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# The Performance of Export Credit Agencies in Post-Communist Central European Countries

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**Abstract:**

This paper is the first one to analyze official government export promotion in all four post-communist Central European Visegrad countries (Czech Republic, Hungary, Poland, Slovakia). Similar development

of those economies in transition period after the fall of communism is described and their extremely fast and successful reorientation towards Western markets is emphasized. Nowadays each government in the region implements its own export strategy, where interestingly each country defines different priority territories for their export. The core of this paper is analysis of export credit agencies in Visegrad countries. Firstly we compare advantages and disadvantages of different forms of export credit agencies. Then we apply empirical data from international trade in gravity model framework and we conclude that the most effective type of export credit agency in Visegrad Four region is currently Polish KUKE which is an institution operating in the form of an insurance company. Other forms such as a bank and an institution providing both insurance and financing facilities are currently less effective. We confirm that smaller distance and higher GDP increase the amount of export in line with basic intuition of a gravity model of international trade.

**Keywords:** international trade, state promotion, export credit agencies, gravity model, Visegrad Group

**JEL:** F14, G28, C23

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# 1 Introduction

This paper deals with government export promotion in Visegrad Group as a representative of transition, post-Soviet central European economies. Visegrad Group is an alliance of four Central European countries – the Czech Republic, Slovakia, Poland and Hungary – established in February 1991. Later on, in 1994, the four Visegrad countries created Central European Free Trade Area (CEFTA). The CEFTA was subsequently enlarged by Moldova, Romania and Bulgaria but four founding members left CEFTA in 2004 to join the European Union.

So far the question of export support was addressed in a number of papers for developed market economies (Egger and Url, 2006, Moser, Nestmann and Wedow, 2008, Herger and Lobsiger, 2010) or for some single emerging markets in isolation (Janda, Michalikova and Skuhrovec, 2012), but up to now a comparative approach considering a group of relatively homogeneous emerging markets is missing in the literature. In our paper we aim at filling this niche in the international trade literature. While Baltensperger and Herger (2009) already provided a comparative study of export insurance schemes in OECD countries, in our paper we concentrate on smaller and more homogeneous group of countries and besides estimating the gravity equation model as in Baltensperger and Herger (2009) we pay considerable attention to description and comparison of institutional details of government export promotion in central European economies which were not addressed in the literature up to now. A unique feature of our paper is also a brief description of main tendencies of international trade of all four Visegrad countries since the demise of the Council of Mutual Economic Assistance in early nineties.

We begin with a summary of international trade development in Visegrad Four countries in Section 2. Strategies and institutions for supporting export in individual Visegrad countries are covered in detail in Section 3. An empirical model based on a gravity equation of international trade that tests effectiveness of different types of ECAs is presented in Section 4. Section 5 provides conclusions and suggestions for further follow up research.

## 2 International Trade in Visegrad Group

We are focusing on three milestones in recent decades that created significant changes in the structure of international trade in Visegrad

countries. Those are dissolution of the Soviet Union in 1991, the European Union accession in 2004 and financial crisis of 2007.

All Visegrad Group countries share a common heritage of belonging to the Council of Mutual Economic Assistance (also known as COMECON). Benacek and Visek (2003), who traced the development of international trade of Communist countries during the post-war period, came to a conclusion that trade among COMECON countries was quite intensive. At the end of 1980s, according to Winiecki (2002), the members of COMECON traded among each other from 40-50% of their overall domestic production up to as much as 75% (Romania). However, this trade was sub-optimal caused by a lack of market mechanism for determination of a structure of specialisation at the level of standard economic agents. Market mechanism was substituted by extensive bureaucratic decision-making at the macro level implying that at that time there was no need for separate institutions engaged in export promotion.

As a aftermath of the demise of the Soviet Union block, all former COMECON countries started to shift from control and command regimes to economies based on market institutions rather determined by supply and demand forces than by bureaucratic central planning. Eastern European countries did not operate under convertible currency system. A dominant part of Visegrad countries' trade shifted from the East to the West after the end of Soviet pressure for a maintenance of goods flows in the Soviet block. Winiecki (2002) investigated a structural change of export partners (as well as import partners, however with a lag) of CEE countries. He showed how trade moved where the markets were, towards the high-income Western countries. CEE countries also possessed a location advantage, being in the heart of Europe, relatively close to some large European production centers. Table 1 contains empirical evidence of this theory. We could observe an extension of West-oriented trade to be even more rapid than it was expected.

Another typical feature of early transition trade was that all CEE countries imported more sophisticated and high-quality products from the West than the ones they exported. First export credit agency in the region was established in 1991 in Poland, instantly followed by new export insurance and financing schemes with state support in all four studied countries. Main idea was to increase competitiveness of domestic exporters when facing different obstacles in foreign markets.

