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Do Default Loss Risks Matter for Arab Exports?
Evidence from a Gravity Modelling Approach

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Abstract

In the literature, it has been common to use credit risk scores to investigate impacts of external sources of risk and political institutions on foreign investment location choice-decisions. However, only a few studies have specifically examined the relationship between importing country's credit risk scores and exports. Side stepping the limited availability of statistics on ECAs activities in the Arab countries, this paper investigates empirically the relationship between merchandise exports and credit scores of importing countries. Based on a gravity equation augmented with the risks of default on international payments, measured by intra-country risk ratings, the principal contribution of the present research is to scrutinize the impact of commercial and political risks on merchandise trade in the Arab region. The findings suggest that in the absence of insurance contracts against the risk of defaulting payments, firms are more likely to export to countries with higher prior probabilities to secure payments. It logically follows that provisions of export credit guarantees well targeted towards reducing buyer risks are likely to boost-up exports.

Keywords: Export, Export credit insurance, Default risk, Arab countries, Gravity model.
***JEL* classification:** C23, F13, F14

1. Introduction

Promoting and selling goods into foreign markets are processes that are always likely to be associated with facing numerous risks. These emanate from the likes of the country/political situations, the status of the banking systems, the commercial/counterparty state of affairs, and the foreign currency position. Risks can arise from voluntary default actions of private or government buyers, or else from involuntary default actions by buyers, caused by their countries' unexpected economic, financial, and political circumstances. An export credit insurance scheme can offer companies relatively worry-free paths to managing such risks. Appropriately, it is a crucial step for an exporter company to weigh-up carefully any available information about foreign buyers when reviewing a new potential foreign market. The accuracy of the risk assessment would presumably help the exporter define export profitability, conditional on non-payment risks, and on the assessment of the worthiness of seeking appropriate export credit insurance instruments for the purpose of mitigating or effectively managing risks related to export businesses.

Risk mitigation techniques designate credit enhancement instruments used by exporters to transfer certain defined risks to creditworthy third parties, often referred to as guarantors and insurers, who are better placed to mitigate them. These are particularly effective in protecting against the threat of government measures and other political acts subsumed under the general heading of political risk of trade partners. These instruments should be even more useful for firms operating in developing countries, as they would not be sufficiently creditworthy.

At the macroeconomic level, the insurability of export credit risk impinges on country risk assessments that encompass all specific sources of potential difficulties faced when trading across borders, ranging from political and social risks to macroeconomic risks. Therefore, all importing countries are categorized according to credit risks they pose, by means of a scoring approach using a combined quantitative and qualitative (experts' opinions) credit risk assessment method. The determination of the score is by country-specific and regional economic, financial and political risk factors.

In the literature, it has been common to use credit risk scores to investigate impacts of external sources of risk and political institutions on foreign investment location choice-decisions. However, only a few studies have specifically examined the relationship between importing country's credit risk scores and exports. Thanks to the availability of adequate data on official export credit guarantee programs, the existing research in this field has been mainly focused on evaluating the effectiveness of these programs, particularly in the European countries (Egger and Url, 2006; Moser et al., 2008; Herger and Lobsiger, 2010; Felbermayr and Yalcin, 2013 and Janda et al., 2013, among others).

Nonetheless, export credit support in several Arab countries is still a relatively new practice, and its effectiveness remains practically untested. Out of the 22 Arab League members, only 11 have Export Credit Agencies (ECAs), Export-Import banks or similar programs. Besides, only a few entities publish data about their respective business volumes, even if highly aggregated and out-of-date for the most part. The deficiency in terms of detailed statistics on the activities of ECAs in the Arab world inhibits performing credible testing of the impact of public export credit guarantees on export performances.

For these reasons, there has not been enough evidence on the influence of export credit guarantees, nor of the impact of importing countries payment risks (reflecting political and commercial risks

on foreign markets) on export performances in the Arab region, despite the fact that the region's industries structures and its key trading partners differ significantly from those in other regions. Getting around the scarcity of statistics on ECAs activities in the Arab countries, this paper aims to contribute to literature by investigating empirically the relationship between merchandise exports and credit scores of importing countries.

Based on a gravity equation augmented with the risks of default on international payments, measured by intra-country risk ratings, the principal contribution of this paper hinges on drawing attention to potential impacts of various types of commercial and political risks on export performance in the Arab region[1]. The research contends that, in the absence of insurance contracts against risks of defaulting payments, exporting firms are more likely to export to countries with higher creditworthiness, or higher prior prospects of making payments. The paper uses 25,284 observations on goods exports per broad sector from 14 Arab countries to 129 countries, from 2005 to 2018. Fittingly, and regardless of the estimation method, there would be evidence in support of an economically significant negative effect of risk payments on exports. In addition, the results would confirm that the estimates relevant to risk scores would hinge essentially on the features of the sample of countries, along with the export product groups.

The remainder of this paper consists of three sections. Section 2 develops a gravity equation to feature the hypothesis of a negative relationship between bilateral export flows and the risk of a payment default. It also provides a short overview of the literature. Section 3 details the econometric methodology and reports the estimation results. Section 4 is devoted to some concluding remarks.

