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Export Credit Insurance and Export Performance: An Empirical Gravity Analysis for Turkey

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Abstract

The paper attempts to find out how far Turkey's official export credit agency, Turk Eximbank, foster export of Turkey during the years of 2000-2015 by employing an empirical trade gravity equation. We estimate different panel gravity regressions for 212 countries for the period of 16 years and the results reveal that a change in export credit insurance positively affect Turkish export, assuming other independent variables are held constant. After applying several post estimation tests we used fixed effect panel specification as the main estimation. In order to allow comparison we also run clustered, robust OLS. Poisson fixed effect (Poisson) and Poisson Pseudo maximum likelihood estimations (PPML) are also estimated to allow for zero trade values in dependent variable in its level. Our analysis also shows that there are significant individual and time effects in panel data structure. Our estimate of different panel gravity regressions for 212 countries and 16 years revealed that increasing export insurance will positively affect Turkish export.

Keywords: Turkey, Turk eximbank, gravity, trade promotion, credit insurance

1. Introduction

Export promotion is a much discussed topic of trade finance in practice as well as in the theory of international trade. Free trade proponents claim that export promotion undermines the multilateral system and distorts competition while advocates of such agencies claim that availability of the independent official organizations strengthens the export position of export companies. (Abraham & Dewit, 2000) Although trade credit decision is complex (Ross & Pike, 1997) Auboin (2009) indicates that 80 to 90 percent of all exports rely on a form of trade finance or credit. That much reliance on trade credit will create a dependency and have a potential disruptive role in case of financial frictions in the global credit markets. Whether global markets are smooth or under stress, exporter firms utilize export credit insurance to protect themselves from a risk of payment default. Imperfection in the credit market restrain exports particularly if the sectors rely strongly on external finance. (Manova, Wei, & Zhang, 2015).

The provider of export credit insurance is usually a state-owned or private organization. Egger and Url (2006) indicate cross border trade credit insurance has been a domain of public export credit agencies until the beginning of the 1980s as private insurance companies were reluctant to undertake this risk. Felbermayr (2013) explains the reason why public export credit agencies were able to provide such services although under current WTO norms such export subsidies would be outlawed: WTO Agreement on Subsidies and Countervailing Measures exempt export insurance credit schemes if a sufficiently large number of GATT members are members of an "international undertaking on official export credits" that regulates the use of those guarantees.

Over 50 countries have ECAs and they have similar product to promote export. WTO objective and supplemental agreements like *the Arrangement on Guidelines for Officially supported export credits* require ECAs to break even in the long term. (del Carmen García-Alonso, Levine, & Morga, 2004).

Turkey has adopted an export growth strategy in the beginnings of 1980s. The production of Turkey has shifted from agricultural goods to industrial goods which required financing for exporters. Chartered by the Cabinet on the 21st August 1987. (Turk Eximbank, 2017) Turk Eximbank is a fully state-owned bank performing as the export incentive instrument in Turkey's sustainable export strategy. (Turk Eximbank, 2016).

Following Turkey's agreement to remove export subsidies and elimination of all direct incentives to export as per GATT/WTO provisions, the role that Turk Eximbank played to secure a stable export growth experience has crucially increased. Turk Eximbank is a full member of the Berne Union since April 1994, the founder member of the Aman Union since 2009 and represents Turkey at the Group on Export Credits and Credit Guarantees of the OECD. In addition to these international aspects, Turk Eximbank commits to confirm OECD Consensus (although he is not a signed party of the Consensus) and harmonized its legislations in accordance with the EU requirements. Turkey is not a party in OECD (2016), Arrangement on Officially Supported Export Credits (also known as Knaepen Package). The arrangement focus on to stop the issuance of state-guarantees on trade credits distorting competition in the export insurance industry. The bank has credits, international loans, export credit insurance and some new instruments to increase the export of Turkish sellers. The bank does not have a consistent and comparable sectoral distribution of the insured exports with Turkish Statistical Institute data.

In this paper, official Turk Eximbank data is utilized. Turkish Eximbank has provided us with the all population of short term export insurance transactions extended during the period of 2000-2015. Total of 212 countries for 16 years counts 3392 observations in our dataset. Although the data obtained from Turk Eximbank provide details about the coverage amount granted to each buyer, export destination and industry there is a standardization problem in Turk Eximbank data which prevent us to make comparison on sectoral level between Turkish export and Turk Eximbank short term export insurance transactions. This study does not include any firm level or sectoral information. Meanwhile Figure 1 gives an insight regarding the sectoral distribution of exports insured under Short Term Export Credit Insurance Program. Figure 1 clearly indicates that Turkish export has a concentration in its export and two most important exports are textile/ready-to-wear/leather and machinery/electrical appliances and metal.