After the EU accession of the Visegrad countries in 2004, one of the most remarkable developments was the sudden upturn in mutual

Table 1: Geographical change of exports: in % shares of aggregate exports

Country		1928	1988	1994	1996
Czech Republic	Westbound	55.2	33.5	58.9	62.8
	Eastbound	19.8	55.2	31.8	30.6
Hungary	Westbound	40.9	37.2	71.5	69.0
	Eastbound	37.3	45.5	25.2	28.8
Poland	Westbound	62.7	44.7	75.0	71.6
	Eastbound	14.2	40.8	15.0	21.4

Note that Westbound stands for 1988-1996 OECD countries except Turkey and Eastbound for ex-COMECON countries including Turkey; data for 1928 and 1988 are for Czechoslovakia  
Source: Winiecki (2002)

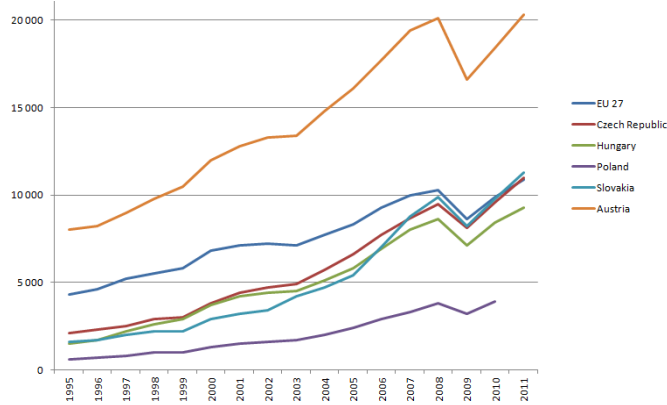
trade. In 2007 the value of aggregate intra-Visegrad trade was two and a half times higher than in 2003. The rate of growth in these countries' trade with the *old* EU member states was only half as much as that. Despite similarly rapid expansion, individual intra-Visegrad bilateral relations had diverging character concerning the composition of trade. Hungary's excessive specialization in transport equipment and components in comparison to the other three Visegrad Group countries was considered to be extreme. Another extreme was Slovakia where the initial proportions across main commodity groups hardly changed in the period of rapid extension of trade volumes (Hunya and Richter, 2011). Automobile and transport industry form a major part of exports in Slovakia, Poland and Hungary. Hungary also exports food and Poland and Slovakia are both famous for their electrical device plants that are widely spread. Generally, export structurally shifted from resource-based/low-tech export to medium- and high-tech products (Gardon, 2010). Elimination of exchange rate volatility resulted in trade expansion but the accession to the Eurozone did not have any significant effects on exports of Slovakia. (Cieslik et al., 2012)

Visegrad countries were severely hit by the recent financial crisis in the fall of 2008. They had primary a current account crisis and shortly, in mid-2010, they overcame the crisis, with the exception of Hungary. Exports from Slovakia and the Czech Republic declined the most in 2009, by 16.5% and 15.8%, respectively, due mostly to external factors (Aslund, 2012). Nowadays, a vast majority of overall

export is headed towards the European Union, especially to Germany (the major partner of Czech and Polish exporters). Slovak exports are headed mainly towards the Czech Republic and also Germany.

To summarize trade development, Figure 1 demonstrates an overall amount of export from the Visegrad Four countries, EU27 and Austria between the years 1995 and 2011. Export is expressed in current prices and in euro per inhabitant units. We can observe that EU27 export per inhabitant is a bit higher but still quite similar to an amount of export from three Visegrad countries (excluding Poland). There is a sharp decrease of a volume of export in every one of the observed countries in 2009 caused by a subsequent impact of the global financial crisis. Export from Slovakia per inhabitant experienced a relatively higher increase than exports from other examined countries. Its value was lower than Czech and Hungarian export volume at first but it exceeded both of them by 2006 and it even exceeded the European Union average value in the end of 2011. It is very interesting to observe volumes of export from such comparable countries as Austria (developed market economy) on one side and Hungary (post-Communist country) on the other side. Both neighboring countries have similar size of population, nevertheless, Austrian export is more than two times higher than Hungarian throughout the whole observed time period.

Figure 1: Export in current prices expressed in euro per inhabitant



Source: Eurostat



## **3 Institutions Supporting Export**

### **3.1 Official Government Export Strategies**

While Visegrad countries shared similar concerns, historical experiences and developmental goals, we can observe significant differences in their export promotions, and most importantly, in governments' targets concerning export. The Czech, Slovak and Polish recent government export strategies were designed to increase volume of exports, mostly exports of small and medium entrepreneurs (in particular the Czech Republic) and to diversify export territories.

The Czech Republic wants to push export towards countries with future growing potential outside of the European Union, in particular to Brazil, China, India, Russia. On the other side, Slovak government prefers exports to the European Union countries and Norway, Liechtenstein and Iceland; countries with growing potential are only its second most important destination. Both Slovakia and Poland try to significantly increase amount of export promotion from the state budget, however, Poland focuses on facilitation of access to state credits and insurance products and hence strengthening of the role of ECAs and Slovakia wants to further develop export promotion instruments.

While there is no official individual export strategy adopted by Hungarian government we could conclude some export objectives of Hungary from their general government plan. In particular, they focus on improving competitiveness and creation of new jobs.

### **3.2 Background to ECAs Analysis**

Originally, ECAs were established as a response to market failures in 1920s and their positive impact was unquestionable; social benefits outrun possible losses. They were traditionally seen as lenders of last resort for national companies against political and commercial risks that were uninsurable by private sector.

Fitzerald (1989) identified justifications of existence of ECAs. Those are above mentioned capital market failure and imperfect information on export credit, incomplete insurance markets and resulting unreasonable premium to cover the risk, moral hazard and adverse selection and hence risk premium unsustainable for majority of exporters, imperfectly competitive foreign markets, export externalities linked to production for the export market, and finally, matching other programs such as development aid.