2. Foundation for the Gravity Equation with Risky importers

It is common to use the gravity model (GM) as a framework for empirical research on the determinants of bilateral yearly trade flows of merchandise between pairs of countries. In addition to its exceptionally intuitive approach and its solid theoretical foundation, the popularity of the GM stems from its empirical flexibility to model factor flows between national entities in space. In its classic form, the standard GM approach predicts that the equilibrium levels of bilateral trade flows between two countries are directly proportional to the product of their sizes, typically measured by GDP or GDP per capita, and inversely proportional to the trade frictions or distance costs, usually measured by geographic and economic distances.

Drawing on Blatensperger and Herger (2009), Anderson and van Wincoop (2003, 2004) and Abraham and Dewit (2001), the purpose of this section is to lay down a foundation for a bilateral trade gravity econometric equation incorporating both the risk of default by importing country's firms, and the state-guaranteed export insurance through officially supported ECAs.

Under certain assumptions detailed in Anderson and van Wincoop (2003, pp.174-175), the nominal value of exports from country i to country j, x_(i,j), satisfying maximization of homothetic preferences, approximated by a CES utility function of country j consumer of goods imported from i, subject to the budget constraint, is given by:

$$x_{i,j} = \left(\frac{P_{i,j}}{P_j}\right)^{1-\sigma} Y_j \ , \ \sigma > 1 \qquad (1)$$

The price indices of goods originating in country *i* and going to country *j* consumers are denoted by $P_{i,j}$, P_j is the consumer price index of country *j*, σ is the constant elasticity of substitution between all goods which measures the degree of competition, and Y_j represents the nominal income of country *j*.

The risk averse exporters from country *i* could be exposed to the default loss associated with political and commercial risks specific to the importing country *j* (λ_j), which corresponds to the exogenous probability that residents in importing country *j* declare insolvency. If the insured exporting firms face a foreign default possibility ($\lambda_j > 0$), they are reimbursed for this loss through the coverage provided by the insurance policy from officially owned and supported ECAs. Symbols $\gamma_{i,j}$ and $r_{i,j}$, respectively, denote the reimbursed amount and the premium per insured currency unit, respectively.

Exporting firms attempts to takeout maximal insurance coverage $\bar{\gamma}_{i,j}$ yielding the highest expected return in the face of likely default. As ECAs subsidies are $s_{i,j}(\bar{\gamma}_{i,j}, r_{i,j}) \stackrel{\text{def}}{=} \lambda_j \bar{\gamma}_{i,j} - r_{i,j} \geq 0$, they would also impose coverage ceiling that leaves some of the risk with the exporter ($\bar{\gamma}_{i,j}$<1)[2].

The price index of goods in country *i* going to country *j* consumers ($P_{i,j}$), satisfying expected profit maximization of exporting firms, is as follows[3]:

$$P_{i,j} = \frac{c_i \tau_{i,j}}{(1-1/\eta)\left(1-\lambda_j+s_{i,j}(\bar{\gamma}_{i,j}, r_{i,j})\right)} \tag{2}$$

$\tau_{i,j}$ accounts for trade costs; c_i denotes the marginal production cost; η and $1/\eta$ refer to to the industry elasticity of demand and the markup, respectively.

Assuming a monopolistic competition market structure ($1/\eta = 0$), and following the first five steps in Baldwin and Taglioni (2006), Blatensperger and Herger (2009) derived the following augmented gravity relationship:

$$X_{i,j} = \frac{Y_i Y_j}{\Omega_j P_j^{1-\sigma}} \left[\frac{1-\lambda_j+s_{i,j}(\bar{\gamma}_{i,j}, r_{i,j})}{\tau_{i,j}}\right]^{\sigma-1}, \sigma > 1 \tag{3}$$

The gravity equation (3) forms the basis for the empirical analysis in this paper. It indicates that the value of exports $X_{i,j}$, from country *i* to country *j*, increases in terms of joint economic size measured by the product of national income ($Y_i Y_j$); decreases in bilateral trade and tariff costs, $\tau_{i,j}$ and in the openness of country *j*'s exports to world markets, Ω_j. As regards the effect of creditworthiness, $(1 - \lambda_j)$, and public export insurance, $s_{i,j}(\bar{\gamma}_{i,j}, r_{i,j})$, it is assumed that a modest default loss risk, reflecting limited political and commercial risks of the importing country, and issuing an export insurance at subsidized rates tend to boost up exports between *i* and *j*.

The theory on the impact of public export credit insurance on export performance, albeit growing over the last decade, is still relatively limited. The lack of availability of public credit insurance data significantly hampers empirical research, especially in non-OECD countries (Lorié, 2019). This literature has provided some insights to understand and evaluate the impact of public export credit insurance on international trade in general and export business in particular[4].

On the other hand, as stated above, the literature has devoted scant attention to investigating the relationship between creditworthiness and export performance. A rare exception is Rienstra-Munnicha and Turvey (2002), who provided an understanding of how export creditworthiness of an importing country affects export sales of agricultural and other manufactured products, and how export credit insurance can mitigate risks of nonpayment. Using export values per capita of the importing countries, data for Canadian agricultural goods and goods from all industries and for Canada, Australia and the U.S. and international credit scores, empirical evidence reveals positive and significant relationship between exports and creditworthiness. More recently, within the literature on trade credit financing, creditworthiness and international trade, Eck et al (2015) developed a model of internationally active firms that need outside finance to be able to export, where asymmetric information problems prevent less productive firms from exporting if only bank financing is available. Access to Cash-in-advance (CIA), perceived as buyer's creditworthiness signal, reduces the asymmetric information problem and thus promotes the export participation of firms. The model prediction is tested using data from the Business Environment and Enterprise Performance Surveys for German firms. They found *that firms that receive CIA from their trading partners have on average a 25 % higher probability to export than firms that do not receive CIA financing. Likewise, a 1 % increase in CIA financing increases the export probability of firms on average by 15 %* (Eck et al, 2015, p 14 paragraphe 2).