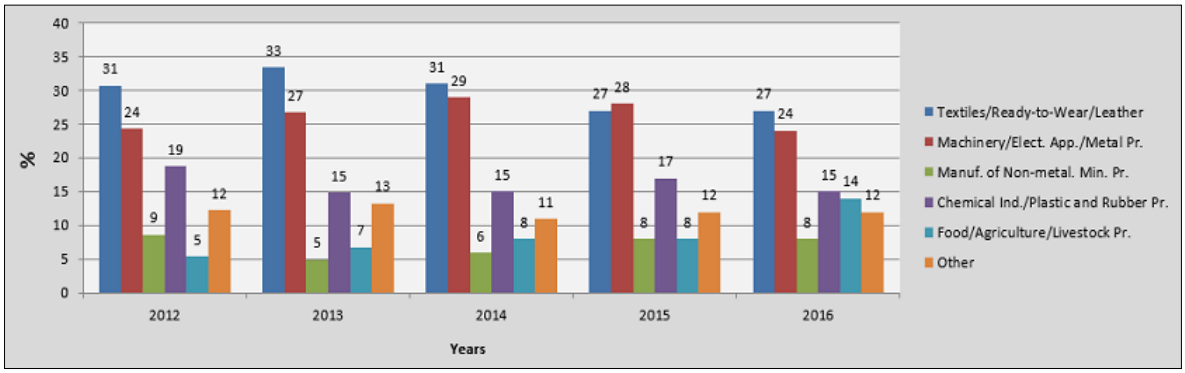

Figure 1. Sectoral distribution of exports insured under short-term export credit insurance program (%)

Although there are papers analyzing the effect of export credit insurance on export regarding Germany (Felbermayr & Yalcin, 2013; Moser, Nestmann, & Wedow, 2008), Austria (Egger & Url, 2006), there is no research made by using Turk Eximbank data. Ata (2013) analyses Turkey's trade with neighbor countries through a gravity equation. His findings indicates that Turkey's export with the neighbor countries is below potential and there is a room to increase the export. In this paper our interest is whether Turk Eximbank export credit insurance produces a significant amount of additional exports for Turkey. We have many of the standard gravity variables together with related dummies.

The paper is organized as follows. The following section is literature review. Section 3 gives information about our data and methodology used. Then we discuss empirical results in Section 4 and Section 5 is the details of the estimations used in Table 3. Section 6 is the conclusion.

2. Literature Review

One of the early studies regarding the topic belongs to Ross and Pike (1997). They employ a survey of Canadian export credit managers to understand how the export credit decision is made. Their findings demonstrate that existing trade credit models are insufficient to explain the export credit decision. Trade credit offer decision in an exporting firm is effected by export specific risks although they are not as important as standard credit risks in the trade credit decision. Still, export specific risks account for a good proportion of the variance in the trade credit model. The above given approach is also one of the reasons why ECAs are created by the governments.

Abraham and Dewit (2000) provide a theoretical, institutional and econometric assessment of the

multidimensional objective function of a typical official export insurance agency by using Belgian OEIA data. They found in their regression analysis covering the period from 1984 to 1993 that export promotion does not necessarily imply trade distortion.

Garcia-Alonso, Levine and Morga (2004) analyze the role played by export credit guarantees in encouraging exports to developing countries. They relate export credit to moral hazards and export quality in their theoretical attempt. Verifying the actual quality of the export product will limit its ability to encourage trade through ECGs. Their result suggest that export credit guarantee may encourage risk-averse firms to trade with countries which might have political risks. The scope for trade may also decrease as the credit guarantee may increase the incentive of firms to export low quality. That result suggests us an interesting policy answer that excessive level of coverage will have a negative impact on trade. What they also discuss that trade is not necessarily encouraged by higher insurance coverage.

Egger and Url (2006) investigated export guarantees effect on trade volumes for goods exports from Austria for the period 1996 through 2002. The analyses they made include several models with full sample, no outliers, AR(1) and AR(1)-no outliers. Their 2-digit NACE panel data reveals that export guarantees have a significant short-term effect on export activity. Newly covered export credit creates additional short-term exports around 25 percent to 40 percent.

Mah (2006) examined whether or not export insurance subsidy of Japan has encouraged Japan's export supply. The unit root tests and cointegration analysis showed that export insurance system has not contributed to promoting export supply in Japan although Japan has been the heaviest user of the export insurance system.

Moser, Nestmann and Wedow (2008) investigate the claim that Hermes (German public export credit) guarantees mitigate the resistance to trade flows arising from hidden transaction cost as a result of political risk. By employing an empirical trade gravity model for 130 countries over the period 1991 to 2003 they estimate the effect of guarantees in a static and dynamic panel model. Their results present that political risk is a robust determinant of exports and should be taken into consideration in any trade related model.

Baltensperger and Herger (2009) tried to answer how far public export insurance schemes foster international trade and reached the conclusion that OECD countries issuing trade credits with state guarantees did not witness more exports towards politically and commercially more unstable low income countries. Rather, it has promoted exports towards high and middle income countries. In the period they investigated, 1999-2005, the risk of foreign default continues to impede international trade in countries suffering from aggravated levels of political and commercial instability. Such an outcome is another distortion to international trade as the high and middle-income countries have already developed financial intermediaries and markets that provide viable alternatives to hedge against payment risks.