ECAs went through a period of high losses which resulted in substantial reforms due to OECD regulations in 1990s. Consequently, number of the Berne Union members becomes larger, new ECAs are established mainly in emerging countries, moreover, ECAs operate profitably. We can conclude that ECAs nowadays shifted from their role as lenders of last resorts, carrying high risk that can be eventually unloaded on the state budget towards market players that try to operate as a private company, support national companies without using public resources on loose economic goals and obtain self-sustainable positive financial results (Ascari, 2007). They are in general organizations providing either financing or insurance mainly to exports that otherwise could not be realized due to their risky potential. Hence they form a complement to commercial financing and insurance.

### **3.3 Institutional Forms of ECAs**

A typical model of export credit agencies in Europe is to have a separate institution providing credits and guarantees, hence operation in a form of a bank; and an insurance company providing different types of export insurance, usually with state guarantees. All three models of ECAs have their advantages and disadvantages that we are going to analyse in this section. Summary characteristics of ECAs in Visegrad countries follow in Table 2. All ECAs in the form of insurance company in the region fulfilled conditions for Berne Union but they remained members of the Prague Club too.

#### **3.3.1 Individual Government Bank**

It is the most common model in the European Union. We could say that its advantages overcome its disadvantages because if it is incorporated as a joint-stock company, it is usually able to gain its own revenues. This implies significantly lower public expenses for the government. Since the government is usually its only shareholder, government has a big impact on the portfolio of credits that the bank provides, and thus, the government can also choose priority territories to promote. On the other side, it can not operate just by itself and it has to insure a vast majority of its credits in another insurance company. This may be prevented by introducing a special government legislation for eximbanks.

This institutional form is used in the Czech Republic and Hungary.

Table 2: Visegrad Export Credit Agencies

Organization	CZ		SK		HU		PL	
	CEB	EGAP	Eximbanka SR	Eximbank	MEHIB	BGK	KUKE	
Form	bank	insurance	bank and insurance	bank	insurance	bank	insurance	
Ownership	80% state 20% EGAP	state	state	state from 2012	state from 2012	state	88% state 12% BGK	
Share Capital <sup>a</sup>	158	51	100	35	15		20	
rating <sup>b</sup>	A1		A1 (2010)					
Berne Union	No	Yes	Yes	No	Yes	No	Yes	
Prague Club	No	Yes	Yes	No	Yes	No	Yes	
main territories with promotion <sup>c</sup>	Russia		former Soviet countries, Near and Middle East	Russia, Ukraine, Serbia	Russia, Ukraine, Serbia	Russia, Ukraine	Russia, Ukraine	

<sup>a</sup>EUR million, approximate numbers

<sup>b</sup>Moody's long term rating

<sup>c</sup>for countries outside EU27 - source EEIP (2011)

In the Czech Republic, *Czech Export Bank* (CEB) was established in July 1995 as an important part of a government export-promoting program. CEB is fully owned by Czech government, either directly or indirectly through EGAP. It offers complementary products to Czech commercial banking products. Even though Czech export is oriented towards countries with some close geographical or political relations with the Czech Republic (EU countries that are evaluated as less risky), a vast majority of newly signed CEB contracts are located in higher risky countries with classification 3 or more.<sup>1</sup>

Analogically, Hungarian *Export-Import Bank* was created in May 1994. It is also fully owned by government (namely Ministry of National Economy). It is engaged in export financing but also export guarantees that would not be invested by commercial banks. Interestingly, Eximbank's main destination country in 2010 was Russia, followed by two highly developed countries - Germany and Austria (Eximbank Annual Report 2010).

In Poland, a gap of state-supported export financing is filled by the *Bank of National Economy* or Bank Gospodarstwa Krajowego (BGK). However, it is essential to mention that BBK is not a typical ECA but rather a state development bank that provides banking services for the public finance sector, especially government support programs.

### 3.3.2 Individual Insurance Company

The second model, usually connected with the model of the individual state export bank, is an *individual insurance company*. Similar to the individual export bank, there is a possibility of long-term operations on its own budget and revenues when the insurance company is incorporated as a joint-stock company. Then direct risk for the government decreases and so there is no need for accounting of direct government guarantees in a national budget. By analogy, the individual insurance company is necessarily reliable on commercial banks' financing. Its disadvantage is that the government can not influence territorial targets of the insurance company. To do so, the government export bank must be employed.

This institution is most commonly used in Visegrad countries, it was established in Poland, the Czech Republic and Hungary.

The *Export Credit Insurance Corporation* (KUKI) was the first ECA on the territory of the Visegrad Four countries. It is partly

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<sup>1</sup>OECD country risk classification ranges between 0(no risk) and 7(very risky).

owned by Bank of National Economy. KUKÉ recently noted a significant boost of insurance activities with the Program in 2010 that focuses on small entrepreneurs. As for the exporting territories, KUKÉ concentrates on countries with high potential, namely Germany, Netherlands, and Russia.