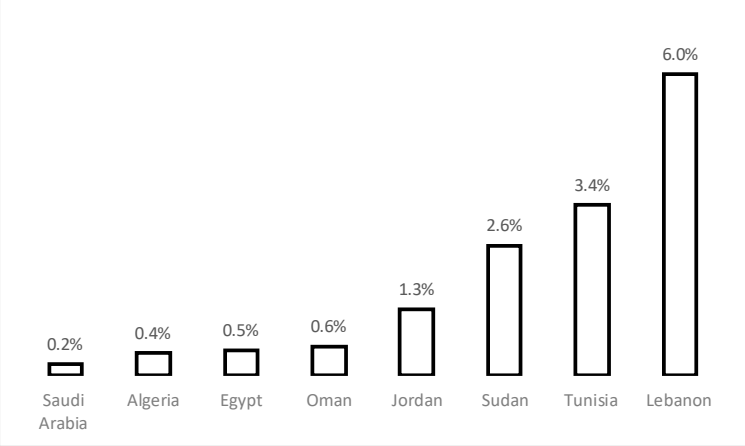
3. Empirical Approach

3.1. ECAs Activities and Export Performance in the Arab Region

The Arab countries are relatively inexperienced in matters of export credit support. Out of the 22 Arab League members, only 11 have ECAs, Export-Import banks or similar programs. In addition to national ECAs/Programs, two multilateral ECAs serve member countries in the region. The first is the Arab Investment and Export Credit Guarantee Corporation (Dhaman), which is a multilateral development institution established in 1974 that offers since 1986 a mechanism of insurance of inter-Arab investments against political risks, and guarantees exports of member states against both commercial and political risks. The second is the Islamic Cooperation for the Insurance of Investment and Export Credit (ICIEC), established in 1994 as a member of the Islamic Development Bank Group to provide investment and export credit insurance based on Sharia principles.

The data published from the Arab ECAs on respective business volumes shows the relative sizes of the programs, as well as their contributions to national exports. Only 10 entities, including Dhaman and ICIEC, publish this data, though out-of-date for the most part. As for the eight Arab ECAs that have published data, the average ratios of business volumes to merchandise exports during the period 2008-2018 range from 0.2% in Saudi Arabia to 6% in Lebanon, which are very low by international standards (cf. Figure1). In 2018, the eight Arab ECAs arranged for approximately $2.42 billion in export financing support, representing just under 0.1% of worldwide export insurance activity as reported to the Berne Union. Moreover, total export credit authorizations in the Arab ECAs have seen little change from $2.3 billion on average to $2.4 billion in 2018.

Figure1: Average ratios of total merchandise exports supported by Arab ECAs, 2008-2018



Sources: Aman Union for credit export insurance series and UnctadStat for merchandise exports series[5].

In addition to the weakness of the export credit activity and its very limited size, the lack of comprehensive data sources allowing for measuring the full scope of trade finance in the Arab region (by reporting and recipient countries) makes it necessary to remove the public export insurance component, $s_{i,j}(\bar{\gamma}_{i,j}, r_{i,j})$, from the gravity equation (3). This makes the assumption that exporters are risk neutral as realistic one (i.e., buying no insurance, $\bar{\gamma}_{i,j} = r_{i,j} = 0$). Accordingly, the basis of the empirical analysis is the following equation:

$$X_{i,j} = \frac{Y_i Y_j}{\Omega_j P_j^{1-\sigma}} \left[\frac{1-\lambda_j}{\tau_{i,j}}\right]^{\sigma-1}, \sigma > 1 \quad (4)$$

Equation (4) represents the theoretical gravity equation governing bilateral trade flows. It includes three blocks, as follows:

$$X_{i,j} = \underbrace{Y_i Y_j}_{size\ term} \underbrace{\left[\Omega_j^{1/1-\sigma} P_j / \tau_{i,j}\right]^{\sigma-1}}_{trade\ cost\ term} \underbrace{\left(1-\lambda_j\right)^{\sigma-1}}_{risk\ payment\ term}, \sigma > 1 \quad (5)$$

Against the background of the above gravity equation, the following subsection attempts to test the hypothesis that significant payment risks, resulting from political and commercial considerations in the importing country, tend to discourage bilateral exports.

3.2. Econometric Specification

To test the impact of payment risks on bilateral exports performance, Equation (4) is log-linearized and augmented with the unobserved effects as follows:

$$ln(Export_{ij,t}) = \underbrace{\alpha_1\left(ln(Y_{it}) + ln(Y_{jt})\right) + \alpha_2 ln(\tau_{ij,t})}_{Control\ variables} + \underbrace{\beta ln(\lambda_{j,t})}_{Risk\ variable} + \underbrace{\mu_{ij} + \mu_t + \epsilon_{it}}_{Unobserved\ effects} \quad (6)$$

Where the *i*, *j* and *t* index refer to observations across pairs of exporting and importing countries and years between 2005 and 2018, respectively.

