Export Credit Guarantees, Moral Hazard and Exports Quality

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April 2004

Abstract

We analyze the role played by Export Credit Guarantees (ECGs) to encourage exports to developing countries. The existence of moral hazard on the side of the firm is introduced. We show that the inability of the exporter's government to verify the actual quality of the product will limit its ability to encourage trade through ECGs, once the coverage provided goes beyond a certain threshold. This result provides a rationale behind the limited coverage on ECGs.

JEL Classification: F12, H56, L10

Keywords: export credit guarantees, offsets, moral hazard.

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1 Introduction

In order to protect themselves from a the risk of payment default, exporter firms can take what is called an Export Credit Guarantee (ECG). This service is offered by Export Credit Agencies (ECAs), which are usually supported or owned by the domestic government. In the U.K., this service is provided by the Export Credits Guarantee Department (ECGD). The ECGD mission statement claims that its objective is "*to benefit the UK economy by helping exporters of UK goods and services win business and UK firms to invest overseas, by providing guarantees, insurance and reinsurance against loss, taking into account the Government international policies*" (www.ecgd.gov.uk).

Subject to examination of each case, the ECGD pays claims against its guarantees and insurance policies where there is a default by the buyer, borrower or guarantor. The ECGD provides cover for both commercial and political risk. Commercial risks include the possibility of insolvency of the purchaser and failure to meet contractual obligations. Political risks include actions on the part of the exporter government (introduction of export licensing and embargoes that would mainly apply to defence) and at the importer end of the deal, restrictions on the transfer of money due under the contract, moratorium on external debt and other actions or events that affect contract performance.

A number of ECGD instruments are used to provide cover for export credits. Most transactions are financed through Buyer Credits or Supplier Credit Finance Facilities, where the exporter is paid by a bank in the UK and the UK bank offers credit to the overseas buyer, which could be as much as 100% of the value of the contract. For these transactions, ECGD offers an export credit guarantee which differs from a typical insurance policy in that it provides unconditional cover for non-payment regardless of the cause for non payment. Although the percentage cover varies with the importer country, there is no established system, as far as we are aware, that makes coverage change with the nature of the product that is being

exported[1].

Also, some ECAs may require some exporter firms to sign a *right of recourse clause* as part of the insurance agreement. In the case of the ECGD, this clause gives them the right to recover from an exporter all or part of any claims payment if it is proved that the exporter has failed to meet any of the conditions of its contract with the overseas buyer. However, the ECGD always sets a limit on the amount for which the firm may be liable, which is generally set at 10%. In addition, the firm will be freed from the recourse obligations once the ECGD is satisfied that a contract has been completed to an agreed standard. Interestingly, even when the buyer is unwilling to provide an unconditional certificate or statement of satisfaction that the contract has been met, a decision to release the seller can be taken, and will be based primarily on the seller's certification of the fulfilment of its contractual obligations that proves to the satisfaction of the ECGD.

Over 50 countries have ECAs that provide similar products to EXIG. All ECAs are required to meet the WTO objective to break even in the long term. Although in heavy losses during the past 20 years, the ECGD seems to be reaching break-even point following a more rigorous financial objective introduced in 1991 by the government, probably reinforced by the World Trade Organization (WTO) prohibition. However, Estrin et al. (2000) argue that there is still an implicit subsidy by the government based on the fact that there is no provision for making a rate of return on the notional capital required to meet claims[2]. It is also interesting to mention that although ECAs tend not to cover 100% of the contract value, sometimes private sector insurers become involved in this market by providing cover for contract value that is not covered by ECA guarantees.

[1] Other conditions of the insurance contract might the dependent of the type of supplier or good supplied. For products which might have a potential environmental or human rights impact, most ECAs require an impact assessment to be made prior to the agreement to provide a credit or cover.

[2] Dewit (2000) provides an analysis of how EXIGs can actually be used as strategic trade policies. However, recent international agreements like the *Arrangement on Guidelines for Officially Supported Export Credits* set benchmarks under which premiums cannot be set, therefore limiting the scope for countries to subsidize firms by lowering premiums.

Table 1 shows the maximum percentage insurance coverage of several ECAs. As can be seen, coverage is usually below 100% and lower for commercial risks than for political risks.

Table 1. **Qualitative Comparison of ECA Insurance Cover**

(Source: ECGD International Comparison Survey, October 2002)

Country/ECA	**Maximum percentage cover**	
ECA (Country)	Political risk	Commercial risk
CESDE (Spain)	99	94
COFACE (France)	90	85/90
ECGD (UK)	95	95
EDC (Canada)	90	90
EKN (Sweden)	100	90
EXIM BANK (USA)	100	100
GERLING NCM (Netherlands)	95	95
HERMES (Germany)	95	85
NEXI (Japan)	97.5	90
SACE (Italy)	95	95

One might think of subsidized premium and good coverage for an exporter firm as a direct encouragement to trade. In fact, in a recent report[3] the ECGD refers to the degree of coverage as a sign on competitiveness relative to other ECAs. However, in this paper we will argue that higher insurance coverage does not always encourage trade. The presence of *asymmetric information* between the different parties involved in a trade agreement covered by and EXIG can make the ECGD's task of increasing the scope for trade with developing nations more demanding. In order to analyze the existence of asymmetric information, we need to assess both political and commercial risk involved in exports to developing nations.

