, Central and Eastern European Countries, and GATT members. Coefficients for these variables are shown in columns (1)-(4) of Table 1. In columns (4)-(6), we replace all time-invariant variables by importing country fixed effects. This specification is closer to the structural form of the model because it controls for importing countries' price indices and the invariant parts of the fixed cost associated with exporting. However, the small time dimension of our panel (7 years) may shed doubts on the robustness of estimates based on within variation.

In all estimations, coefficients on the political insecurity variable have the expected negative sign. The corresponding marginal effects are rather large: A 10% increase in the ICRG index for a country reduces the probability that a French firm export to this destination by 0.17% to 2.8%, depending of the estimation method and the selected sample.[19] Besides, productivity influences positively the probability that a firm exports. This result confirms the very well documented evidence of firms' selection into export markets. Coefficients on importing countries' GDP, and all geographical variables reported in columns (1)-(3), also have the expected sign. The probability that a firm exports to a country increases with its economic size, and diminishes with geographical and cultural distances.

In order to test Proposition 1, we must distinguish between countries with a high level of insecurity and more secure ones. We split the sample of countries into two sub-groups, defining as a high insecurity destination all countries which mean value of insecurity index over the period 1986-1992 is above the median. Columns (1) and (4) of Table 1 report the estimate of an interaction term between firm's productivity and a dummy for high risk countries. For both the between and within regressions, the coefficient on this variable is significantly negative. This indicates that a higher TFP has a less predominant role on the probability that a firm exports in insecure markets than in more secure ones. This is precisely the theoretical prediction summarized in Proposition 1.

An alternative test of Proposition 1 is given in columns (2)-(3) and (5)-(6). These columns

[19] A 10% change in the insecurity index is not a particularly big variation; on the between variation, it is only one fourth of one standard deviation of the mean, and more than 50% of the countries in our sample experienced a change in their insecurity index larger than 10% between 1986 and 1992.

Table 1: Insecurity and firm's export decisions

	Dependent variable: Firms' export status to country f ($x_{ift} > 0$)					
	(1)	(2)	(3)	(4)	(5)	(6)
		Between*			Within**	
Countries	*All*	*Low insecurity*	*High insecurity*	*All*	*Low insecurity*	*High insecurity*
log TFP	0.311^a	0.324^a	0.287^a	0.338^a	0.329^a	0.295^a
	(0.013)	(0.013)	(0.015)	(0.013)	(0.013)	(0.015)
log TFP	-0.005^a			-0.063^a		
* High insecurity	(0.001)			(0.007)		
log Political	-0.153^a	-0.457^a	-0.097^a	-0.167^a	-0.330^a	-0.143^a
insecurity	(0.006)	(0.012)	(0.008)	(0.007)	(0.019)	(0.007)
log GDP	0.194^a	0.180^a	0.175^a	0.171^a	0.224^a	0.125^a
	(0.001)	(0.001)	(0.002)	(0.004)	(0.006)	(0.004)
log Distance	-0.252^a	-0.165^a	-0.466^a			
	(0.002)	(0.002)	(0.005)			
Contiguity	0.374^a	0.450^a				
	(0.004)	(0.004)				
French	0.437^a	0.450^a	0.456^a			
language	(0.004)	(0.005)	(0.005)			
Former	0.314^a	0.365^a	0.230^a			
colony	(0.006)	(0.009)	(0.007)			
UE - 15	0.292^a	0.375^a				
	(0.004)	(0.004)				
CEEC	-0.411^a	-0.248^a	-0.602^a			
	(0.007)	(0.008)	(0.010)			
GATT	0.131^a	0.289^a	0.026^a			
member	(0.003)	(0.004)	(0.004)			
			Marginal effects			
log TFP	0.150^a	0.255^a	0.073^a	0.145^a	0.245^a	0.064^a
log TFP* High	-0.001^a		-0.014^a			
log Pol. Insec.	-0.055^a	-0.284^a	-0.017^a	-0.053^a	-0.195^a	-0.021^a
N	12513568	6183948	6329620	12513568	6 183948	6329620
Pseudo-R^2	0.266	0.253	0.161	0.284	0.265	0.188

Probit estimates. *: year and industry fixed effects, **: country, year and industry fixed effects. Standard errors clustered by firms in parentheses. ^{c}: $p < 0.1$, ^{b}: $p < 0.05$, ^{a}: $p < 0.01$

report estimates of equation (14) for the two subset of low and high risk countries separately. As expected, the coefficients on firms' TFP are systematically lower for the group of higher insecurity countries. This difference is significant in the case of the between estimes. The within regressions yield, however, coefficients for the two groups that are not statistically different at the 10% level.