To provide evidence that supports the hypothesis of a negative relationship between risk of default on international payments and exports, a balanced panel of 14 Arab exporting countries and 129 partners (importing countries) between 2005 and 2018 are used, totalizing on average more than 95% of the total Arab merchandise exports (1053.5 billion US$ in 2018). A synoptic overview of various data sources and their definitions is available in Appendix.

The dependent variable, $ln(Export_{ij,t})$, corresponds to the natural logarithm of country *i* exports value at importing country *j* at year *t*. The following three set of variables appear at right-hand-side:

1. Control variables: These include ***Economic Size*** as measured by the sum of home and host country natural logarithm of gross domestic product, expected to have a positive impact as larger markets tend to support more trade. As in Egger and Url (2006), the country importer's logarithm of manufacturing imports to overall imports ratio, ***Manufacturing***, is included as an explanatory variable. The proxy measure for the relative factor endowment is to have an expected negative impact, as the Arab region has relatively low levels of intra-industry trade, i.e., exports are, ceteris paribus, directed to countries with a dissimilar factor endowment (Hoekman, 2016). The set of control variables also includes the log population weighted ***Distance*** between home and host countries. In addition, it consists of a set of common dummy variables used in conventional gravity equations to identify particular links between countries that encompass the existence of ***Colonial Link***, common official or primary languages (***Common Language***), and the existence of ***Bilateral Investment Treaty*** or ***Regional Trade Agreement*** in force between the country pair. All these proximity variables are time-invariant.
2. Risk variable: It is represented by the payment risk ensuing on foreign markets as proxied by the assessment of the risk of default on international payments compiled from OECD (***Risk Score***) and encompassing transfer and convertibility risk and cases of force majeure (war, expropriation, revolution, civil disturbance, floods, and earthquakes). For the sake of the analysis, the risk score index in converted into 1-100 point scales, higher value of the index corresponds to higher risk.
3. Unobserved effects: These include country-pair specific effects, time dummy variables and an idiosyncratic error term to proxy what Anderson and Wincoop (2003) label as multilateral trade resistance, and other observable and unobservable country-specific characteristics.

3.3. Baseline Estimation Results

The estimation of the gravity equation (6) requires to address some important econometric challenges, such as heteroscedasticity of bilateral trade data and the treatment of zero bilateral trade flows on data (see Cheng and Wall 2004; Santos Silva and Tenreyro 2006, 2011; Anderson 2011; Gómez Herrera 2013; Martínez Zarzoso 2013; Head and Mayer 2014). These challenges are addressed in the rest of the paper, by considering both linear (least square dummy variable or ***LSDV***) and nonlinear methods (Poisson Pseudo Maximum Likelihood or ***PPML*** and Heckman sample selection model or ***Heckman***). The drive for this is to give proper account for the patterns of heteroscedasticity characteristics in bilateral trade data (and for the protrusion of the occurrence of zeros in the considered bilateral trade database).

Table 1 reports the estimate results from regressing economic size, trade costs and risk score on the value of Arab exported goods across 1806 country-pairs with in excess of 25,000 observations covering the time period 2005-2018. Equation (6) is estimated in a first phase using LSDV. Results reported in the first column are obtained in the presence of country-time fixed effects, to control for the multilateral resistances of Anderson and van Wincoop (2003), and to absorb any other observable and unobservable country-specific characteristics.

Several findings stand out. First, starting with the result of main interest, the relationship between the payment risk (***Risk score***) and bilateral Arab total merchandise exports is unambiguously negative and statistically significant, regardless of the used estimation method. This suggests that exporters from the Arab region are reluctant to ship goods towards markets suffering from significant political and commercial instabilities. The magnitude of the ***Risk score*** variable effect is not inconsequential, a downward classification of a specific country by one category, ceteris paribus, drives down total goods exports by almost 14%. The estimated elasticity is robust to the introduction of other explanatory variables.

The estimates of all other covariates are statistically significant and have the expected signs. They confirm that distance is a significant impediment to bilateral trade. The impacts of economic size, speaking the same official language, sharing colonial ties and being partners in regional trade agreement or bilateral investment treaty on bilateral exports are all positive and statistically significant, in line with the literature.

The negative and statistically significant coefficient of ***Manufacturing*** indicates that a larger share of manufacturing goods in total imports in the importing country is expected to be associated with less exports from the Arab region. This result is in harmony with the exceptionally low intra-industry trade index in the region, as an indicator of Arab countries' ability to compete in a more open trade setting. All other things being equal, Arab exports are bound for countries with a dissimilar factor endowment.

Comparisons between the LSDV estimates in column (1) and the PPML estimates in column (2) reveal significant differences in terms of magnitudes and significance. In particular, the PPML estimate of the negative effect of risk score is considerably smaller in absolute value, but remains highly significant. Similarly, the estimate of distance decreases in magnitude in absolute value, but remains significant. More importantly, p-values of the Ramsey RESET test, reported at the bottom of Table 1, reveal that only the PPML and Heckman specifications pass the misspecification test. Overall, these estimates favor the PPML and Heckman estimators over those of the LSDV approach. The key differences among PPML (column 2) and Heckman (columns 3-5) estimators stand out in terms of magnitudes of all coefficients, in particular with respect to the coefficient of the ***Risk score***.