A possible source of asymmetric information would be that the exporter firm could take an action, not observable to the ECGD, which affects the probability

[3]ECGD (2003) Report on the Comparison of Export Credit Agencies.

of default. Estrin et al. (2000) argue that it is difficult to think of situations in which the firm is more aware about political risk in the importer country than its own government. However, they also recognize that there is more chance for the existence of asymmetry in the knowledge of commercial risks. As the cover that ECAs give is generally less than 100%, this seems to reflect that if total cover was offered, there would be little incentive for banks or exporters to properly investigate the risks associated with a particular project. Also, the exporting company could take actions that would result in non-payment. Estrin et al. (2000) do not mention quality as one of such possible causes for non-payment, they only mention "non-delivery of the product" and state that such actions would be directly observable by the insurance company and therefore not a moral hazard problem. However, they claim that EXIGs can serve as an important device for signalling confidence in the exporter by the importing government. This signal concerns the quality of the ECGD's backed bid and the idea is that if the firm was likely to fail to deliver on quality, the government would not want to cover it since poor quality, if discovered, may lead to payment default. The crucial assumption here is that the exporter's government is more informed than the importing government about the quality of the product or service to be exported. However, this is not always the case, especially when the firm is going to develop a specific procurement project in which the importer government in the only targeted client. Such a project would have the characteristics of a good whose quality is not be easily verifiable prior or even after project delivery either by the buyer itself or any external parties.

The objective of our paper is to study the impact of ECGs on trade in the presence of asymmetric information in the form of private action by the firm affecting the quality of the good, not shared by either the exporting or importing countries' government. We study the impact of such asymmetric information over the ability of the ECGD to encourage exports to developing nations. Our paper suggests that importers should monitor closely the ECGs provided by the exporter government to its domestic firm as it could be a good method to identify the likelihood of quality

cheating on the exporter's side. Given this, the importer will only sign a delivery contract with the exporter if the expected profits of delivering high quality for the firm are higher than those of delivering low quality[4]. As a result, trade will not occur if the incentive compatibility constraint that induces the firm to select the high level of quality does not hold in the insurance contract between the firm and the ECGD. The ECA will then play a crucial role in helping or preventing trade. We show that a minimum coverage is needed in order to encourage a risk averse firm to export to a country which might default payment due to political reasons; however, excessive coverage needs to be avoided in order to give incentives to the firm to invest in high quality and therefore, the commitment power to convince the importer government that it is safe to sign an imports agreement with that firm.

The problem we study shares some similarities with Laffont (1995). That paper analyzes the design of an optimal contract that would provide incentives for a firm to both behave efficiently and invest in "safety care", which decreases the probability of an environmental disaster. In Laffont (1995), a sufficiently high punishment to the firm if environmental disaster happens is enough to ensure investment in safety care.

In our model, the importer government cannot verify the quality that the firm is selling prior to the contract being signed. Real quality can only be discovered with a certain probability once the product is delivered. As in Laffont (1995), an importer government should also design a contract providing incentives to the firm so to select the high level of quality. The firm failing to deliver such quality would face punishment if found out. However, there are a few reasons why this may not be possible in our case. The first is that the exporting firm may enjoy limited liability with respect to the developing country. In other words, it may be quite difficult to impose a fine on a firm based on a foreign (more developed) country. Second, quality is difficult to verify in a contract. An importer country may have incentives to always claim that low quality was delivered in order to avoid payment

[4]This type of behavior on the side of the consumer has also been analyzed in the warranties literature, see e.g. Lutz and Padmanabhan (1998).

or reputation loss, even if the reason for not wanting the good is a "change of heart", which we will interpret as political default. It is likely to be difficult to verify the real reason for payment default in international courts, which again make punishment implementation difficult, even if the importer discovers that the firm cheated on quality.

In this paper, we introduce the ECGD as the principal in a game in which the firm's client is a foreign country. The ECGD will have an interest in ensuring that the firm does not cheat on the quality. The reason for this interest though will not be altruistic, but based on domestic profit maximization[5]. Not ensuring incentives for investing in quality will result in no trade. The importer government will be aware of the terms of the export credit guarantee when it decides on whether or not to import a good and these terms will, in turn, show whether the firm has enough incentives to produce the promised quality. Therefore, the ECGD will play a crucial role in aiding or preventing trade through the 'signal' it gives about the quality the firm will deliver.