4.2.2. Trade margins

We test Proposition 2 by investigating the influence of insecurity on export margins. Table 2 displays the between estimates of equation (18). In columns (1)-(3) the dependent variable is the log of the number of exporting firms to each country, for each of the 7 years of the sample and the 21 manufacturing industries. In columns (4)-(6) it is the mean value exported by country, year and industry. We perform a Tobit estimation to control for zero trade flows, and all regressions include year-industry pairwise fixed effects.

All gravity variables perform correctly. Market size raises both the number of exporters and the mean shipment. Geographic and cultural distances have also the expected negative effect on the two margins. Considering the extensive margin, insecurity has a strong negative influence on the number of exporters. For low insecurity countries (see column 2), this influence is very strong: a 10% increase in the insecurity index in a country reduces the number of exporting firms to this destination by about 7.7%. As predicted by our model, a marginal increase of insecurity has a significantly smaller influence on the extensive margin (see column 3).

For the intensive margin, results shown in column (3)-(6) are clearly different. Considering all countries in the sample, we find no significant relationship between insecurity and the mean value of individual exports. For low risk countries, insecurity unambiguously increases the mean export value. On the contrary, for countries with a high level of insecurity, political insecurity has a negative influence on the intensive margin. These contrasting results draw exactly the bell-shaped relationship predicted by our model and summarized by Proposition 2. As explained above, this corroborates our hypothesis that insecurity has a disrupting effect on the selection of exporting firms.

Table 3 gives the within estimates of equation (18). Regarding the extensive margins, the coefficients on the insecurity variable are not significatively different from a country sample to the other. However, the estimates for the intensive margin exhibit the expected non-linear shape; in relatively safe country, a marginal increase of insecurity has no significant influence on mean shipments, whereas it has a strong negative effect in very insecure markets.

To illustrate our results, let us consider the two following experiments: Imagine that, everything else staying unchanged, Italy and Pakistan succeed in reducing their insecurity level up to the one of their safest neighboring country, i.e. Switzerland and India respectively. This represents a reduction of the insecurity index of 19.3% for Italy and 16.6% for Pakistan. Relying on the coefficients estimated on the within variation, such an improvement should increase Italian imports by 13.2%. This increase is completely channelled by the extensive margin. On the contrary, the impact on Pakistani trade is mainly driven by the intensive margin.[20]). Indeed, the number of imported varieties only increases by 11.7% while the mean shipment rises by 30.6%. These two examples show that a comparable change in institutional quality may have very different influence on international trade depending on

[20]Total trade should increase by +45.9% which would raise Pakistani imports from France from 31% to 45% of Indian imports from France.

Table 2: Insecurity and trade margins - Between estimates

Dep. Var	Number of firms			Mean shipment		
	(1)	(2)	(3)	(4)	(5)	(6)
Countries	*All*	*Low insecurity*	*High insecurity*	*All*	*Low Insecurity*	*High insecurity*
log Political insecurity	-0.481^a	-0.772^a	-0.525^a	-0.171	1.290^a	-0.927^a
	(0.027)	(0.064)	(0.051)	(0.105)	(0.260)	(0.200)
log GDP	0.474^a	0.404^a	0.485^a	0.962^a	0.869^a	1.078^a
	(0.005)	(0.006)	(0.008)	(0.017)	(0.022)	(0.029)
log Distance	-0.449^a	-0.211^a	-0.909^a	-0.667^a	-0.440^a	-1.104^a
	(0.014)	(0.015)	(0.027)	(0.054)	(0.060)	(0.106)
Contiguity	-0.286^a	0.184^a		-0.325^b	0.153	
	(0.041)	(0.038)		(0.165)	(0.157)	
French language	1.107^a	0.680^a	1.332^a	0.774^a	0.619^a	1.189^a
	(0.027)	(0.044)	(0.039)	(0.108)	(0.183)	(0.156)
Former colony	0.773^a	1.238^a	0.441^a	1.240^a	1.075^a	0.835^a
	(0.028)	(0.052)	(0.038)	(0.111)	(0.213)	(0.153)
UE-15	0.511^a	0.737^a		0.166	0.684^a	
	(0.035)	(0.035)		(0.139)	(0.141)	
CEEC	-0.473^a	-0.096^b	-1.057^a	-0.100	0.330^b	-1.185^a
	(0.039)	(0.041)	(0.069)	(0.151)	(0.167)	(0.278)
GATT member	0.217^a	0.629^a	-0.021	0.148^b	0.447^a	-0.074
	(0.017)	(0.022)	(0.026)	(0.067)	(0.089)	(0.100)
Nb. obs.	16170	8085	8085	16170	8085	8085
R^2 *	0.428	0.504	0.385	0.1354	0.145	0.135