The *Czech Export Guarantee and Insurance Corporation* (EGAP) was established in June 1992. KUPEG, the biggest domestic risk insurance company, separated from EGAP. EGAP mainly focuses on export buyer credit insurance.<sup>2</sup> It cooperates with almost all Czech commercial banks and even with foreign banks financing Czech exports, however, CEB is its primary partner.

Hungarian *MEHIB* was created as the last from above institutions, in 1994. After the bill passed in May 2012, the Minister of Economy can directly control MEHIB, as well as Export-Import bank. MEHIB's political risk insurance is protected by the state guarantees, nevertheless, it also provides marketable risk insurance for which it is fully responsible. Similar to KUKÉ, it highly orientates towards Russia and other post-Soviet markets.

### **3.3.3 Institution Offering Both Insurance and Banking Products**

The last type of the institutional form of export credit agencies is an *institution offering both insurance and banking products*. This model is named a combination model in this paper. Its disadvantages, derived from the previous discussion, are that this institution can not use only its own financing to operate. Furthermore, it is quite difficult to define this institution: Is it a bank or is it an insurance company? This also implies that it is not possible for this type of ECA to obtain its own rating, therefore it has to face an extensive risk. At the same time, a special laws must be adopted for this institution to operate as a separate joint-stock company (such as Act No. 80/1997 Coll. on the Export-Import bank in Slovak Republic). Commercial banks might not be willing to provide financing that is sometimes necessary. On the other side, this type of an institution has a wider range of products offered in one place and its costumers can benefit from its one stop shop approach. This institution can also use its own "know-how" and support.

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<sup>2</sup>Export buyer credit insurance accounted for almost 70% of all EGAP's contracts in 2011

The only representative of this form is Slovak Eximbanka. It is necessary to mention that this export support scheme has also employed in Hungary until 1994, when the Export Guarantee Ltd. was divided into two separated organizations, above mentioned MEHIB and Export-Import bank.

Eximbanka was established as the last one, in 1997. It provides bank products and not only insurance of political risk but also marketable risk insurance. Territorially, Eximbanka's export promotion are recently headed towards the European Union countries with over 80% of bank products and over 70% insurance products in 2010.

### **3.4 Banking and Insurance Products of Visegrad Group ECAs**

Before we further proceed to empirical analysis of ECAs, we must first familiarize with the wide portfolio of subsidized financial instruments offered by Visegrad ECAs, either in form of banks or insurance companies, in order to fully understand completeness, and especially flexibility of ECAs when fulfilling needs of different types of domestic exporters, as well as foreign buyers of exports, and their practical importance in today's financial markets. Therefore, in this section we introduce products of ECAs depending on the type of consumer. Moreover, we compare product portfolios of all ECAs on Visegrad territory, sorted by product types.

Future exporter seeking investment might benefit from following credit categories. Initial direct export credit is provided to domestic exporters by ECAs. If exporter has already taken credit from commercial bank, he could sign refinancing contract with the ECA. Refinancing enables exporter's bank to obtain funds from ECA in order to consequently provide credit for the exporter under more favorable conditions. Even potential domestic investors can use subsidized credits for investment to finance projects abroad. Nevertheless, this credit instrument is not widespread. Another type of banking product offered for entrepreneurs in Visegrad Four region is a bank guarantee, namely bid, performance, retention, advance payment bond or guarantee and warranty.

Foreign buyer of exports from Visegrad Four can as well profit from ECAs instruments, depending on the stage of business with the exporter. Note that available range of customized products for export buyers is much wider than those for exporters. Even before signing

the contract, pre-export credit financing costs connected to contract is available. Furthermore, direct and indirect export buyer credits are extensively traded. The latter stands for an agreement signed between the buyer's bank and ECA. Refinancing of buyer's export credit is also common.

Table 3: Bank Products

	CZ	SK	PL	HU
Pre-export credit	Yes	Yes	No	No
Direct export supplier credit	Yes	Yes	No	Yes
Direct export buyer credit	Yes	Yes	Yes	Yes
Indirect export buyer credit	Yes	Yes	Yes	Yes
Credit for investment abroad	Yes	Yes	No	Yes
Refinancing of supplier's export credit	Yes	Yes	No	Yes
Refinancing of buyer's export credit	Yes	No	No	Yes
Forfeiting	Yes	Yes	Yes	Yes
Purchase of export insured receivables	Yes	No	Yes	No
Non-payment bank guarantees	Yes	Yes	Yes	No
Payment bank guarantees	No	Yes	No	No

Source: [www.ceb.cz](http://www.ceb.cz); [www.eximbanka.sk](http://www.eximbanka.sk); [www.kuke.com.pl](http://www.kuke.com.pl);  
[www.bgk.com.pl](http://www.bgk.com.pl); [www.eximbank.hu](http://www.eximbank.hu)

Following part summarizes insurance instruments used in government export promotion. They are mainly proposed to commercial banks.

Majority of insurance products are designed for exporter's commercial banks. Insurance of credit for pre-export financing covers the bank against a non-repayment of the credit due to inability of exporter to fulfill the contract or to manufacture goods or provide services. Bank can moreover choose from insurance of short term or medium and long term supplier credit financed by the bank. They protect against the risk of non-repayment by a foreign importer. Bank possibly applies insurance of confirmed letter of credit. This instrument is defined as a written promise of a seller to a buyer that is guaranteed to clear by seller's bank (in this case, by exporter's bank).