The rest of the paper is organized as follows. Section 2 outlines the basic characteristics of our insurance game, setting out the model, the sequence of moves and the features of the optimal incentive compatible and individually rational contract between the firm and the ECA. It then analyzes the impact of insurance on the scope for trade. Finally, Section 3 provides conclusions and discusses future lines for research.

[5]The need to ensure a good quality of the imports to developing countries is highlighted in the barter/countertrade literature. Marin and Schnitzer (1998) suggest an economic rationale for counter-trade agreements is that they address a double moral hazard problem: the exporting country may deliver high or low quality goods, with quality not being immediately observed, and the importer country cannot pay up front, owing to liquidity constraints, and may then choose to default (see also Marin and Schnitzer (2002)).

2 The Insurance Game

2.1 The model

A monopoly in country A exports a single product/project to country B. Since our focus is on the moral hazard problem in country A, for simplicity we assume that country B is risk-neutral with valuation of the product given by

$$U_B = \theta q - p. \tag{1}$$

where q is the quality of the product to be imported, p is the agreed price to be paid to the exporter and θ represents the willingness to pay for quality.

The firm in country A, firm A, producing a good of quality q incurs a cost $\psi(q)$ with $\psi(0) = 0$. Assuming that pure production costs are c and, for the moment, that the firm receives the full payment, p, the profit of the firm is given by

$$\pi_A = \pi_A(q) = p - c - \psi(q) \tag{2}$$

We will later allow for the firm to be risk averse, in which case, for convenience, we assume a separable utility function $U_A = f(p-c) - \psi(q)$ where $f' > 0$ and $f'' < 0$. If the firm is risk neutral, $U_A = \pi_A$.

As in Marin and Schnitzer (1998), we assume that country B faces a financial (credit) constraint and does not pay the agreed price for the good until after this product is delivered. This is due to the cash constraints in country B, which we think of as a developing country. We also assume that this product is an experience good whose quality cannot be verified until the product is used/tested by the imported government.

Country B defaults on the agreed price p if and only if it receives no benefit from the good. This can come about for two reasons:

- With probability δ, there is a change in preferences reflected in θ becoming 0. We assume then that $\theta = \bar{\theta}$ with probability $1 - \delta$.

- If $q = 0$ and if with probability γ the importer country will discover the true quality of the imported good.

We assume that the above are two independent events. As quality cannot be verified in international courts, in either of the two above situations, once the product is received, the importer government has to decide whether to pay the agreed price anyway or incur in default cost r, the maximum payment that can be enforced. We do not allow for the importer government to use and not pay for a product if none of the events above have happened. The use of the product is observed as a sign of the above events not having happened. Implicitly, we are assuming that the developing country would have a high reputation loss (e.g., through the imposition of a higher risk premium by financial markets) if it decided to do that. Clearly, there will be no incentive to default if $r \geq p$; therefore, in order to create a default possibility we assume that $p > r$. The sequence of moves is as follows:

First, the firm in country A agrees a price $p > r$ with country B.

Second, the firm delivers a high quality good ($q = \bar{q}$) or a low quality good ($q = 0$).

Third, the preferences of country B are realized: $\theta = 0$ with probability δ and $\theta = \bar{\theta}$ with probability $1 - \delta$.

Fourth, if $\theta = 0$, the imported good is not used and country B defaults incurring a cost r transferred to firm A. If $\theta = \bar{\theta}$ country B tests the quality of the good.

Fifth, with probability γ country B discovers the true quality of the good. If it turns out to be low, the good is not used and default occurs. If it turns out to be high, the good is used and a full payment is made. With probability $1 - \gamma$ country B does not discover the true quality of the good. Then the good is used and full payment is made.

Figure 1 sets out the game tree from event 2 onwards. Using this tree we can immediately write down the following conditional expected profits of the exporting firm and conditional expected utilities of the importing country.

$$E[\pi_A \mid q=0] = [(1-\delta)\gamma+\delta](r-c)+(1-\delta)(1-\gamma)(p-c) \quad (3)$$

$$E[\pi_A \mid q=\bar{q}] = (1-\delta)p+\delta r-c-\psi(\bar{q}) \quad (4)$$

$$E\left[U_B \mid q=0\right] = -\left[(1-\delta)\gamma+\delta\right]r-(1-\delta)(1-\gamma)p \quad (5)$$

$$E\left[U_B \mid q=\bar{q}\right] = (1-\delta)\left(\bar{\theta}\bar{q}-p\right)-\delta r \quad (6)$$