Turning to Heckman estimates, as indicated in the columns 3 to 5, ***Risk score***, ***Bilateral investment treaty***, ***Colonial link and Common language*** are treated as excluded variables, to the extent that they are expected to affect the probability of positive bilateral exports, but not the size of trade. In this regard, one of the advantages of the Heckman selection model materializes from the fact that the decision on whether to export or not (Probit equation), and the decision on how much to export (outcome equation) are not modelled as completely independent. The model allows for some correlation between both error terms to reflect more accurately the real decision process.

The first part of the output presented in column 3 is the outcome equation, i.e. the usual gravity model. Although the signs of the estimated coefficients correspond with what is expected, the magnitudes are significantly different from those in their LSDV and PPML equivalents (columns 1 and 2). The evidence points to far more significance in the Heckman estimated coefficients, compared to those obtained with other techniques. The Heckman model predicts that the variable "Risk score" affects negatively and significantly the likelihood of non-zero bilateral exports of goods. In the selection stage, all the other explanatory variables are highly significant. The presence of a bilateral investment treaty, a colonial link or a common language makes bilateral exports from Arab countries more likely.

The last row of Table 1 provides information on the significance of the relationship between the outcome and the Probit or selection equations. Sample selection creates a bias, only if the error terms of the two equations are correlated. That information is contained in the parameter ρ whose estimate (-0.618) is statistically highly significant (Wald test rejecting the hypothesis of $\rho = 0$), suggesting that sample selection is a major issue in this dataset.

The estimated coefficients of the Probit equation variables cannot be interpreted as marginal effects of single-unit changes in each corresponding variable on the dependent variable. Any conditional marginal effect, and not the coefficient of the Heckman model, is equivalent to the corresponding coefficient of the LSDV model. As shown in column 5, results of the LSDV and Heckman models are significantly different, in terms of significance levels and magnitudes. These results may possibly relate to the fact that the selection bias is a severe issue, and that the coefficient ρ is relatively large in absolute value. Accordingly, a downward classification of a specific country by one category, ceteris paribus, drives down total goods exports by 2.2% as predicted by the Heckman model, instead of 14% as predicted by the LSDV model.

Table 1
Baseline estimation results

	LSDV	***PPML***	***Heckman***		
	(1)	(2)	(3)	(4)	(5)
			Outcome Equation	Probit Equation	Conditional Marginal Effect
Economic size	0.889***	0.860***	1.071***		1.071***
	(0.035)	(0.052)	(0.027)		(0.027)
Distance	-1.523***	-0.681***	-1.387***		-1.387***
	(0.095)	(0.113)	(0.071)		(0.071)
Manufacturing	-0.203***	-0.457***	-0.353***		-0.353***
	(0.057)	(0.057)	(0.039)		(0.039)
Risk score	-0.410***	-0.115***		-0.154***	-0.066**
	(0.169)	(0.048)		(0.022)	(0.020)
Regional Trade Agreement	0.323*	0.898***	1.263***		1.263***
	(0.184)	(0.288)	(0.167)		(0.167)
Common Language	0.398*	0.384		0.764***	0.329***
	(0.232)	(0.289)		(0.116)	(0.081)
Bilateral Investment Treaty	0.314***	0.045		0.828***	0.356***
	(0.103)	(0.170)		(0.128)	(0.060)
Colonial Link	0.611*	-0.016		4.852***	2.088
	(0.361)	(0.70)		(0.558)	(0.293)***
Constant	-3.631***	-12.209***	-11.357***	1.548***	
	(1.372)	(1.606)	(0.960)	(0.096)	
Number of observations	25284	25284		25284	
Number of partners	129	129		129	
Country-pairs	1806	1806		1806	
Zero trade flows observations		2724		2724	
Country time-fixed effects	Yes	Yes		Yes	
R-squared	0.694				
Pseudo R^2		0.727			
RESET test (p-value)	0.000	0.556		0.4318	
Rho				-0.618	
Wald test (Rho=0)				11.33***	

Notes:
Robust White heteroscedastic consistent standard errors clustered by country pair are reported in parentheses. The dependent variable in column (1) is the logarithm of the bilateral exports value transformed using an inverse hyperbolic sine transformation (Burbidge et al. 1988) in order to deal with zero bilateral exports. The dependent variable is the value of exports and the logarithm of the value of exports in columns (2) and (3) respectively. Specific effects dummies are included whose estimates are omitted for brevity, to control for multilateral resistances. *** Significant at 1 %, ** Significant at 5 % and * Significant at 10 %. The PPML estimator is implemented by the Stata module -PPML- developed by Santos Silva, JMC. and Tenreyro, S., (2015). "PPML: Stata module to perform Poisson pseudo-maximum likelihood estimation," Statistical Software Components S458102, Boston College Department of Economics. The Heckman model is estimated by maximum likelihood procedure. Accordingly, the Probit and outcome equations are estimated simultaneously by implementing Stata's Heckman command.

For the choice of the best model specification to account for zero bilateral FDI and heteroskedastic issues, it would be an open to doubt point of view to rely on formal statistical tests. Based on Ramsey reset test, the magnitude of coefficients, their economic implications, and previous findings in the literature, the Heckman maximum likelihood estimations provide ranges for plausible estimates. Given that the correlation coefficient in the Heckman Model between the selection and the outcome equations is large, dropping zero bilateral exports values would result in a serious bias. The Heckman estimation is a cut above other implemented methods as it offers two other dimensions, the statistical inference to the full population and the extensive margin of

exports (the probability for positive bilateral exports). For this reason, the remainder of the paper focuses on the implementation of this model.