Tobit estimates with Year-industry pairwise fixed effets. * $PseudoR^2$

Standard errors in parentheses, ^{c}: $p < 0.1$, ^{b}: $p < 0.05$, ^{a}: $p < 0.01$

Table 3: Insecurity and trade margins - Within estimates

Dep. Var	Number of firms			Mean shipment		
	(1)	(2)	(3)	(4)	(5)	(6)
Countries	*All*	*Low insecurity*	*High insecurity*	*All*	*Low Insecurity*	*High insecurity*
log Political insecurity	-0.684^a	-0.687^a	-0.701^a	-1.668^a	-0.764	-1.840^a
	(0.032)	(0.063)	(0.043)	(0.214)	(0.440)	(0.282)
log GDP	0.251^a	0.286^a	0.228^a	0.762^a	0.729^a	0.803^a
	(0.011)	(0.013)	(0.019)	(0.076)	(0.087)	(0.124)
Nb. obs.	16170	8085	8085	16170	8085	8085
R^2 *	0.847	0.979	0.746	0.283	0.342	0.245

Tobit estimates with Country-industry pairwise fixed effets. * $PseudoR^2$
Standard errors in parentheses, ^{c}: $p < 0.1$, ^{b}: $p < 0.05$, ^{a}: $p < 0.01$

the initial level of insecurity. Whereas a tariff should have a monotonous and linear influence on trade margins, insecurity, because it disrupts firms' selection, have a non-linear influence on trade patterns.

Tables 4 and 5 show several robustness checks of this empirical results. Table 4 estimates equation (18) with two alternative econometric methods. We first perform poisson maximum likelihood estimates, as suggested by Santos Silva and Tenreyro (2006). Results are shown in columns (1)-(4). Columns (5)-(8) report OLS estimates. All these regressions are very similar to the Tobits, confirming the non-linearity of the relationship between insecurity and mean shipments; the between estimates exhibit again a positive then negative impact of insecurity, and the within estimates give non-significant then negative coefficients.

In Table 5 we address the potential correlation between the insecurity variable and some missing variables that may influence the intensive margin. In columns (1)-(4) we replace the GDP variable by the GDP per capita and the population. We also introduce in the equation the ICRG index of economic insecurity which measures macroeconomic risk. Once again, the sign and the significance of the coefficients on the insecurity variable remain the same. In columns (5)-(8) we test the robustness of our model to the choice of the insecurity variable. We estimate equation 18 using Freedom House index of civil liberties.[21] This index covers a large set of countries for the period 1986-1992. It is less relevant however than the ICRG index because it mainly focuses on political and individual freedom, and the rule of law only contributes marginally to the index. Moreover, Freedom House attributes an aggregate mark ranging from 1 to 7, which let us with a relatively small variance, particularly in the within dimension. The estimated coefficients are much less significant, but the results still comfort our theoretical predictions.

[21] http://www.freedomhouse.org

Table 4: Insecurity and mean shipments: alternative methods

	Dependent variable: Mean shipment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PPML*		PPML**		OLS*		OLS**	
Insecurity	*Low*	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
log Political	1.30^a	-0.43^a	-0.56	-0.38^c	0.32^a	-0.37^a	-0.25	-0.36^a
insecurity	(0.49)	(0.10)	(0.43)	(0.20)	(0.10)	(0.07)	(0.17)	(0.10)
log GDP	0.63^a	0.44^a	0.25	0.46^a	0.49^a	0.48^a	0.51^a	0.23^a
	(0.06)	(0.02)	(0.26)	(0.14)	(0.01)	(0.01)	(0.03)	(0.04)
log Distance	-1.05^a	-0.54^a			-0.26^a	-0.63^a		
	(0.20)	(0.06)			(0.02)	(0.04)		
Contiguity	-0.22				0.44^a			
	(0.18)				(0.06)			
French	0.19^b	-0.00			0.10	0.18^a		
language	(0.08)	(0.05)			(0.07)	(0.05)		
col45	-1.37^a	-0.24^a			0.23^a	-0.05		
	(0.35)	(0.07)			(0.08)	(0.05)		
UE-15	-0.68^a				0.22^a			
	(0.18)				(0.05)			
CEEC	-1.53^a	-0.16			-0.03	-0.66^a		
	(0.30)	(0.19)			(0.06)	(0.09)		
GATT	-0.38^b	-0.24^a			-0.00	-0.07^b		
Member	(0.16)	(0.06)			(0.03)	(0.03)		
Nb. obs.	8085	8085	8085	8085	7434	6831	7434	6831
Log L / R^2	-2.7e10	-6.8e9	-5.2e9	-2.6e9	0.52	0.34	0.04	0.01