As for the bank of importer of Visegrad goods or services, it might employ insurance of export buyer credit instrument to cover the risk of non-repayment of export buyer credit by a foreign importer. Characteristics of this type of insurance are highly standardized by the OECD Consensus.

Future investors (or their banks) benefit from insurance of investments of domestic legal persons abroad when investor is willing to enter target markets of Visegrad governments. Exporter can apply insurance of short term or medium and long term exporter supplier credit, depending on the length of the contract.

Alternative forms of insurance are also applied on derived financial instruments such as exporter's bank guarantees, receivables or leasing. Unique insurance offered exclusively by ECA is insurance of prosperity of foreign markets designed for the exporter into a risky territory.

Table 4: Insurance Products

Insurance of	CZ	SK	PL	HU
Short Term Export Supplier Credit	Yes	Yes	No	Yes
Short Term Export Supplier Credit Financed by a Bank	Yes	No	No	Yes
Medium and Long Term Export Supplier Credit	Yes	Yes	Yes	No
Medium and Long Term Export Supplier Credit Financed by a Bank	Yes	No	No	No
Export Buyer Credit	Yes	Yes	Yes	Yes
Confirmed Letter of Credit	Yes	Yes	No	No
Credit for Pre Export Financing	Yes	Yes	No	No
Investment of Domestic Legal Persons Abroad	Yes	Yes	Yes	Yes
Credit for the Financing of Investments of Domestic Legal Persons Abroad	Yes	Yes	No	No
Prospection of Foreign Markets	Yes	No	No	No
against the Risk of Inability to Fulfill an Export Contract	Yes	Yes	No	No
Bank Guarantees Issued in Relation to an Export Contract	Yes	Yes	No	Yes
Short Term Export Receivables	No	No	Yes	No
Leasing	No	No	Yes	Yes

Source: [www.egap.cz](http://www.egap.cz); [www.eximbanka.sk](http://www.eximbanka.sk); [www.kuke.com.pl](http://www.kuke.com.pl); [www.mehib.hu](http://www.mehib.hu)

The analysis of ECA products in this section implies that the widest portfolio of both insurance and financing products is offered by the Czech Republic (22 different types all together), followed by Slovakia (18), Hungary (13) and Poland (10). A proximity of Czech and Slovak export product portfolio could be observed; this might be explained by close historical ties and joint development of banking and insurance sector.

## 4 Gravity Model of International Trade

A natural question arises when discussing and analyzing different schemes of export credit agencies as we have done in the previous



sections: Which one of export credit agencies (a bank, an insurance company or their combination) is the most effective? Or in other words, state promotion from which type of export credit agency has the highest impact on the structure of exports? While we already discussed advantages and disadvantages of ECAs on a qualitative level now we are going to test their effectiveness on a quantitative level by using the gravity model framework.

The gravity model of trade used in international economics was independently introduced in literature by Tinbergen (1962) and Poyhonen (1963). Its name is derived from Newton's Universal Law of Gravitation. In its most simple form, the amount of trade between two countries depends positively on the mass and negatively on the resistance. The mass could be approximated by the size of economies in those countries that could be measured by their GDP. Analogically, the resistance could be expressed by the distance of countries (we use geographical distance of capital cities). This model is widely used in econometrical analysis of trade flow between countries because of its high consistency with other macroeconomic models. It explains many types of flows, such as migration, commodity shipping, tourism or commuting (Bergstrand, 1985).

The concept of the gravity model has been further examined in multiple empirical papers regarding an export promotion. Egger and Url (2006) investigated a panel of data from Austria and found out that public export credit guarantees have a less than proportional positive effect on international trade volume. They predominantly affect the country structure of foreign trade but leave the industry specialization almost unchanged. Moser, Nestmann and Wedow (2009) applied the empirical gravity model on data from German ECA Euler Hermes and they investigated the effect of public guarantees while controlling for political risk in importing country. They found a statistically and economically significant positive effect of public export guarantees on exports which proved that export promotion is indeed effective. Baltensperger and Herger (2009) examined how far an export promotion boost international trade in OECD countries. They found out that countries issuing export credits with state generous guarantees did not register any significantly higher amount of exports towards politically unstable countries and they concluded that export support rather promotes exports to higher income countries. Herger and Lobsiger (2010) examined how far officially backed guarantees on trade finance achieve their determined goal of promoting exports in Switzerland. They concluded that guarantees increase exports in the

manufacturing sector by around 1%. Potacelova (2009) and Janda, Michalikova and Skuhrovec (2012) provide gravity model of export credits supported by Czech Export Bank.

We will contribute to the discussion of effectiveness of export credit agencies by using the empirical gravity model with an exogenous variable “export promotion” for different types of ECA in Visegrad countries. ECA in the form of bank is represented by the Czech CEB, an insurance company by Polish KUKE and their combination by Slovak Eximbanka.