2.2 Incentive compatibility and participation constraints

There are three conditions for a price to be agreed and trade to take place. The first is an incentive compatibility condition for firm A that ensures the production of a high quality good. Otherwise if the importer government believed that the firm is lying about the quality it would obviously not import the good (this could change if minimum quality is not zero) and no trade will take place. The condition is:

$$\text{IC}_A : E[U_A \mid q=\bar{q}] > E[U_A \mid q=0] \quad (7)$$

The constraint above says that the firm will tell the truth as long as the expected utility when lying is lower than the one from producing the promised quality. If the exporter government could observe quality or $\Psi(\bar{q})$ (an indirect way of observing quality), it would be optimal for the exporter country's government to implement a punishment system that ensured that the incentive compatibility constraint of the firm was fulfilled in order to allow trade. For the moment, we assume that this is not the case and that the exporter government can only observe the occurrence of payment or default. Given that IC_A holds and so quality $q=\bar{q}$ is produced, the two remaining conditions are the participation constraints that state that trade is Pareto-improving. That is:

$$\text{PC}_A : E[U_A \mid q=\bar{q}] \geq f(0) \quad (8)$$

$$\text{PC}_B : E[U_B \mid q=\bar{q}] \geq 0 \quad (9)$$

From PC_B it follows that the maximum price country B is willing to pay is such

that $E\left[U_B \mid q = \bar{q}\right] = (1-\delta)\left(\bar{\theta}\bar{q} - p\right) - \delta r = 0$.

$$p = \bar{p} = \bar{\theta}\bar{q} - \frac{\delta}{1-\delta} r \tag{10}$$

Thus, the maximum price is an increasing function of the valuation of high quality, $\bar{\theta}\bar{q}$, and a decreasing function of the probability of default, δ, and the minimum enforceable payment, r, in the event of not using the good.

The minimum price at which country B is willing to trade must satisfy both the IC_A and the PC_A constraints. Suppose first that the firm in country A is *risk-neutral*. We then have that $U_A = \pi_A$ up to an affine transformation. The minimum price that satisfies the IC_A is such that $E[\pi_A \mid q = \bar{q}] = E[\pi_A \mid q = 0]$. Using (3) and (4), the minimum price satisfies $(1-\delta)\gamma(p-r) = \psi(\bar{q})$, giving

$$p = \underline{p}^{IC} = r + \frac{\psi(\bar{q})}{(1-\delta)\gamma} \tag{11}$$

For the risk-neutral case, the minimum price must also satisfy the PC_A constraint:

$$(1-\delta)(p - c - \psi(\bar{q})) + \delta(r - c - \psi(\bar{q})) = 0$$

i.e., at a price given by

$$p = \underline{p}^{PC} = \frac{\psi(\bar{q}) - \delta r}{1-\delta} + c \tag{12}$$

Then the negotiated price must lie between the range

$$\max[\underline{p}^{PC}, \underline{p}^{IC}] \leq p \leq \bar{p} \tag{13}$$

We can now distinguish between two equilibria: equilibrium II, for which $\underline{p}^{PC} < \underline{p}^{IC}$ and only the incentive compatibility constraint can bind for firm A, and equilibrium I, for which $\underline{p}^{PC} > \underline{p}^{IC}$ and only the participation constraint can bind for firm A. From (11) and (12), equilibrium II happens iff

$$r > c(1-\delta) - \psi(\bar{q})\left(\frac{1}{\gamma} - 1\right) \tag{14}$$

If at $\delta = 0$, $r > c - \psi(\bar{q})\left(\frac{1}{\gamma} - 1\right)$, then (14) always holds and we only have type II equilibrium. If $r < c - \psi(\bar{q})\left(\frac{1}{\gamma} - 1\right)$, then there exists a threshold $\delta^* \in (0,1)$ for which if $\delta \in [0, \delta^*)$ we have a type II equilibrium, whilst for $\delta \in (\delta^*, 1]$ we have a type I equilibrium. Figure 2 illustrates these two cases[6].

[6] These figures assume that $r > c$.

2.3 Insurance

We now assume that the firm is risk-averse and seeks insurance cover from the government in country A. The firm seeks to cover its potential loss from default equal to the difference between full payment and the transfer that can be enforced following default, $p - r$. If the government charges a commercial rate for the insurance, the premium rate will be equal to the probability of default, δ. Let $\beta \in [0, 1]$ be the degree of coverage provided. The firm then receives a payment $\beta(p - r) + r$ if default occurs (with probability δ) and full payment p if default does not occur (with probability $1 - \delta$). In both cases, it pays a premium of $\delta\beta(p - r)$. The net revenues (net of production costs and insurance premium, but excluding the cost of quality) are given by $R_n = p - c - \beta\delta(p - r)$ if no default occurs, and $R_d = \beta(1-\delta)(p-r)+r-c$ if default does occur. Clearly with full coverage ($\beta = 1$), $R_n = R_d = p - c - \delta(p - r)$, but, as we shall see, this will generate an unexpected problem: the firm will then have an incentive to lie about the quality and, anticipating this, the importer will not trade. With this notation we now have that:

$$\begin{aligned} E[U_A \mid q = 0] = & \quad [(1 - \delta)\gamma + \delta]f(R_d) + (1 - \delta)(1 - \gamma)f(R_n) \\ E[U_A \mid q = \bar{q}] = & \quad \delta f(R_d) + (1 - \delta)f(R_n) - \psi(\bar{q}) \end{aligned}$$