*: Year-Industry pairwise fixed effects. **: Country-Industry pairwise fixed effects.
Robust standard errors in parentheses. ^{c}: $p < 0.1$, ^{b}: $p < 0.05$, ^{a}: $p < 0.01$

Table 5: Insecurity and mean shipments: alternative variables

	Dependent variable: Mean shipment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Between*		Within**		Between*		Within**	
Insecurity	*Low*	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
log Political insecurity	0.62^{c}	-0.37^{c}	-0.23	-2.16^{a}				
	(0.36)	(0.21)	(0.47)	(0.29)				
log FH Civil Rights					0.12^{c}	-0.44^{a}	-0.09	-0.41^{c}
					(0.07)	(0.15)	(0.09)	(0.22)
log Economic Insecurity	-0.43^{b}	-1.25^{a}	-0.78^{a}	0.97^{a}				
	(0.18)	(0.15)	(0.27)	(0.21)				
log GDP					0.84^{a}	1.07^{a}	0.74^{a}	0.90^{a}
					(0.02)	(0.03)	(0.09)	(0.12)
log Population	0.88^{a}	0.99^{a}	-0.18	-0.01				
	(0.02)	(0.03)	(0.61)	(0.58)				
log GDP per cap.	0.67^{a}	1.06^{a}	0.74^{a}	0.94^{a}				
	(0.05)	(0.05)	(0.11)	(0.13)				
log Distance	-0.46^{a}	-0.99^{a}			-0.40^{a}	-1.15^{a}		
	(0.06)	(0.11)			(0.06)	(0.11)		
Contiguity	0.13				0.25			
	(0.16)				(0.16)			
French language	0.65^{a}	0.87^{a}			0.49^{a}	0.95^{a}		
	(0.18)	(0.16)			(0.18)	(0.15)		
Former Colony	0.92^{a}	1.06^{a}			1.26^{a}	1.17^{a}		
	(0.22)	(0.17)			(0.22)	(0.15)		
UE-15	0.71^{a}				0.65^{a}			
	(0.14)				(0.14)			
CEEC	0.29^{c}	-1.03^{a}			0.37^{b}	-1.04^{a}		
	(0.17)	(0.28)			(0.17)	(0.28)		
GATT	0.53^{a}	0.07			0.49^{a}	0.00		
	(0.09)	(0.11)			(0.09)	(0.10)		
Nb. obs.	8085	8085	8085	8085	8085	8085	8085	8085
R^2	0.15	0.14	0.34	0.25	0.14	0.14	0.34	0.24

Tobit estimates. Standard errors in parentheses. ^{c}: $p < 0.1$, ^{b}: $p < 0.05$, ^{a}: $p < 0.01$

*: Year-Industry pairwise fixed effects. **: Country-Industry pairwise fixed effects.

5. Concluding remarks

We propose an original approach to consider the influence of insecurity on world trade. We extend Melitz' (2003) and Chaney's (2008) frameworks, developing a model of trade with heterogeneous firms that accounts for insecurity in the destination countries. Whereas the existing literature often assimilates insecurity on export markets to an additional trade barrier, we emphasize a specific characteristic of insecurity. Trade barriers, such as trade costs, tarifs, quotas, industry regulations, and economic risk, affect similarly all exporting firms. This is not the case for political insecurity. Indeed, while all exporting firms face the same risk, not all firms really have to handle a risky situation on their export market. In our model, we represent political insecurity as a specific fixed cost associated to corruption, which firms have a given probability of facing. We show that political insecurity not only reduces trade, but also distort the selection of firms. We also provide empirical evidence from French exporters which conform the majority of our predictions.