## 4.1 Econometrical Model and Data Description

We estimate three different specifications of gravity model along the lines of Egger and Url (2006) and Janda, Michalikova and Skuhrovec (2012). Our gravity model has a form:

$$\begin{aligned} \ln(\text{export}_{it}) &= \beta_0 + \beta_1 \ln(\text{promotion}_{it}) + \beta_2 \ln(\text{GDP}_{it}) + \\ &+ \beta_3 \ln(\text{distance}_i) + \beta_4 \ln(\text{population}_{it}) + \\ &+ \beta_5 \ln(\text{risk}_{it}) + \mu_i + \mu_t + \epsilon_{it} \end{aligned}$$

where  $t$  stands for a year<sup>3</sup>,  $i$  for a receiving country destination,  $\mu_i$  is a country specific error term,  $\mu_t$  is a time specific error term and  $\epsilon_{it}$  stands for an error term with zero mean and constant variance.

An endogenous variable in our regression models is logarithm of export from observed country (the Czech Republic, Poland, Slovakia) to country  $i$  in year  $t$ . It is expressed in current US dollars. In case of the Czech Republic, data were obtained from the Czech Statistical Office in CZK and then transformed to USD by using an average yearly exchange rate (obtained from the Czech National Bank); other data were downloaded from the Comtrade database already in USD.

A key variable in our model is  $\ln(\text{promotion}_{it})$ . It is a logarithm of overall amount of state promotion sent into a country  $i$  in year  $t$  that was provided by a corresponding export credit agency. It is a sum of different forms of promotion: guarantees, credits, insurance etc. It is a key variable in our model and we use its coefficient to compare effects of export credit agencies in three different forms on

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<sup>3</sup>Model describing the bank (CEB) covers time period 2003-2011; an insurance company (KUKE) model covers time period 2002-2011; and model of the combination (Eximbanka SR) covers only year 2010-2011 since there were no precise data available for the prior period.

an amount of export. Data were provided by KUKKE, CEB and Ex-imbanka. We assume that state export promotion increases export especially to countries with higher political risk. Hence we expect a positive coefficient of the variable.<sup>4</sup> Other exogenous explanatory variables are:

$\ln(GDP_{it})$  is a logarithm of GDP of a receiving country  $i$  in year  $t$ . This variable is suggested to be used as a proxy for a size of market in gravity models. Data were obtained from the International Monetary Fund and they are expressed in current USD. We expect a coefficient of this variable to be positive because demand for imported products and services should increase in bigger markets.

$\ln(distance_t)$  is a logarithm of geographical distance of capital cities of exporting and importing country  $i$ , expressed in kilometers. It is proposed as a proxy for transaction costs and hence for resistance in the gravity model. Transaction costs increase with growing distance of an importer so we expect this coefficient to be negative.<sup>5</sup>

$\ln(population_{it})$  is a logarithm of population in receiving country  $i$  in year  $t$ . With growing population demand for foreign exports increases, therefore we expect the coefficient to have a positive value. Data were obtained from the International Monetary Fund official database.

$\ln(risk_{it})$  is a logarithm of a political risk of country  $i$  in year  $t$ . We used the OECD classification of riskiness of countries that is periodically updated. The smaller the risk classification is, the less risky the country is. The OECD classification ranges between 0 to 8. Already Tinbergen (1962) pointed political risk to be an important obstacle to international trade flow because it represent an additional transaction cost. Governments try to stimulate exports by granting export credit guarantees against

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<sup>4</sup>Note that a common practice when dealing with transformation of zero values to logarithm form is to remove those observations. However, in our case there is a large number of zero values and so we can not remove all of them. Thus when running the regression we substituted all zero values of promotion by 1 in order to be able to compute logarithm form. This approach has been suggested by Janda, Michalikova and Skuhrovec (2012).

<sup>5</sup>Source: timeanddate.com.

export risks, especially political risks (Moser, Nestmann and Wedow, 2008). This variable was introduced by Moser et al. (2008) in gravity model estimation. However, we expect the effect of export promotion to riskier countries to be offset by the volume of export of to less risky countries that are chosen by the majority of exporters. This implies a negative expected sign of the *risk* coefficient.<sup>6</sup>

Table 5: Descriptive statistics of the *bank* model

Variable	Obs	Mean	Std. Dev.	Min	Max
export (USD)	1635	5.88 *10 <sup>8</sup>	2.95*10 <sup>9</sup>	0	5.21*10 <sup>10</sup>
promotion (USD)	1635	3617157	2.96*10 <sup>7</sup>	1	5.99*10 <sup>8</sup>
population	1542	3.74*10 <sup>7</sup>	1.38*10 <sup>8</sup>	25625	1.34*10 <sup>9</sup>
GDP (USD)	1457	2.35*10 <sup>13</sup>	1.85*10 <sup>14</sup>	1.15*10 <sup>8</sup>	3.06*10 <sup>15</sup>
distance (km)	1635	5622.814	3788.947	0	18197
risk	1618	4.850433	2.845627	1	9

Table 6: Descriptive statistics of the *insurance company* model

Variable	Obs	Mean	Std. Dev.	Min	Max
export (USD)	1682	6.82*10 <sup>8</sup>	2.88*10 <sup>9</sup>	18	4.73*10 <sup>10</sup>
promotion	1821	1.4*10 <sup>7</sup>	5.30*10 <sup>7</sup>	1	8.66*10 <sup>8</sup>
population	1711	3.72*10 <sup>7</sup>	1.37*10 <sup>8</sup>	23044	1.34*10 <sup>9</sup>
GDP (USD)	1621	2.20*10 <sup>13</sup>	1.76*10 <sup>14</sup>	1.15*10 <sup>8</sup>	3.06*10 <sup>15</sup>
distance (km)	1821	5675.937	3810.224	0	17690
risk	1789	4.921185	2.842617	1	9

For further information about the structure of datasets, descriptive statistics for all three models are reported in Tables 5, 6, and 7.