3.4. Robustness of the Results

In this sub-section, the robustness of the results for non-OECD and low income countries is checked. The principal argument for excluding OECD countries, and focusing on low-income economies, relates to the fact that commercial and political risks tend to be potentially more significant in non-industrial and low-income countries. It is therefore important to verify and authenticate the impact of ***Risk score*** for these categories of importing countries.

Besides, separate regressions are performed for each export product group, as defined according to the Standard International Trade Classification (SITC) Revision 3. In addition to initial total merchandise product groups, three broad sub-categories have been introduced, i.e., separate groups for primary commodities, manufactured goods, and machinery and transport equipment.

The results summarized in Tables 2 and 3 show that the relationship between ***Risk score*** and various types of Arab export values is evidently significantly negative and substantially large, compared to the baseline estimation results, across the product groups for non-OECD countries in general and low-income importing countries in particular. For the latter, the effect of the variable "risk score" on exports ranges from -4.2 for total goods, to -2.5 for manufactured ones. Based on these results, a downward classification of a specific low-income importing country by one category (for example from OECD risk category 4 to risk category 5), ceteris paribus, drives down total goods exports to this region by almost 140%, some sixty-four times more than previous estimates by the Heckman model for all partners. The default payment-risk sensitivity is all the more important in that the exports are mainly primary commodities.

Not only do results suggest a direct relationship between default payments-risk, proxied by the OECD country risk classification scores, and Arab export values, it also appears that ***Risk score*** is an important determinant of the exports value, particularly when the partner is a low-income country. It is also worth noting that these results obtained from a large dataset for the period 2005 to 2018 control for multilateral resistance terms, using fixed effect estimation.

The 2008 global financial crisis, and the current calamity generated by the novel coronavirus disease underline the necessity for Arab export-dependent countries to diversify their sources of growth. In this respect, the diversification of their export destinations could be deemed as a key consideration. An increase of trade between developing middle to low-income countries might not only offer a way out of the crisis in the short run, but also be a crucial element, in the long-term perspective, of a more reliable and sustainable development strategy for middle to lower-income countries (Milberg and Winkler, 2010). However, low-income countries are commonly characterized by a failing institutional quality, less effective economic policy frameworks and significant levels of commercial and political risks. Correspondingly, from a policy perspective, publicly supported trade credit insurance or guarantees, at fair or subsidized rates, can help exporters mitigate risks and promote Arab exports, particularly to low-income partners.

Table 2
Estimation of the Heckman model for **Non-OECD importing countries** and 4 product groups
(only conditional marginal effects are reported)

	Total Goods	***Primary Commodities***	***Manufactured Goods***	***Machinery and Transport Equipment***
Economic size	1.054***	1.083***	0.860***	0.679***
	(0.035)	(0.045)	(0.029)	(0.033)
Distance	-1.676***	-1.678***	-1.487***	-1.696***
	(0.082)	(0.108)	(0.074)	(0.087)
Manufacturing	-0.495***	-0.596***	-0.340***	-0.267***
	(0.036)	(0.046)	(0.033)	(0.038)
Risk score	-0.105***	-0.147***	-0.025	-0.025
	(0.031)	(0.048)	(0.023)	(0.031)
Regional Trade Agreement	1.588***	1.702***	1.275***	1.768***
	(0.171)	(0.224)	(0.159)	(0.183)
Common Language	0.238***	0.499***	0.314***	0.056
	(0.077)	(0.118)	(0.065)	(0.092)
Bilateral Investment Treaty	0.469***	0.538***	0.397***	0.351***
	(0.150)	(0.197)	(0.126)	(0.142)
Colonial Link	1.939***	4.598***	3.704***	0.855
	(0.155)	(0.235)	(0.179)	(0.947)
Number of observations	18816	18816	18816	18816
Number of partners	96	96	96	96
Country-pairs	1344	1344	1344	1344
Zero trade flows observations	2331	4786	4112	5174
Country time-fixed effects	Yes	Yes	Yes	Yes
Rho	-0.734	-0.732	-0.850	-0.191
Wald test (Rho=0)	53.35***	34.62***	195.05***	0.77

Notes:
Robust White heteroscedastic consistent standard errors clustered by country pair are reported in parentheses. The dependent variable is the logarithm of the value of exports category. Specific effects dummies are included whose estimates are omitted for brevity, to control for multilateral resistances. *** Significant at 1 %, ** Significant at 5 % and * Significant at 10 %. The Heckman model is estimated by maximum likelihood procedure. Accordingly, the Probit and outcome equations are estimated simultaneously by implementing Stata's Heckman command.