It is a good point to mention that the literature has a clue that distribution of export credit insurance of the ECAs are biased. The less developed countries receive a less portion of the ECA credits while they need more of it. Developing countries owe a huge amount of debt to ECAs and it is a critical aspect for developing countries in terms of debt sustainability. These countries are not relieved by rescheduling of the debt.(Blackmon, 2014)

Head, Mayer and Ries (2010) analyzed the effect of independence on post-colonial trade by using bilateral trade data from 1948 to 2006. The paper suggests that there is a negative correlation between colonial independence and trade.

Herger and Lobsiger (2010) endeavor to discover how far officially backed guarantees on trade finance achieve their stipulated goal of promoting exports. Their results on gravity equations on Swiss Export Risk Insurance Scheme data for the years from 2006 to 2008 show that the scheme increases exports in the manufacturing sector by around 1 per cent. The positive effect of export guarantee increases for some emerging countries like Russia, Iran, Turkey, Mexico, or Indonesia as well as in some sectors like chemical and machinery industry.

Badinger and Url (2013) analysis the effects of export credit guarantee usage on trade for a new cross-sectional data of Austria for the year 2008. In their sample, the companies that use public export credit guarantees are large, stand-alone domestic firms with a high R&D intensity and a high risk exposure.

Janda, Michalikova, and Skuhrovec (2013) analyzed a panel of 160 countries for the years from 1996 to 2008 by employing two gravity models of exports for the Czech Republic. They show through Least Trimmed Squares estimator that guarantees are a significant factor that influences the volume of exports in the Czech Republic positively with a leverage point.

Felbermayr and Yalcin (2013) empirically analyzed export credit guarantees and export performance for Germany for the years from 2000 to 2009. The study showed that export guarantees positively affect export

volumes. Felbermayr and Yalcin (2013) also stress that there is a concentration of export guarantees for limited number of sectors and export destinations. They found that one per cent increase in Hermes guarantees boosts exports on average by about 0.012 per cent.

Auboin and Engemann (2014) employed Berne Union data on export credit insurance for the period of 2005-2011. They identify a significantly positive effect of insured trade credit on trade. Using an instrumentation strategy they found that the effect of insured trade credit on trade is very strong and remains stable over the cycle.

Veer (2014) used data for the period from 1992 to 2006 of a large credit insurance company and its export credit insurance for 25 OECD countries for exports to 183 countries worldwide. Applying various trade models, he found a positive and statistically significant effect of private export credit insurance on export. The results suggest that the private export credit insurance effect on trade is larger than the value of export insured. Due to the multiplicator effect, each euro of insured export generates around 1.3 euros of exports.

Eck, Engemann and Schnitzer (2014) show that firms intensively use cash-in-advance because it serves as a quality signal that reduces the high uncertainty related to international transactions. In their model, asymmetric information problems discourage less productive firms from exporting if only bank financing is available for these firms. However, if cash in advance is provided by foreign buyer that reduces the asymmetric information problem and thus promotes the export participation of firms that are not able to export with traditional bank financing. This result inherently include that if the asymmetric information problem is discouraging the transaction to happen, then exporters can be provided for export insurance for those importers who can't provide cash in advance.

Brunner (2015) analyzed the effect of imperfections in the formal export credit and insurance market on trade growth in the regions of Africa and Asia by using a panel data regression on quarterly data for the period 2005 to 2012. Their research identified a significantly positive effect from the reinforcing interaction of the export credit and insurance market, and export diversity-complexity on trade.

Brandi and Schmitz (2015) use a two-stage instrumentation approach to investigate the effect of the availability of trade finance on trade for the period 2005-2013 by using Berne Union data. Their one sided gravity model of trade results suggest that a one per cent increase in commitments is followed by a 0.27-0.54 per cent increase in total imports in the next year. Trade openness is also important to encourage a healthy importer-exporter relation. When a country is more open to trade, the more frequent exchanges of goods support reliable importer-exporter relationships, so that trade partners do not have to rely as much on trade finance instruments.

Agarwal and Wang (2016) investigates the impact of US Export-Import Bank on US exports by using a three dimensional panel of 226 countries, 94 industries and 7 years spanning from 2007 to 2013. In their gravity framework on a country-industry-year level panel dataset, their results depict the general ineffectiveness of the Bank in promoting exports within and across industries. Their findings also reveal that industries other than aerospace parts and products are more likely to benefit from the Eximbank authorizations and that Eximbank authorizations to larger businesses seem to be more effective in encouraging exports.

Niepmann and Schmidt (2016) approach the topic from a different perspective. They analyze the letter of guarantees as a risk mitigating instrument for exporters and try to answer how banks affect export patterns through issuing these guarantee instruments. Their research show that a one-standard deviation negative shock to a country's supply of letter of credit reduces U.S exports to that country by 1.5 percentage points. Export to countries that are poorer and smaller, where fewer U.S. banks are active, are more affected when banks reduce their supply of trade finance. What Eximbanks perform for insuring the shipments substitute to what banks do in issuing letter of credits for exports. These two are competitors in terms of market structure as much as they are export promotion instruments.