## 4.2 Empirical Results

We are going to present results of our gravity models in this section. We arranged our datasets into unbalanced panel data and estimated

<sup>6</sup>Note that in regression we used classification from 1 to 9 instead of 0 to 8 (1 we used equals 0 from original OECD risk classification); this way we could transform values into a logarithm form without losing a significant number of observation.

Table 7: Descriptive statistics of the *combination* model

Variable	Obs	Mean	Std. Dev.	Min	Max
export (USD)	340	4.18*10 <sup>8</sup>	1.57*10 <sup>9</sup>	65	1.60*10 <sup>10</sup>
promotion (USD)	372	1.56*10 <sup>7</sup>	7.69*10 <sup>7</sup>	1	6.97*10 <sup>8</sup>
population	338	3.94*10 <sup>7</sup>	1.42*10 <sup>8</sup>	29244	1.34*10 <sup>9</sup>
GDP (USD)	332	3.28*10 <sup>13</sup>	2.59*10 <sup>14</sup>	1.87*10 <sup>8</sup>	3.06*10 <sup>15</sup>
distance (km)	372	5622.116	3909.794	0	18100
risk	372	4.596774	2.852868	1	8

three different models for bank, insurance company and their combination. A common approach with panel data is to estimate both random effect and fixed effect models by GLS regression and then use Hausman test to decide. Under the null hypothesis of Hausman test, both random effect and fixed effect models are effective and consistent; the alternative hypothesis rejects the random effect model. We do expect the fixed effect model to be more consistent with our data because we used a sample of almost all countries in the world; data were not chosen randomly. Data for smaller underdeveloped countries, such as their GDP or export, are usually not available in international databases and hence they were excluded from our regression. Fixed effect estimation are the ones most often used in papers dealing with the gravity equation. Results of our regressions are reported in Table 8 that follows.

Table 8: Static GLS regression

	bank		insurance company		combination	
	RE	FE	RE	FE	RE	FE
promotion	0.013* (0.007)	0.010 (0.007)	0.080*** (0.009)	0.05*** (0.009)	0.014 (0.010)	-0.005 (0.010)
population	0.969*** (0.061)	1.768*** (0.238)	0.732*** (0.062)	2.314*** (0.250)	0.882*** (0.084)	-0.119 (0.376)
GDP	0.047*** (0.012)	0.022* (0.012)	0.064*** (0.013)	0.042*** (0.013)	0.099*** (0.037)	-0.047 (0.042)
distance	-2.027*** (0.117)		-1.710*** (0.128)		-1.815*** (0.140)	
risk	-0.614*** (0.072)	-0.443*** (0.079)	-0.567*** (0.077)	-0.370*** (0.086)	-1.176*** (0.174)	-0.111 1.007
constant	17.417*** (1.340)	-11.705*** (3.800)	17.851*** (1.436)	-21.141*** (3.983)	15.624*** (1.800)	19.128*** (6.142)
n	1421	1421	1499	1499	308	308
R <sup>2</sup>	0.694	0.276	0.713	0.222	0.726	0.227
Hausman <i>p</i> -value	0.00		0.00		0.00	

Note that \*, \*\*, \*\*\* denote significance at 10%, 5%, 1% level, respectively.

Hausman test rejected the random effect estimation as it was expected.  $R^2$  from the fixed effect models in all three cases ranges between 0.222 to 0.276; this implies that explanatory variables from our models explain only between 22 to 27% of overall variance in *export*. When using the random effect estimation,  $R^2$  was much higher. It could have been caused by omitting the variable *distance* from the later model. This variable probably explained a lot of variance in *export*.

Our key variable, *promotion*, equals 0.01, 0.05 and -0.005 for bank, insurance company and combination model, respectively. Therefore the insurance company comes out as the most effective. The export bank promotion follows and our analysis identifies promotion provided by the institution integrating financing and insurance instruments as the least effective one. Indeed we must interpret those results with caution. Variable *promotion* in bank and combination model do have higher p-values (around 0.2) and hence they are not significant at required levels. Further, in case of combination model, the variable *promotion* has even a negative effect on exports. Nevertheless, the random effect model gives similar results and hence so far we can conclude that the promotion provided by the ECA in the form of the insurance company, KUKE, is the most effective and the only significant in this case of CEB, KUKE and Eximbanka SR. Magnitude of all coefficients could be interpreted as usual elasticities because we deal with a log-log model. 1% increase of *promotion* provided by the bank increases *export* by 0.01% *ceteris paribus*, by 0.05% provided by insurance company and it decreases *export* by 0.005% in case of institution providing both insurance and financing products.

Concerning other variables, all variables in models of separate institutions are significant (in the insurance company model they are all significant at even 1% confidence interval). In those 2 models, all variables have expected coefficients. Hence increasing population and GDP cause export to increase. With growing distance export decreases because of higher transaction costs and hence Poland, Slovakia and the Czech Republic choose to export to geographically closer countries (estimates from the random effect models). Exporters also choose countries with lower risk to overcome potential losses. Not all variables in combination model have expected coefficient. This could have been caused by rather small number of observations or by excluding some significant variables from the model. Estimates of variables could be biased.