The minimum price that satisfies the IC_A now is found from equating these two expressions; i.e., from:

$$(1 - \delta)\gamma(f(R_n) - f(R_d)) = \psi(\bar{q}) \tag{15}$$

If the firm is only slightly risk-averse, it will still seek insurance and the IC_A constraint then implies $(1-\delta)\gamma(p-r)(1-\beta) = \psi(\bar{q})$ at a value for the price approximated by[7]:

$$p = \underline{p}^{IC} = r + \frac{\psi(\bar{q})}{(1 - \beta)(1 - \delta)\gamma} \tag{16}$$

From this, we see that insurance would actually *increase* the minimum price at which the incentive to provide high quality holds. For the more risk averse firm the

[7] This uses $R_n - R_d = (p - r)(1 - \beta)$.

relationship between the minimum price and coverage is found from differentiating (15) to obtain:

$$\frac{d\underline{p}^{IC}}{d\beta} = -\frac{(p-r)(\delta f'(R_n) + (1-\delta)f'(R_d))}{(1-\delta)\beta f'(R_d) - (1-\beta\delta)f'(R_n)} \tag{17}$$

By the mean-value theorem there exists a $\alpha \in (R_d, R_n)$ such that $f'(R_n) - f'(R_d) = (R_n - R_d)f''(\alpha) = (p-r)(1-\beta)f''(\alpha)$. Hence (17) becomes

$$\frac{d\underline{p}^{IC}}{d\beta} = \frac{(p-r)(\delta f'(R_n) + (1-\delta)f'(R_d))}{(1-\beta)[(1-\delta)(p-r)\beta f''(\alpha) + f'(R_n)]} \tag{18}$$

Since $f''(\alpha) < 0$, we cannot sign this derivative unambiguously, except at $\beta = 0$ where it is positive. But for sufficient low degree of risk aversion the denominator will be positive so that again, more coverage increases the price at which IC_A holds.

Insurance also changes the participation constraint of the firm. With IC_A holding, the minimum price that satisfies the PC_A constraint is given by

$$(1-\delta)(f(R_n) - \psi(\bar{q})) + \delta(f(R_d) - \psi(\bar{q})) = f(0)$$

Differentiating with respect to β the slope of the PC_A curve in its binding form is then given by

$$\frac{d\underline{p}^{PC}}{d\beta} = \frac{\delta(p-r)(f'(R_n) - f'(R_d))}{(1-\delta\beta)f'(R_n) + \delta\beta f'(R_d)} < 0 \tag{19}$$

since $R_n > R_d$ and $f'' < 0$. Figure 3 illustrates the IC_A constraint (for a sufficiently low degree of risk aversion), the PC_A constraint and the PC_B constraint (which remains unchanged) as coverage $\beta \in [0,1]$ increases. Let $\underline{\beta} \geq 0$ and $\overline{\beta} < 1$ be the points at which PC_A and IC_A intersect PC_B. Let β^* be the point at which PC_A and IC_A intersect. Then trade occurs with coverage $\beta \in [\underline{\beta}, \overline{\beta}]$. In the interval $[\underline{\beta}, \beta^*)$ there is a type I equilibrium where PC_A binds. In this interval increased insurance coverage *lowers* the minimum price at which the firm is willing to participate and therefore improves the scope for trade. In the interval $(\beta^*, \overline{\beta}]$ there is a type II equilibrium where IC_A binds. In this interval increased insurance coverage *increases* the minimum price at which the firm is willing to participate and reduces the scope for trade. We summarise this result in the following proposition:

Proposition

Let $\beta \in [0,1]$ be the degree of insurance coverage. Then for $\beta \in [\underline{\beta}, \beta^*]$, increased coverage improves the scope for trade by reducing the minimum price at which the firm will participate; however for $\beta \in [\beta^*, \overline{\beta}]$, it reduces the scope for trade by increasing the minimum price at which the incentive compatibility constraint is satisfied. Thus for low coverage the scope for trade improves, while for high coverage the scope for trade is reduced. Finally, with full coverage ($\beta = 1$), there is no incentive for the firm to provide high quality, and trade does not occur.

The intuition for this result goes as follows. The minimum price at which the firm is willing to trade is derived from the participation constraint. To satisfy this constraint, an increase in coverage calls for a decrease in the minimum price since it increases the expected profits of the firm. However, at the same time, an increase in coverage decreases the expected losses that the firm will suffer if it delivers low quality. That decrease will need to be compensated by an increase in the price (if payment occurs) for the incentive compatibility constraint to still hold. Both effects must be taken into account to assess the impact of increased coverage on the scope for trade.