Note that our conclusions provide an explanation to the selection puzzle emphasized by Eaton, Kortum and Kramarz (2007). Models of trade with heterogeneous firms predict that firms that are competitive enough to export to small and remote countries should also supply the more accessible markets. Eaton et al. develop a model that fits the data very well, assuming demand and fixed cost random shocks on firms to explain why the hierarchy of markets served does not hold. We provide a theoretical explanation for these random shocks and find strong empirical evidence corroborating this explanation. Indeed, if a pure random shock is sufficient to generate the imperfect selection of firms into export markets, it cannot explain the non linearity of the intensive margin with respect to the level of insecurity.

6. Appendix

Marginal impact of insecurity on trade and trade margins

This appendix presents the consequence of a marginal change in parameters that characterize insecurity on trade flows and the number of exporting firms.

Aggregate Trade flows (X_{HF}):

$$\frac{\partial X_{HF}}{\partial \beta} = \lambda \tau^{-\rho} \frac{\left(1-\frac{\rho}{\sigma-1}\right)(1-\gamma)\beta^{-\frac{\rho}{\sigma-1}} L_F \left(\frac{C_D}{C_X}\right)^{1-\frac{\rho}{\sigma-1}}}{\left(L_F \left(\frac{C_D}{C_X}\right)^{1-\frac{\rho}{\sigma-1}} + \tau^{-\rho} L_H \left(\beta^{1-\frac{\rho}{\sigma-1}}(1-\gamma) + \gamma^{\frac{\rho}{\sigma-1}}\right)\right)^2} < 0$$

with $\lambda = \frac{2\mu(\sigma-1)}{\sigma\rho-\mu(\sigma-1)} \frac{1-\sigma+\rho}{\rho} \mu L_H L_F$.

Number of exporting firms:

$$\begin{aligned} \frac{\partial N x_{HF}}{\partial \beta} &= \frac{\lambda_5}{\sigma C_X} \frac{-\left(\frac{\rho}{\sigma-1}\right)(1-\gamma)\beta^{\frac{\rho}{1-\sigma}-1}}{\left(L_F \left(\frac{C_D}{C_X}\right)^{1-\frac{\rho}{\sigma-1}} + \tau^{-\rho} L_H \left(\beta^{1-\frac{\rho}{\sigma-1}}(1-\gamma) + \gamma^{\frac{\rho}{\sigma-1}}\right)\right)^2} x \\ &\quad \left[L_F \left(\frac{C_D}{C_X}\right)^{1-\frac{\rho}{\sigma-1}} + \tau^{-\rho} L_H \left(\beta^{1-\frac{\rho}{\sigma-1}}(1-\gamma) + \gamma^{\frac{\rho}{\sigma-1}}\right)\left(\beta^{-1} + \frac{\rho}{\sigma-1} - 1\right)\right] \end{aligned}$$

Table 6: Data description (mean values 1986-1992)