3. Data and Methodology

3.1 Data

Our data is collected from various sources and covers period from 2000 to 2015. The details of variables are given in Table 1. We have 212 countries (Appendix A) for our analysis for 16 years that makes 3392 observations in total. (N=3392, n=212, T=16). As our panel has many entities but few time periods it is a short balanced panel structure. Zero values are given 1 to allow logarithmic transformation for OLS and fixed effect estimation. Missing values and incorrect treatment of zero trade flows can produce severely biased results (Baldwin & Taglioni, 2006) For this reason, we also applied Poisson PMLE method which allows zero trade.

To begin with, we use data on Turkish export provided by Turk Eximbank which is our dependent variable. Turk

Eximbank insured shipments are the main independent variable (IV). A big portion of data is obtained from CEPIIs GeoDist data which makes available a set of gravity variables developed in Mayer and Zignago (2005). GDPs, Populations and Areas of the source and destination countries are used as proxy of economic size. Cost proxies like distance, time difference, and conflict and country risk are also obtained from CEPII Database. International trade volume is expected to be lower when the transaction costs get higher. Transaction costs change with the distance between trading partners. Moser, Nestmann and Wedow (2008) indicate that political risk is an important and robust determinant of export and should be taken into account in any empirical model of trade. Therefore, country risks of OECD classification is included in our analysis.

Many of the variables in this dataset is dyadic that it includes variables valid for pairs of countries like distance between two countries. We used weighted distance and Mayer and Zignago (2011) explains how weighted distances are calculated for the countries and why, in some countries, economic center is represented by another city due to being not populated enough for such a representation. Reel Effective Exchange Rate is obtained from World Bank. We also compared World Bank REER with Darvas (2012) but they appear similar in our graph analysis.

Table 1. Variables, type, description and source

Variable	Type	Description	Source
Export	Monadic	Turkish export from 2000 to 2015 in logarithmic US$. The original WITS values have been added 1 USD to allow for logarithmic transformation on zero-valued export.	WITS Database
Eximbank Insurance	Monadic	Turk Eximbank insured shipments from 2000 to 2015 in US$. Turk Eximbank values have been added 1 USD to allow for logarithmic transformation on zero-valued export.	Turk Eximbank
GDP Per Capita	Monadic	Gross Domestic Product (GDP) Per Capita across country-pairs in logarithmic US$ is used for economic size.	CEPII Database
Population	Monadic	Population of the countries, total in million	CEPII Database
REER	Monadic	Real Effective Exchange Rate: the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs. (Head & Mayer, 2002)	World Bank
Distance	Dyadic, Time Invariant	Distance is a weighted measurement using latitudes, longitudes and populations data of main agglomerations of all countries. The general formula developed by (Head & Mayer, 2002)	CEPII Database
Area	Dyadic, Time Invariant	Logarithmic area of countries in square kms of the countries.	CEPII Database
Time difference	Dyadic, Time Invariant	Number of hours difference between export and import	CEPII Database
Landlocked	Dyadic, Time Invariant	Dummy variable indicating 1=Landlocked	CEPII Database
Contiguity	Dyadic, Time Invariant	Dummy variable indicating 1=Contiguity	CEPII Database
Common Religion	Dyadic, Time Invariant	Percentage in which both countries share religions	CEPII Database
EU Membership	Dyadic, Time Variant	Dummy variable indicating 1=Destination is a EU Member (Appendix B)	Compiled by Authors
Conflict	Dyadic, Time Variant	Dummy variable indicating 1=War	CEPII Database
Country Risk	Dyadic, Time Variant	Country Risk Classification of the Participants to the Arrangement on Officially Supported Export Credits	OECD

Trade costs are also important part of the standard gravity models and usually bilateral distance is used in empirical studies as a proxy of trade costs. However, there are additional variables which are customarily used. Islands, landlocked countries and common borders (contiguity) are the dummy variables used to reflect the hypotheses that transport costs increase with distance and that they are higher for landlocked countries and islands but are lower for neighboring countries. (Bacchetta et al., 2012). Common religion, a percentage indicating that both countries share same religion and EU membership are also controlled.

3.2 Methodology

We employed a form of gravity model, the workhorse tool of empirical fields, which is popularly used from theory based to more exotic applications (Baldwin & Taglioni, 2006). The gravity model has to come to be the starting point for a wide variety of research questions with a policy component. (Shepherd, 2013) The commencement of using the idea that the size of bilateral trade flows between a country pair can be approximated by a law called the “gravity equation” is the seminal work of Tinbergen (1962). A good discussion

of the application of gravity models can be found in Bacchetta et al. (2012).

Egger and Url (2006), Moser, Nestmann and Wedow (2008) and Janda (2013) have applied the gravity model in the contexts of credit insurance. Head, Mayer and Ries (2010) follow a specification in their work where the gravity equation is combination of monadic effects and the dyadic effects. Dyadic effects are mainly the control variables and factors that affect trade costs between *i* and *j*. Dyadic variables can be classified as time-invariant (distance, shared border, shared language etc.) and time-variant (belonging jointly to GATT/WTO or being EU member). The vector of dyadic variables contain all the "usual suspects" but the complete list remain incomplete. Unobserved dyadic linkages end up in the error term (ui_{jt}). (Head et al., 2010).