2.4 Comparative statics

In this paper, we have not made any assumptions over the bargaining power of either exporter or importer when agreeing on a selling price. As already discussed in the introduction, levels of coverage do not usually depend on individual firms or projects, and it is therefore difficult to talk about an optimal level of coverage for our firm. Still, if the firm described in the paper had all the bargaining power in the exports deal and the government could design a coverage targeted to this individual firm, the optimal coverage would be $\overline{\beta}$ and a price $\bar{p}$ would be paid. Lower bargaining power on the side of the exporter and therefore lower export prices, p, would decrease

the optimal level of coverage down to β^*. In this section, we analyze the impact of changes in the model's parameters, r, γ and δ not only on the $\left[\beta^*, \overline{\beta}\right]$, but also on the interval of all possible trade inducing levels of coverage and therefore, the scope for trade.

- It can be easily proved that an increase in the minimum enforceable payment from the buyer will cause an upward shift in the IC_A curve in Figure 3 (for risk aversion sufficiently low), $\frac{d\underline{p}^{IC}}{dr} > 0$, a downward shift in the PC_A curve in Figure 3, $\frac{d\underline{p}^{PC}}{dr} < 0$ and a decrease in the maximum price the importer country is willing to pay, $\frac{d\bar{p}}{dr} < 0$. Therefore, an increase in r has an ambiguous impact on the trade area. However, note that both the minimum and maximum levels of coverage, β^* and $\overline{\beta}$ are now smaller. Therefore, the increase in r will have either no impact of a negative impact on the optimal level of coverage. The intuition is clear: the higher the enforceable payment is, the easier it will be for firms to want to participate in the sale, even for lower coverage, in addition, firms will also have more incentives to cheat in quality and therefore, a lower maximum coverage will be required for every level of prices.

- It can also be proved that an increase in the probability that the buyer discovers the true quality of the good will cause a downward shift in the IC_A curve,$\frac{d\underline{p}^{IC}}{d\gamma} < 0$ (for risk aversion sufficiently low) and no impact on the PC_A curve, $\frac{d\underline{p}^{PC}}{d\gamma} = 0$. This, together with the fact that $\frac{d\bar{p}}{d\gamma} = 0$, implies that an increase in γ increases the trade area and therefore the scope for trade, specially at high levels of coverage. Also, as β^* and $\overline{\beta}$ are now bigger, the increase in γ will have either no impact of a positive impact on the optimal level of coverage. Here, a higher chance of being discovered acts as an incentive not to cheat and therefore, higher levels of coverage still induce trade.

- An increase in the probability of default will cause an upward shift in the IC_A curve, $\frac{d\underline{p}^{IC}}{d\delta} > 0$ (for risk aversion sufficiently low) and the PC_A curve

$\frac{d\underline{p}^{PC}}{d\delta} > 0$. This, together with the fact that $\frac{d\bar{p}}{d\delta} < 0$, implies that an increase in δ decreases the trade area and therefore the scope for trade. The impact on the optimal level of coverage is uncertain, although for high initial levels of coverage the effect will be negative; a higher probability of default discourages participation and therefore requires higher levels of coverage to ensure it but, it also strengthens the incentives to cheat and thus therefore, reduces the required quality-inducing coverage.

- A reduction in $\bar{\theta}$ will only (negatively) affect $\bar{p}$, reducing the scope for trade, again, making the "window" of opportunity for trade, $\left[\underline{\beta}, \overline{\beta}\right]$ smaller, but not affecting β^* and therefore having none or negative impact on the optimal level of coverage.

- In addition to the results obtained above, it would be straightforward to allow for a *right of recourse* within our model. Assume that $1-\alpha$ represents the probability of a right of recourse being awarded, that $r = 0$ and that the firm receives no compensation. We also assume that recourse can only be activated with any success probability if the buyer discovers that the quality is low, which happens with probability γ. Note that the existence of a probability of successful recourse would only affect the incentive compatibility constraint in the following way[8]:

$$(1-\delta)\gamma\left[f(R_n) - \alpha f(R_d)\right] + (1-\delta)\left(1-\alpha\right)\gamma f(c) - \psi(\bar{q}) = 0 \qquad \text{(IC recourse)}$$

It can be easily checked that $\frac{d\underline{p}^{IC}}{d\alpha} > 0$. Clearly, an increase in the probability of recourse (decrease in α), increases the scope for trade, shifting the IC downwards

[8]Note that in this case

$$E[\pi_A \mid q = 0] = [(1-\delta)\alpha\gamma + \delta]f(R_d) + (1-\delta)(1-\gamma)f(R_n) - (1-\delta)\left(1-\alpha\right)\gamma c. \qquad (20)$$

in Figure 3. Therefore, the decrease in α will have either no impact or a positive impact on the optimal level of coverage.

The above analysis helps us identify which would be the type of goods whose trade would be negatively affected by uniform high coverage rates. These will be likely to be experience or merit goods, as trade deals in such goods would tend to be characterized by lower γ (probability that the buyer discovers the true quality), higher δ (chance the buyer changes his mind with respect to whether he still wants the delivered goods) and probably higher α (lower probability of successful recourse). An insurance system with high coverage would leave these goods outside the trading triangle in Figure 3.