Table 3
Estimation of the Heckman model for **low income importing countries** and 4 product groups
(only conditional marginal effects are reported)

	Total Goods	***Primary Commodities***	***Manufactured Goods***	***Machinery and Transport Equipment***
Economic size	0.620***	0.496***	0.664***	0.502***
	(0.120)	(0.142)	(0.128)	(0.146)
Distance	-2.833***	-2.712***	-1.926***	-1.617***
	(0.279)	(0.354)	(0.325)	(0.434)
Manufacturing	-0.233***	-0.268***	-0.164***	-0.216***
	(0.055)	(0.073)	(0.054)	(0.067)
Risk score	-4.237***	-4.133***	-2.492**	-2.766*
	(0.031)	(1.548)	(0.252)	(1.491)
Regional Trade Agreement	0.524***	1.433***	0.535***	5.901***
	(0.137)	(0.183)	(0.143)	(0.694)
Common Language	0.235**	0.355*	0.147	0.465**
	(0.110)	(0.198)	(0.166)	(0.192)
Bilateral Investment Treaty	0.309*	0.717***	0.461***	1.001***
	(0.164)	(0.271)	(0.138)	(0.274)
Colonial Link	-	-	-	-
	-	-	-	-
Number of observations	3136	3136	3136	3136
Number of partners	16	16	16	16
Country-pairs	224	224	224	224
Zero trade flows observations	559	955	893	1177
Country time-fixed effects	Yes	Yes	Yes	Yes
Rho	-0.668	-0.830	-0.911	-0.876
Wald test (Rho=0)	9.85***	13.41***	24.79***	30.76***

Notes:
Robust White heteroscedastic consistent standard errors clustered by country pair are reported in parentheses. The dependent variable is the logarithm of the value of exports category. Specific effects dummies are included whose estimates are omitted for brevity, to control for multilateral resistances. *** Significant at 1 %, ** Significant at 5 % and * Significant at 10 %. The Heckman model is estimated by maximum likelihood procedure. Accordingly, the Probit and outcome equations are estimated simultaneously by implementing Stata's Heckman command.

4. Concluding Remarks and Policy Recommendations

Based on a gravity equation augmented with the risks of default on international payments, measured by intra-country risk OECD rating, the principal contribution of the present research is about bringing to light the impacts of various types of commercial and political risks as potentially important factors for merchandise trade in the Arab region. The research uses 25,284 observations on Arab goods exports per broad sector, from 14 Arab nations to 129 countries, relative to the period 2005 - 2018. The paper contends that, in the absence of insurance contracts against risks of defaulting payments, exporting firms are more likely to export to countries with higher prior probability of payments. It logically follows that the provision for export credit guarantees well targeted towards reducing buyer risks are more likely to give a boost to exports.

The paper finds evidence in support of an economically significant negative effect of risk payments on exports, irrespective of the estimation method used. In consequence, exporters from the Arab region are reluctant to ship goods towards markets suffering from significant political and commercial instabilities. The magnitude of the Risk score variable effect is not negligible, suggesting that a downward classification of a specific country by one category, ceteris paribus, drives down total goods exports by almost 14%. Controlling for multilateral resistance terms, the estimated elasticity is robust to the introduction of other explanatory variables.

In addition, the results confirm that the estimates with regard to the risk score hinge crucially on the feature of the sample of countries, and the export product groups. In fact, based on a sample of non-OECD countries alone, the risk score is found to be effective over the entire period under investigation. The estimated elasticities exceed significantly the values derived over the whole sample. These elasticities, irrespective of product group categories, are typically much higher in absolute values when the sample is limited to low-income partners. Therefore, a downward classification of a specific low-income importing country by one category (for example from OECD risk category 4 to risk category 5), ceteris paribus, drives down total goods exports to this region of the world by almost 140%, some sixty-four times more than previous estimates from the Heckman model for all partners. The default payment-risk sensitivity is all the more important in that the exports are mainly primary commodities.

From a policy perspective, the empirical results provide a clear and compelling justification to the valuableness of specialized export financial institutions to financing exports and mitigating credit risks. Publicly supported trade credit insurance or guarantees, at fair or subsidized rates, can help exporters mitigate risks and promote Arab exports, particularly to low-income partners.

Most Arab countries are in need to set-up ECAs, or to take steps towards boosting the effectiveness of existing ones, to finance exports and remedy market failures and imperfections. However, to maximize the positive impact of such public financial institutions, two main dimensions require attention from policymakers in any country, the financial sector dimension and the real sector one (Chauffour et al. 2010). The former refers to the variations in the structure of the financial sector and the impacts on the behaviors of other financial institutions. The second dimension is about the incentive framework changes in the real sector.

A specialized export finance institution calls in the first place for comprehensive understandings and analyses of the current conditions and tendencies within the financial sector of the country in question. The substance of this should be detecting any market failures that may adversely affect

the volume of exports. For this purpose, the depth of the financial system and its actual lending practices must be subject to careful scrutiny.

The Arab region is characterized by severe supply shortages of trade finance products. Referring to those banks surveyed for a trade finance study by the Asian Development Bank (Di Caprio et al., 2017), the study estimates the global trade finance gap at $1.5 trillion, 14 % of which originate in the Middle East and Africa. About three-quarters of all rejected trade finance transactions come from SMEs and midcap firms. While there are no separate estimates for Arab countries in this regard, and given the region's comparatively low levels in terms of both financial sector depth and access, it seems reasonable to expect that trading companies there face significant trade finance gaps. This is rationalized in particular by the high risks, deficiencies in relevant regulations, demand shortages, low profitability, and inadequacies of local markets capacities with respect to offering trade finance products (Auboin and Di Caprio, 2017). For these reasons, this paper contends that it is essential to strengthen the capacity to provide necessary trade finance flows by local banks in the Arab world.