As Head et al. (2010) indicate, for the value of xi_{jt}, the exports from exporting country *i* to importing country *j* in year *t* can be represented in the following equation for the value. This is a well-known empirical and theoretical formulations of the gravity equation.

$$Xi_{jt} = G_t M_{it}^{ex} M_{it}^{im} \varphi_{ijt} \quad (1)$$

Where M_{it}^{ex} and M_{it}^{im} are indexes of the attributes of exporter *i* and importer *j* in a specific year. G_t is the factor determining Eximbank insured shipments. M_{it}^{ex} and M_{it}^{im} are monadic effects and φ_{ijt} is the dyadic variables and represent observed and unobserved effects.

In practice, the gravity equation uses the variables in natural logarithm which allows an easy interpretation of the estimated parameters. Logarithmic transformations are convenient means of transforming a highly skewed variable into one that is more approximately normal. (Benoit, 2011) The logarithmic estimations are elasticities and indicates the percentage variation in trade following a 1 per cent increase in β. (Bacchetta et al., 2012). That is why we have log-log model mainly. Estimation of linear-log models for Poisson fixed effect and Poisson Pseudo Maximum Likelihood allow us to include zero values of Turkish Export in the analysis. Our general regression formulation is as follow.

$$\ln(Exports_{ijt}) = \alpha_0+\alpha_1\ln(Exim_{it})+\alpha_2\ln(GDPcap_{it})+\alpha_3\ln(Pop_{it})+\alpha_4(reer_i)+\alpha_5(eu)+\alpha_6(risk_{it})+\alpha_7(conflict)+ \alpha_8(dist_i)+ \alpha_9(area_{it}) +\alpha_{10}(tdiff_{it})+ \alpha_{11}(landlocked_t)+ \alpha_{12}(contig)+ \alpha_{13}(comrelig) +\varepsilon_{it} \quad (2)$$

Where *i* denotes the exporting country, *j* denotes the importer, *t* denotes time, and ln(.) denotes the natural logarithm operator. ε represents the omitted other influences on bilateral exports. Our parameter of interest is α_1 and it represent public export credit insurance effect on exports holding other determinants of export constant.

4. Diagnosis and Model Specifications

Regression analysis using non-stationary variables may cause spurious regressions by providing significant *t* and *F* statistics and a high R^2 while there is no true relationship between the variables. (Gujarati, 2014). Therefore, we tested the variables under consideration for the stationary by using the augmented Dickey-Fuller test, Phillips-Perron tests and Pesaran's CADF tests. Although all of the tests conclude that the variables are stationary we only report the Pesaran's CADF in Table 2. The results can be seen below indicate that t-bar statistics have a higher critical value than cv10(%90), cv5 (%95) and cv1(%99) confidence level statistics. The variables are stationary and we can proceed the following test to decide the convenient estimator.

Table 2. Pesaran's CADF test

TR_Export	t-bar	cv10	cv5	cv1	Z[t-bar]	P-value
	-1.536	-1.990	-2.040	-2.140	2.913	0.998
EXIM Insured Shipment	t-bar	cv10	cv5	cv1	Z[t-bar]	P-value
	-0.914	-1.990	-2.040	-2.140	11.786	1.000

Note. t-bar test, N,T = (212,16) Obs = 2544 Augmented by 3 lags (average)

Cross-sectional average in first period extracted and extreme t-values truncated Deterministics chosen: constant.

We run F test after fixed effect regression and the result of the test that all u_i=0: F(185, 2733) = 37.15; Prob > F = 0.0000 means that the fixed effects are non-zero and pooled OLS will be biased. Likelihood-ratio test of sigma_u=0**:** chibar2(01)= 2238.90 Prob>=chibar2 = 0.000 also rejects H_0 that classical model is not suitable for modelling as there are individual effects. We applied LR test to see if the panel effect are two dimensional, i.e individual or time, and the result rejects H_0 hypothesis that at least one of the standard errors of individual and time effect is equal to zero.

Breusch and Pagan (1980) Lagrangian multiplier test for random effects has the null hypothesis in the LM test indicates that the variances across entities is zero. By estimating the following equation ln_TR_export[destination_name,t] = Xb + u[destination_name] + e[destination_name,t] for Var(u) = 0,

chibar2(01) = 6604.52 and Prob > chibar2 = 0.0000 means that there is no significant difference across countries. The test failed to reject the null therefore running a simple OLS is not convenient and the random effect model is able to deal with heterogeneity better than the pooled OLS. Checking the hypothesis of no random effects (Var(u[i])=0), and rejecting H_0 indicates that there are individual effects. All of the above tests are weak in showing us if fixed or random effects are effective.

Conventionally, the Hausman test was used to identify the appropriate specification of the model between fixed or random effects. We applied the Hausman test and the test was inconsequential due to the violation of positive definite differences of variance. Result of the test failed to reject the null hypothesis of fixed effects vs. random effects. Instead, we used Schaffer, Stillman and others (2016) user written test, xtoverid in Stata. Sargan-Hansen statistics 57.330 (Chi-sq(8) P-value=0.0000 suggest fixed effect model as the extra restrictions imposed by random effect are rejected. Mundlak (1978) approach provide an alternative to the Hausman test. The result of that test by using robust estimator of the variance-covariance matrix suggests that time-invariant unobservables are related to our regressors and the fixed effect model is appropriate.