Country	Security Index[a]	Total Trade[b]	Nb. of firms[c]	Mean Ship.[d]	Country	Security Index[a]	Total Trade[b]	Nb. of firms[c]	Mean Ship.[d]	Country	Security Index[a]	Total Trade[b]	Nb. of firms[c]	Mean Ship.[d]
Angola	43.9	0.28	3.2	0.86	Ghana	48.8	0.13	1.47	0.92	Norway	86.8	3.66	22.11	1.65
Albania	62.7	0.02	0.56	0.4	Guinea	46.9	0.3	6.04	0.5	New Zel.	85.6	0.48	7.3	0.66
Argentina	58.5	1.65	7.63	2.11	Gambia	51	0.02	0.7	0.31	Oman	57.3	0.31	4.11	0.76
Australia	80.1	3.25	18.88	1.71	Guinea-Biss	43.9	0.01	0.51	0.19	Pakistan	36.9	0.9	5.49	1.64
Austria	86.2	7.22	35.84	2	Greece	61.2	4.62	27.91	1.64	Panama	44.8	0.32	2.35	1.4
Bel/Lux	80.5	57.06	110.3	5.16	Guyana	40.9	0.01	0.25	0.49	Peru	40.4	0.26	2.89	0.84
BurkinaF.	48.9	0.3	8.6	0.35	Honduras	40.7	0.05	0.82	0.57	Philip.	41	0.75	4.54	1.64
Banglad.	32.5	0.18	1.39	1.3	Haiti	30.1	0.07	2.67	0.26	Poland	56.1	1.59	9	1.74
Bulgaria	65.4	0.5	3.89	1.27	Hungary	72.7	1.19	8.42	1.44	Portugal	70.8	8.96	40.78	2.16
Bahrain	50.7	0.28	4.89	0.58	Indonesia	45.3	1.65	6.26	2.64	Paraguay	51.3	0.09	1.61	0.53
Bahamas	66	0.28	0.82	3.85	India	44.4	2.92	10.14	2.88	Qatar	50.6	0.44	5.58	0.81
Bolivia	42.4	0.03	0.81	0.36	Ireland	79.1	2.61	18.59	1.39	Roumania	50.8	0.7	2.9	2.43
Brazil	65.6	3.1	8.62	3.64	Iran	37.6	1.55	4.04	3.32	Saudi A.	52.6	4.15	18.07	2.31
Brunei	76.2	0.05	0.5	0.85	Irak	31.9	1.32	3.39	2.92	Sudan	22.1	0.11	1.66	0.67
Botswana	66.9	0.02	0.42	0.44	Iceland	85.6	0.15	5.62	0.27	Senegal	57.4	0.97	19.64	0.49
Canada	83.6	5.74	29.85	1.92	Israel	44.5	2.4	20.18	1.19	Singapore	78.8	3.35	16.06	2.04
Switzer.	93.5	26.42	86.02	3.06	Italy	75.5	73.94	76.97	9.54	Sierra L.	46.7	0.01	0.62	0.24
Chile	54.4	0.93	7.32	1.24	Jamaica	59.7	0.05	0.9	0.53	Salvador	33	0.08	0.89	0.93
China	61.7	4.42	5.5	7.98	Jordan	43.4	0.55	5.99	0.92	Somalia	37	0.01	0.28	0.22
Ivory Coast	63	1.49	23	0.65	Japan	86.7	10.55	25.96	4.01	Surinam	42.5	0.01	0.26	0.34
Cameroun	50.7	1.19	22.61	0.52	Kenya	54.3	0.45	3.12	1.44	Sweden	86.7	9.92	34.21	2.89
Congo	54.3	0.52	13.5	0.39	S.Korea	63	3.68	12.37	3.02	Syria	43.4	0.49	5.01	0.98
Colombia	56.4	0.82	4.97	1.65	Kuwait	45.2	0.83	9.67	0.85	Togo	46.2	0.4	11.1	0.36
Costa R.	65.1	0.09	1.51	0.61	Lebanon	18.1	0.66	15.11	0.43	Thailand	57.4	1.43	8.77	1.57
Cuba	56	0.16	1.46	1.03	Libya	42.2	0.9	2.48	3.61	Tunisia	52.3	4.19	29.27	1.42
Cyprus	56.3	0.49	8.81	0.55	Sri Lanka	35.9	0.11	2	0.55	Turkey	50.6	3.28	14.11	2.27
Czechos.	68.1	1.19	6.61	1.82	Marocco	47.3	5.98	35.4	1.67	Taiwan	75.5	2.92	13.41	2.14
Germany	85.6	119.5	97.21	12.21	Madagas.	58.1	0.35	8.45	0.41	Tanzania	53.3	0.05	1.03	0.49
Danemark	86.4	5.71	30.37	1.88	Mexico	66.1	2.4	8.82	2.67	Uganda	36.8	0.04	0.51	0.7
Algeria	60.4	5.75	22.57	2.55	Mali	38.2	0.25	6.85	0.37	Uruguay	60.9	0.27	3.71	0.72
Equador	57.7	0.21	2.23	0.98	Malawi	52.2	0.04	0.56	0.69	USA	83	46.68	46.92	9.96
Egypt	46.5	2.83	11.08	2.55	Malaysia	64.7	0.94	6.89	1.33	Venezuela	67.1	1.18	6.26	1.91
Spain	70.6	44.3	67.83	6.42	Niger	52.4	0.22	7.61	0.29	Vietnam	48.4	0.14	1.29	0.97
Ethiopia	30.8	0.09	1.43	0.59	Nigeria	44.9	1.42	5.6	2.49	Yougosla.	45.6	3.14	10.2	3.05
Finland	89.5	3.6	24.08	1.48	Nicaragua	39.7	0.06	0.61	0.98	Zaire	33.1	0.47	5.61	0.81
Gabon	61	0.94	19.9	0.47	Netherl.	87.8	30.92	61.01	5.04	Zambia	45.2	0.07	0.96	0.76
UK	80.9	68.42	72.18	9.42						Zimbabwe	48.7	0.17	1.88	0.91

Note: [a]: ICRG Political Security index. [b]: Billions of French Francs. [c]: Hundreds. [d]: Millions of French Francs.

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