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Appendix

Table 4: Description of the data set

Variable	Description	Source
Export	The dependent variable in LSDV model is the logarithm of the bilateral exports value US$ million transformed using an inverse hyperbolic sine transformation in order to deal with zero bilateral exports. The dependent variable is the value of exports and the logarithm of the value of exports in PPML model and Heckman model respectively. In addition to initial total merchandise product group, three other export broad sub-categories defined according to the Standard International Trade Classification (SITC) Revision 3 are considered: primary commodities, manufactured goods, and machinery and transport equipment. Each category of export value is expressed in US$ million.	UNCTADstat Data Center
Economic size	Sum of the logarithm of gross domestic product (GDP) across country-pairs in US$ million	UNCTADstat Data Center
Distance	Weighted distance (pop-wt, km) across country-pairs in logarithm	Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) GeoDist database.
Manufacturing	Logarithm of manufacturing imports to overall merchandise imports ratio in importing country.	UNCTADstat Data Center
Risk score	Assessment of the risk of default on international payments initially on a scale from 0 to 7, first converted into 1-100 point scales and taking the logarithm, higher value of the index corresponds to higher risk.	Compiled from OECD Country risk classification according to established methodology for assessing country credit risk and classifying countries in connection with their agreement on minimum premium fees for official export credits.
Regional Trade Agreement	Nominal variable equal 1 if a regional trade agreement is in force between the exporter and the importer.	Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) GeoDist database.
Common Language	Nominal variable equal 1 for a common official language between the exporter and the importer.	Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) GeoDist database.
Bilateral Investment Treaty	Nominal variable equal 1 if a bilateral investment treaty agreement is in force between the exporter and the importer.	World Bank, ICSID Database.
Colonial Link	Nominal variable equal 1 if a colonial history between the exporter and the importer.	Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) GeoDist database.

Table 5: Country coverage and OECD risk classification

Risk Class	High income	Upper middle income	Lower middle income	Low income
0	Australia, Austria, Belgium, Canada, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Liechtenstein, United Kingdom, United States of America			
1	Taiwan			
2	Chile, China, Hong Kong SAR, Kuwait, Saudi Arabia, United Arab Emirates, Brunei Darussalam	Botswana, China, Malaysia		
3	Bahamas, Qatar, Trinidad and Tobago, Uruguay	Bulgaria, Costa Rica, Mexico, Panama, Peru, Romania, Thailand	India, Indonesia, Morocco, Philippines	
4	Bahrain, Oman	Algeria, Colombia, Croatia, Dominican Republic, Namibia, Russian Federation, South Africa	Guatemala	
5		Azerbaijan, Brazil, Paraguay, Turkey	Bangladesh, Bolivia, El Salvador, Honduras, Jordan, Tunisia, Viet Nam	Senegal
6		Albania, Argentina, Belarus, Ecuador, Gabon, Guyana, Iran, Jamaica, Kazakhstan, Suriname	Angola, Armenia, Cameroon, Côte d'Ivoire, Egypt, Ghana, Kenya, Mongolia, Nigeria, Papua New Guinea, Sri Lanka, Zambia	Togo, Uganda
7		Iraq, Lebanon, Libya, Venezuela	Congo, Nicaragua, Pakistan, Sudan, Ukraine, Yemen	Burkina Faso, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Sierra Leone

Note: Categories for default risk refer to the OECD classification of the year 2018 and income groups defined as by the World Bank

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[1] As a hidden transaction cost, economic and political risks matter to international trade activity in general and not only export performance, as considered in this paper. Meon and Sekkat (2004) found that participation of Middle East and North African countries in the world economy is particularly restrained due to low quality of institutions and political risk. In a more recent paper, Gu (2015) explores the impacts of sovereign defaults on trade and income through a real exchange rate channel, in a DSGE model of two risk-averse open economies. The proposed theoretical model is able to study default-triggered changes of both trade balances and bilateral trade, with separate import and export flows.

[2] It is important to point out that *due to asymmetric information about the probability of default or the frictions involved in international contract enforcement, export insurance markets are arguably incomplete, in particular when it comes to obtaining coverage against the event of political instability* (Baltensperger and herger 2009, pp.548)

[3] For further details on this see Baltensperger and herger (2009, pp.548-549)

[4] For instance, Funatsu (1986), Abraham and Dewit (2000) and Dewit (2001) are among the pioneers in providing a theoretical background for export credit insurance. According to Bernard and Jensen (2004), ECAs contribute to the reduction of sunk costs through prospects of gathering information on foreign markets, thus strengthening their positive effects on export participations. More recently, Heiland and Yalcin (2015) have developed a theoretical model that identifies whether ECAs can have an influence on mitigating financial market frictions. From the standpoint of empirical research, most studies on the impact of export credit guarantees on export performance are at the country/industry level (Abraham and Dewit, 2000; Egger and Url, 2006; Mah, 2006; Moser et al., 2008; Baltensperger and Herger 2009; Felbermayr and Yalcin, 2013; Janda et al., 2013; Auboin and Engemann 2014; Van der Veer 2015; Polat and Yesilyaprak, 2017; Freund, 2016; Agarwal and Wang, 2018). Over the past eight years, firm-level research have emerged (Felbermayr et al., 2012; Badinger and Url, 2013; Heiland and Yalcin 2015; Agarwal et al. 2019).

[5] Aman Union was launched in 2009 following an agreement between DHAMAN and ICIEC to join their efforts for establishing a union for commercial and non-commercial risks Insurers and Reinsurers in their respective Member Countries. It aims at promoting and developing the commercial and non-commercial risks insurance industry in Member Countries and strengthening the mutual relationships among members through a range of activities including encouragement of exchange of information, technical assistance, expertise and consultation among Members.