Interestingly, experience goods which are not highly valued by importers (low $\bar{\theta}$) may be even more negatively affected by uniform high coverage.

There is an obvious policy conclusion to our analysis: if the aim of the ECGD is to promote trade, then coverage should not be homogenous across projects. It is true that the recourse deal is a way to encourage high quality trade and therefore, trade flows, but only if there is a high enough probability of verifying the project's quality in court. It is also clear from our analysis that an increase in the probability of accurately verifying quality by either the buyer or the courts will increase the scope for trade. It is then important to improve the systems that may help verify both in courts and by the buyer the real quality of the purchased good.

3 Conclusions

Export Credit Agencies are agencies supported or owned by developed countries whose aim is to help domestic exporters to export their goods to, or invest in, developing countries, often alongside offset agreements. They provide guarantees, insurance and reinsurance against loss due to failed contract or payment default, taking into account the government international policies.

In our paper, we claim that contract frustration or non-payment can arise for two different reasons: political default owing to a change in the priorities of the

importer government or commercial default owing to the importer country being unhappy with the quality of the product, once this is delivered. In deciding whether to import or not a product a government must assess the incentives that the firm has to produce a high quality good. We discuss that, in this assessment, it will be crucial to observe the terms of the contract provided by the ECA to the domestic firm. This provides an additional tool for ensuring that high quality products are delivered to developing countries.

Our results suggest that an ECGs can improve the scope for trade by encouraging risk averse firms to trade with countries which might engage in political default but, it may also reduce the scope for trade by increasing the incentive of firms to export low quality. This suggests that an excessive level of coverage will have a negative impact on trade. The reason being that high level of coverage will decrease the expected losses of the firm if it decided to deliver low quality and therefore, it will discourage the importer country from signing an exports deal with the firm.

Our paper is specially relevant to goods or projects covered by an ECA whose quality is not easily verifiable prior or even after project delivery. A standard high degree of coverage might make it difficult to ensure that the firm has sufficient incentive to deliver. Such risk will be lower for exporters supplying goods on which they have a track record or whether the technology which is being exported is well established, the technical expertise of the buyer is also important in assessing the need and quality of the project. Obviously, tailor made projects rather than "production-line" projects are at more risk. Our research would call for heterogenous coverage rates being applied to different projects, giving lower coverage rates for "experience good" type projects.

There is a number of ways in which our model could be extended. The ECG is a sub-optimal mechanism in that the ECGD is constrained to break even. If we allow the ECGD to extract rent from the firm, our analysis would get closer to the optimal mechanisms of Laffont and Martimort (2002), and we could also explore the possibility of existence of cost reducing effort on the side of the firm, therefore,

getting closer to Laffont (1995).

A second possible extension of our model would look at the agency relationship with the ECA acting as an agent of the government in the exporting country, while still being the principal in the insurance game with the firm. In this framework, we might investigate the issue of the ECA being 'captured' by the firm, and thus address the impact of interest group power over the export credit guarantees and therefore, over the scope for trade (see e.g., Becker (1983), Fiorina (1985) and Laffont (2000)).

An additional line of research could look at the possibility that the exporter government provides incentives to the importer government so that it reveals the signal that he observes about the quality of the good produced by the firm. Following Faure-Grimaud et al (2000), we could extend our model so as to address the possibility that the importer government and the firm collude at the expense of the exporting government.

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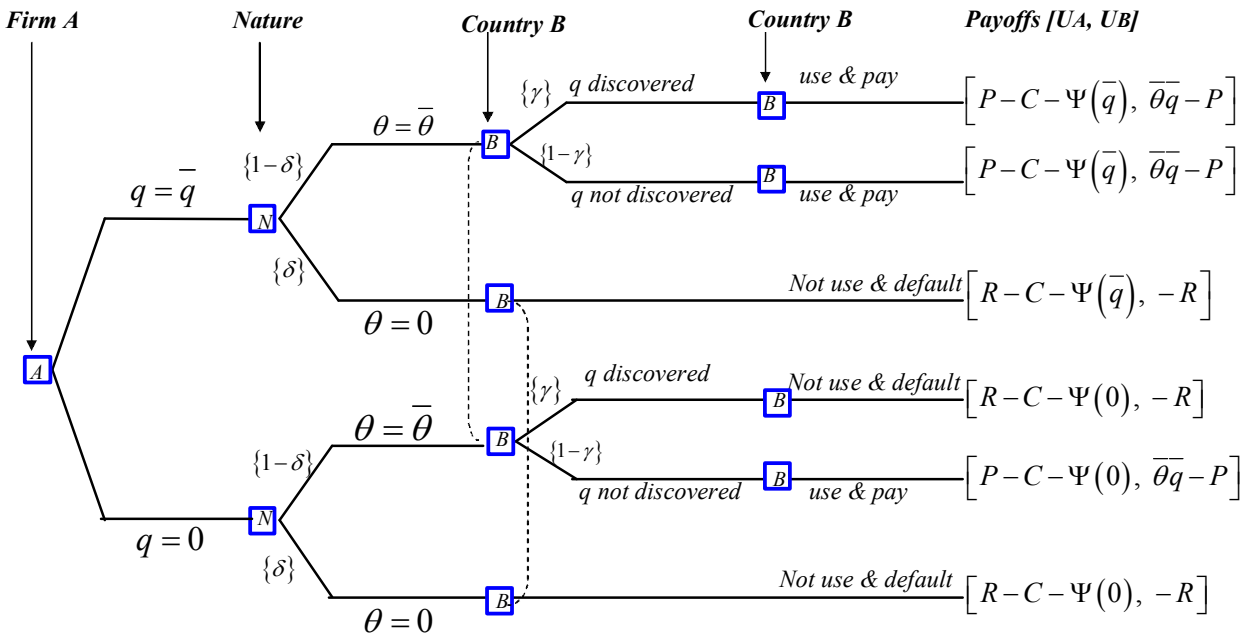