To provide robustness check to our results and since Hausman test

decided in favor of the fixed effect estimation, we estimated the gravity equation by using Least Squared Dummy Variable (LSDV) approach, which may be considered as a special kind of fixed effect estimation.<sup>7</sup> This model does not omit variables constant over time, therefore the explanatory variable *distance* is not going to be excluded from our analysis (Potacelova, 2009). Results are reported in Table 9.

Table 9: Static LSDV OLS regression

	bank	insurance company	combination
promotion	0.009 (0.006)	0.025*** (0.008)	-0.003 (0.010)
population	0.200 (0.224)	0.207 (0.227)	-0.054 (0.372)
GDP	0.001 (0.010)	0.016 (0.011)	-0.051 (0.041)
distance	-3.096*** (0.214)	-0.776*** (0.224)	-2.694*** (0.476)
risk	-0.165** (0.070)	0.027 (0.074)	0.022 (0.996)
constant	35.235*** 4.526	20.830*** 4.528	35.702*** (7.116)
n	1421	1499	308
R <sup>2</sup>	0.955	0.947	0.971

Note that \*, \*\*, \*\*\* denote significance at 10%, 5%, 1% level, respectively.

$R^2$  from LSDV models increased significantly in comparison with previous fixed and random effect models. They explain around 95% of variance of export. We must add that new country and time dummy variables from LSDV (not reported in the Table 9) were estimated as very significant in spite of their quantity (more than 200 dummy variables). Hence we can conclude that the LSDV model fits well our regression. When comparing magnitude of coefficients of the variable *promotion* and its significance, the LSDV model confirmed our previous analysis. 1% increase of state promotion causes export to increase by 0.025% in case of the insurance company, by 0.009% in case of the bank. The same amount of promotion from the institution integrating

<sup>7</sup>We included full set of dummy variables for each year and country; the country dummy variable  $C_j$  equals 1 for country  $i$  when  $i = j$  otherwise  $C_j$ . Analogically for the time dummy variable  $Y_s$ . We used OLS to estimate the model

$$\log(\text{export}_{it}) = \beta X_{it} + \sum_{j=1}^n \gamma_j C_j + \sum_{s=1}^t \delta_s Y_s + \epsilon_{it}$$

where  $X_{it}$  denotes full set of explanatory variables described above.

insurance and bank activities decreases export from the country by 0.003%. As mentioned above, this result is probably biased because of relatively small number of observations during a short time period. We could also expect that the export promotion increases export in a longer time period. The only significant variable on 1% significance level is *distance* which is the main explanatory variable in gravity model and hence we also confirmed that the gravity equation works and it is a useful tool to estimate trade flows among countries. Another significant variable in LSDV models is *risk* but only in the bank model so we can not make any general conclusion about the effect of political risk of the country on the amount of export.

We conclude that the state promotion of export, provided in the form of the insurance company (KUKÉ), is the most effective from observed forms. At the same time it showed up to be the only type of promotion with significant statistical as well as economical effect on export from observed country.

## 5 Conclusions

Improving country's competitiveness on foreign markets by boosting quantity of exports is a target of each government. This is especially true for Central and Eastern European countries that went through a very turbulent transition period and they had to implement an enormous amount of reforms in last decades that we analyzed in this paper.

Visegrad Four countries are all small economies with relatively high degree of openness, hence high quality state export plans are particularly crucial for countries' future development. All four Visegrad countries fully recovered from their all centrally-planned past and they are now fully integrated into European and world economy. They are members of the European Union, Organization for Economic Cooperation and Development and the World Trade Organization. EGAP, Eximbanka SR, MEHIB and KUKÉ, regional export credit agencies dealing with insurance, are members of the Berne Union and Prague Club. International membership therefore implies multiple agreements and regulations signed and fulfilled by export credit agencies in Visegrad countries.

Different Visegrad countries used slightly different institutional forms of their export supporting agencies. A most common institutional setting in Visegrad Group is to have a separate institution providing credits and guarantees, hence operation in a form of a bank,



and an insurance company providing different types of export insurance, usually with state guarantees. This model is used in the Czech Republic, Poland and Hungary; there is just one organization targeting financing and insurance facilities in Slovakia. All three models of ECAs have their advantages and disadvantages: their combination offers wider range of products and shares know-how, on the other side, separate institutions are less risky for the state and they are usually able to operate on their own budget.

In this paper we used data from individual ECAs and we tested effectiveness of three forms of export credit agencies. We estimated random effect, fixed effect and LSDV model and all of them determined export credit agency in the form of the insurance company to be the most effective; that means that 1% increase of export promotion provided by tested insurance company had the highest effect on percentage growth of exports.

Since our empirical models did not find significant effects of official export promotion, future examination in this field is possibly needed. We estimated only static econometrical models and did not use dynamic model with lag variables. A possible extension of our empirical research would be to use System GMM analysis which could be applied on data from Visegrad countries as in Janda et al. (2012). Another option is to use Mundlak corrected random effect estimation (Moser et al., 2009). Other explanatory variables could alternatively be added into the regression. It would be also helpful to include longer time period for future estimations in case of Slovak Eximbanka when more data will be available.

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