We applied the Wald test to see if the dummies for all years are equal to 0. If so then no time fixed effects are needed. For that we applied testparm which is a joint test to see if the dummies for all years are equal to 0, if they are then no time fixed effects are needed. Prob > =0.000 is smaller than alpha (0.05) Therefore Wald test did not fail to reject the null that the coefficients for all years are jointly equal to zero. Therefore time fixed effects are needed. Modified Wald test for groupwise heteroscedasticity in fixed effect regression model has the null hypothesis of homoscedasticity (constant variance). The result of the test rejects the null and there is heteroscedasticity. We calculated a modified Wald statistic for groupwise heteroscedasticity in the residuals of a fixed effect regression model, following Greene (2000) and the result confirms heteroscedastic. Wooldridge test for autocorrelation in panel date test also reveals that there is no first-order autocorrelation in our data.

5. Estimation

As Park (2011) indicates presenting all models, unless for comparison purposes, whether significant or not is a common error and should be avoided. Our regression diagnostics show us that individual effect u_i does exist and OLS is not capable of producing efficient and consistent parameter estimates. Therefore our first specification in Table 3 column 1 pools data in a simple OLS just provided to allow us to compare results to those in the gravity equation literature. For our OLS we choose to apply robust option as a simple and effective way of fixing violations of the homoscedasticity assumption. We also clustered analysis depending on the distance, unique variable to each country pair, to allow correlation of the error terms within groups, as suggested in the literature. (Shepherd, 2013)

Table 3. Regression results

	(1) Log of Turkish Export OLS	(2) Log of Turkish Export Fixed Effect	(3) Turkish Export with 0 values Poisson Fixed Effect	(4) Turkish Export with 0 values Poisson PML
Log of EXIMBANK Insured Export main	0.179***	0.034***	0.044***	0.125**
	(0.03)	(0.01)	(0.00)	(0.04)
Log of GDP per capita (current US$)	1.023***	1.160***	0.925***	0.989***
	(0.20)	(0.25)	(0.00)	(0.12)
Log of GDP per capita (current US$)	0.608***	0.544***	0.714***	0.579***
	(0.11)	(0.09)	(0.00)	(0.12)
Log of Population of Origin	0.608	2.322*	0.150***	1.210
	(1.54)	(1.11)	(0.00)	(0.91)
Log of Population of Destination	0.413***	1.336***	1.037***	0.378***
	(0.10)	(0.28)	(0.00)	(0.10)
Real Effective Exhange Rate	-0.012*	-0.016*	-0.003***	-0.003
	(0.01)	(0.01)	(0.00)	(0.00)
1=Destination is a EU member	1.159	-0.261	-0.248***	-0.098
	(0.77)	(0.29)	(0.00)	(0.22)
Country Risk	0.114	0.382	0.273***	-0.022
	(0.09)	(0.25)	(0.00)	(0.06)
1=War	-0.300	0.000		0.853***
	(0.84)	(.)		(0.22)

Weighted distance (pop-wt, km)	-0.000***	0.000		-0.000***
	(0.00)	(.)		(0.00)
Log of area in sq. kms	0.150*	0.000		0.137
	(0.07)	(.)		(0.07)
Time Difference (nbr of hours)	0.093	0.000		0.079
	(0.07)	(.)		(0.07)
1=Landlocked	-0.766**	0.000		0.028
	(0.29)	(.)		(0.16)
1=Contiguity	-0.078	0.000		0.913***
	(0.98)	(.)		(0.21)
1=Common Religion	0.949**	0.000		0.393
	(0.34)	(.)		(0.24)
constant	-9.466	-18.255***		-10.074**
	(5.31)	(3.46)		(3.69)
R-sqr	0.742	0.523		0.801
dfres	129	1901		
BIC	7467.0	5269.1	46217685.7	2.0e+08
N	2039.0	2039.0	2039.0	2039.0
r2	0.7	0.5		0.8

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The first estimate OLS model fits the data well: its R^2 is 0.74, meaning that the explanatory variables account for over 77 percent of the observed variation in DV. F-test is statistically significant and rejects the hypothesis that all coefficients are jointly zero at the 1 percent level. Looking at the estimated coefficients and the corresponding t-tests, OLS results in column one show that increases in Turk Eximbank insured shipments promotes Turkish export with 0.18 elasticities. Increases in exporter and importer country per capita income, importer population promote bilateral trade. Distance and real effective exchange rate reduce trade.