Figure 1: The Game Tree

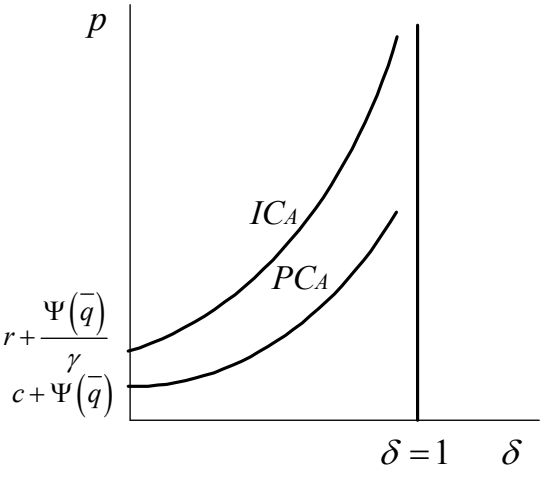

Figure 2.a. Type II Equilibrium only

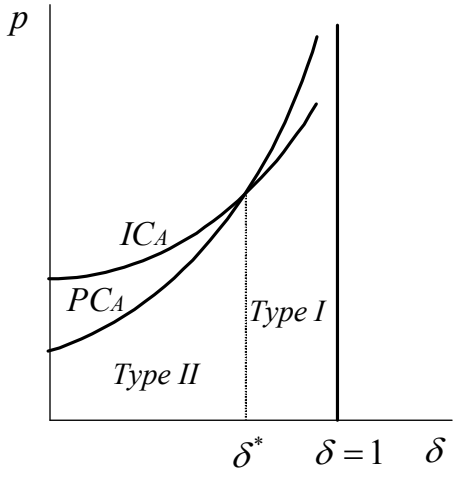

Figure 2.b. Type I and II Equilibria

Figure 2: Equilibrium Types

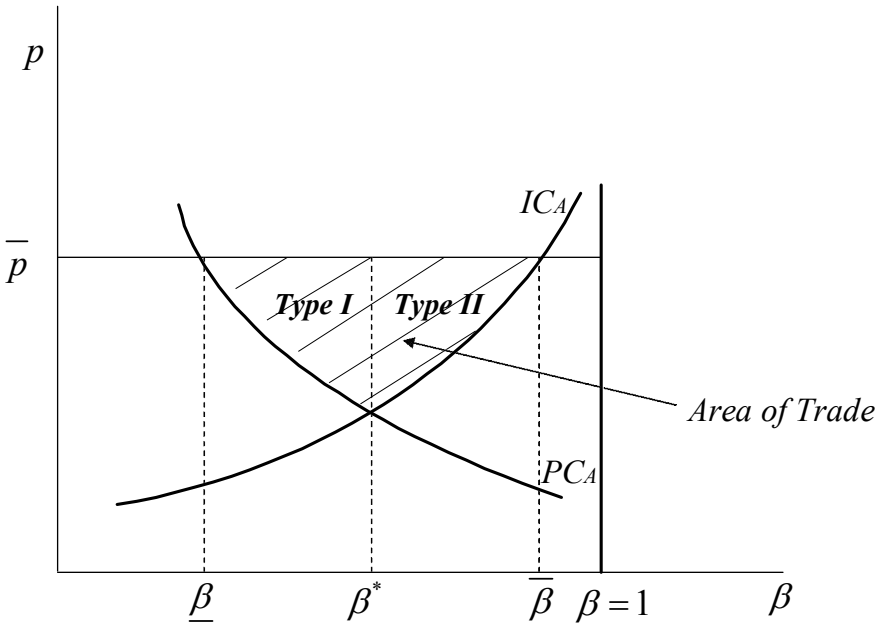

Figure 3: The Scope for Trade as Coverage Increases