The second column of Table 3 gives the fixed effect estimation which allows us to identify the effects of variable that vary bilaterally. Therefore dummy variables that are collinear with the fixed effect will be automatically dropped from the model by Stata. Unobservable multilateral resistance can be accounted for by dummy variables by employing fixed effect but the drawback is that it is not possible to estimate a fixed effects model which includes data that only vary by exporter (constant across importer). In our analysis, conflict, distance, time difference, landlocked, contingency and common religion and area sqm2 of importer country have been omitted because of collinearity. Rho, interclass correlation says that 85% of the variance is due to differences across panels. Coefficients in the fixed effect (within) regression for Turk Eximbank insured shipments, both GDP per capita of the countries, population are significant and positive as expected. Reel Effective Exchange Rate is significant but has a negative coefficient. Turkish export is negatively related with the Reel Effective Exchange rate. If we change the exchange rate by 1 unit, we'd expect our variable to change by 1.9%. The remaining common religion, EU membership of the destination country, country risks have not significant P values. The remaining dummy variables are omitted because of collinearity. Changing Turk Eximbank insured shipments by one percent, the fixed model result suggests that Turkish Export will increase 0.033%. The other coefficients are also log-log and they show elasticities. Although not reported, we controlled for the time effect and found significant difference in years except 2007. Result shown in column 3 of Table 3 is estimated using Poisson fixed effect estimation which is an estimation that allows zero observations in dependent variable. Excluding constant within group variables, this estimator gives significant positive P values for Eximbank Insurance, GDP per capita and Population for both countries and country risk. Reel effective exchange rate and EU membership are also significant but with a negative coefficient.

Last estimation in Table 3 presents Poisson Pseudo Maximum Likelihood estimation which is different than Poisson estimation as it uses the method of Silva and Tenreyro (2010) and in that zero values are also allowed. The estimation result gives significant positive coefficients for Eximbank insured shipments, GDP per capita for the countries, population of the destination for monadic variables. Conflict and distance, contiguity are also significant. As Fally (2015) mentions Poisson-PML does not require the dependent variable to be Poisson distributed. The estimation procedure is fairly easy to implement and robust to misspecifications. This estimator allows us to incorporate observations with zero export as Poisson-PML is consistent with the presence of zero trade flows. Stata removes the variables if there is perfect collinearity. The area of the origin country is in such a situation and it is dropped from the analysis. Constant within group variables are dropped and the dependent

variable in this specification is the yearly level of Turkish Export. All monadic variables are significant. Reel effective exchange rate and EU membership are significant but have negative coefficients. In this model, the higher country risk will also increase export by 0.27 unit. Table 4 gives the summary of significance and directions of the coefficients in the estimated models.

Table 4. Summary significance and directions of the coefficients

	(1)OLS	(2)Fixed Effect	(3)Poisson Fixed Effect	(4)Poisson PML
Log of EXIMBANK Insured Export main	$+^{***}$	$+^{***}$	$+^{***}$	$+^{**}$
Log of GDP per capita (current US$)	$+^{***}$	$+^{***}$	$+^{***}$	$+^{***}$
Log of GDP per capita (current US$)	$+^{***}$	$+^{***}$	$+^{***}$	$+^{***}$
Log of Population of Origin		$+^{*}$	$+^{***}$	
Log of Population of Destination	$+^{***}$	$+^{***}$	$+^{***}$	$+^{***}$
Real Effective Exhange Rate	$-^{*}$	$-^{*}$	$-^{***}$	
1=Destination is a EU member			$-^{***}$	
Country Risk			$+^{***}$	
1=War				$+^{***}$
Weighted distance (pop-wt, km)	$-^{***}$			$-^{***}$
Log of area in sq. kms	$+^{*}$			
Time Difference (nbr of hours)				
1=Landlocked	$-^{**}$			
1=Contiguity				$+^{***}$
1=Common Religion	$+^{**}$			

Note. Model 1 and 2 are Log-Log while Model 3 and 4 are Level-Log.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

6. Concluding Remarks

Export promotion through export credit insurance is an important element in Turkey's export strategy. Our estimate of different panel gravity regressions for 212 countries and 16 years revealed that if we increase export credit insurance 1 percent, we'd expect Turkish export to increase between 3 percent to 17 percent depending on log-log OLS and fixed effect results. The level-log estimations approve the effect that increasing export credit insurance one percent we can expect an increase in Turkish export between 4 percent to 12 percent, assuming other independent variables are held constant. Our analysis also shows that there are significant individual and time effects in panel data structure. Our control for lagged export credit insurance did not give any significant result.

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Appendix

Appendix A. Importer Countries

Afghanistan	Denmark	Lao PDR	Rwanda
Albania	Djibouti	Latvia	Saint Helena
Algeria	Dominica	Lebanon	Saint Pierre and Miquelon
Andorra	Dominican Republic	Lesotho	Samoa
Angola	East Timor	Liberia	San Marino
Anguila	Ecuador	Libya	Sao Tome and Principe
Antigua and Barbuda	Egypt, Arab Rep.	Lithuania	Saudi Arabia
Argentina	El Salvador	Luxembourg	Senegal
Armenia	Equatorial Guinea	Macao	Seychelles
Aruba	Eritrea	Macedonia, FYR	Sierra Leone
Australia	Estonia	Madagascar	Singapore
Austria	Ethiopia	Malawi	Slovak Republic
Azerbaijan	Faeroe Islands	Malaysia	Slovenia
Bahamas, The	Falkland Island	Maldives	Solomon Islands
Bahrain	Fiji	Mali	Somalia
Bangladesh	Finland	Malta	South Africa
Barbados	Fm Sudan	Marshall Islands	Spain
Belarus	France	Mauritania	Sri Lanka
Belgium	French Polynesia	Mauritius	St. Kitts and Nevis
Belize	Gabon	Mexico	St. Lucia
Benin	Gambia, The	Micronesia, Fed. Sts.	Vincent and the Grenadines
Bermuda	Georgia	Moldova	Suriname
Bhutan	Germany	Mongolia	Swaziland
Bolivia	Ghana	Montserrat	Sweden
Bosnia and Herzegovina	Gibraltar	Morocco	Switzerland

Botswana	Greece	Mozambique	Syrian Arab Republic
Brazil	Greenland	Myanmar	Tajikistan
British Virgin Islands	Grenada	Namibia	Tanzania
Brunei	Guatemala	Nauru	Thailand
Bulgaria	Guinea	Nepal	Togo
Burkina Faso	Guinea-Bissau	Netherlands	Tonga
Burundi	Guyana	Netherlands Antilles	Trinidad and Tobago
Cambodia	Haiti	New Caledonia	Tunisia
Cameroon	Honduras	New Zealand	Turkmenistan
Canada	Hong Kong, China	Nicaragua	Turks and Caicos Isl.
Cape Verde	Hungary	Niger	Tuvalu
Cayman Islands	Iceland	Nigeria	Uganda
Central African Rep.	India	Norfolk Island	Ukraine
Chad	Indonesia	Northern Mariana Islands	United Arab Emirates
Chile	Iran, Islamic Rep.	Norway	United Kingdom
China	Iraq	Oman	United States
Christmas Island	Ireland	Pakistan	Uruguay
Cocos (Keeling) Is.	Israel	Palau	Uzbekistan
Colombia	Italy	Panama	Vanuatu
Comoros	Jamaica	Papua New Guinea	Venezuela
Congo, Dem. Rep.	Japan	Paraguay	Vietnam
Congo, Rep.	Jordan	Peru	Wallis and Futura Isl.
Cook Islands	Kazakhstan	Philippines	Yemen
Costa Rica	Kenya	Pitcairn	Zambia
Cote d'Ivoire	2Kiribati	Poland	Zimbabwe
Croatia	Korea, Dem. Rep.	Portugal	Rwanda
Cuba	Korea, Rep.	Qatar	
Cyprus	Kuwait	Romania	
Czech Republic	Kyrgyz Republic	Russian Federation	

Appendix B: The chronology of EU membership in our dataset

2000: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom

2004: Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, Slovenia,

2007: Romania, Bulgaria

2013: Croatia

Appendix C: Correlation Table of the Variables

	Log TR Export	**Log Exim**	**Log GDP_O**	**Log GDP_D**	**Log Pop O**	**Log Pop D**	**REER**	**EU**	**Risk**
Log TR Export	10.000								
Log Exim	0.7975*	10.000							
Log GDP_O	0.2064*	0.1170*	10.000						
Log GDP_D	0.3477*	0.3372*	0.2109*	10.000					
Log Pop O	0.2046*	0.1408*	0.8476*	0.2027*	10.000				
Log Pop D	0.6511*	0.6396*	0.0607*	-0.1858*	0.0756*	10.000			
REER	0.1433*	0.0591*	0.8341*	0.1549*	0.4714*	0.0312	10.000		
EU	0.3661*	0.3314*	0.0670*	0.4521*	0.0591*	0.1203*	0.0527*	10.000	
Risk	-0.2303*	-0.3205*	-0.0053	-0.5887*	-0.0040	-0.0802*	-0.0047	-0.1143*	10.000
Conflict	0.1246*	0.1029*	0.0000	0.0304	-0.0000	0.0590*	0.0000	0.0399*	0.0992*
Distance	-0.5461*	-0.4620*	-0.0000	-0.0622*	-0.0000	-0.3269*	-0.0000	-0.3700*	-0.1788*
Area_D	0.5518*	0.5468*	0.0000	-0.2234*	-0.0000	0.8495*	0.0000	0.0642*	0.0391
Time Diff.	-0.4343*	-0.3654*	-0.0000	0.0793*	-0.0000	-0.3049*	-0.0000	-0.3113*	-0.2318*
Landlocked	-0.0190	-0.0592*	-0.0000	-0.2784*	-0.0000	0.1208*	0.0000	0.0164	0.2149*
Contiguity	0.1291*	0.1015*	0.0000	-0.0062	-0.0000	0.0935*	-0.0000	0.0511*	0.0522*
Common Rel	0.0187	0.0481*	0.0000	0.1808*	0.0000	-0.0155	0.0000	-0.0190	0.0397

	Conflict	Distance	Area_D	Time Diff.	Landlocked	Contiguity	Common Rel
Conflict	10.000						
Distance	-0.2670*	10.000					
Area_D	0.0575*	-0.3071*	10.000				
Time Diff.	-0.2067*	0.9018*	-0.3202*	10.000			
Landlocked	0.0294	-0.2226*	0.1983*	-0.2499*	10.000		
Contiguity	0.4494*	-0.2477*	0.0774*	-0.1629*	0.0423*	10.000	
Common Rel	-0.0248	-0.0165	0.0486*	0.0071	-0.0533*	-0.0234	10.000