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How do Export Risk Guarantees affect Exports? The Case of Switzerland*

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For the case of Switzerland, this paper endeavours to uncover in how far officially backed guarantees on trade finance achieve their stipulated goal of promoting exports. The results of gravity equations suggest that the Swiss Export Risk Insurance scheme increases exports in the manufacturing sector by around 1 per cent. As regards specific destination countries and industries, this average increase is highly concentrated and accrues primarily with exports towards large emerging markets and of chemical products as well as machinery.

Keywords: Swiss Export Risk Insurance, export risk guarantee, export promotion, trade finance
JEL-Codes: F13

1 Introduction

Trade finance provides firms with a range of payment methods, credit instruments, and insurance policies to fund and secure the financial transactions settling the export and import of goods and services. The hazards of trying to verify the creditworthiness of distant buyers, enforce contracts in a foreign court, claim delayed or defaulted cross-border payments, or obtain information about the economic and political conventions and conditions abroad all add to the financial uncertainties in international trade and payments. For politically unstable countries in the developing world, payment risks are thought to reach a level that, arguably, cannot be handled by a single firm, commercial banks, or insurance company (see e.g. FINGERAND and SCHUKNECHT 1999). To facilitate international trade, virtually every OECD country – the exceptions being Ireland and Iceland – and more recently an increasing number of emerging markets have therefore established so-called Export Credit Agencies (ECAs), which have a mandate to promote exports by issuing guarantees on certain parts of trade finance on the government's behalf. Though schemes that officially support export credits and insurances account for less than 1 per cent of total exports in OECD countries

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(Baltensperger and Herger 2009), this fraction is much higher when it comes to trade in the aircraft, mechanical and electrical engineering, power generation, or shipbuilding industry, where the design, production, and assembly of large units of capital intensive goods can take years. As regards countries, official guarantees matter most for trade towards emerging markets.

Publicly supported export credit and insurance schemes are primarily established to correct the failures that allegedly arise with the non-marketable parts of trade finance and, thus, foster employment in the international sector. Therefore, it is perhaps not surprising that the desire for creating and strengthening an ECA tends to increase in times of crisis.[1] Note, however, that state-guaranteed trade finance can also serve other goals such as the dispersion of development aid or providing inconspicuous export subsidies to politically privileged industries (Dewit 2001).[2]

The conditions in Switzerland are closely intertwined with the general motives and international developments as regards public interventions in trade finance. As with many other industrialised countries, the collapse of trade during the Great Depression gave rise to the desire to establish a Swiss ECA, which was founded in 1934 under the name "Export Risk Guarantee" (Exportrisikogarantie, Garantie contre les Risques à l'Exportation) to foster the foreign demand for domestically produced goods.[3] The scheme was retained beyond the economic and political turmoil of the Great Depression and World War II, even though the Swiss economy witnessed a period of virtually full employment and strong growth during the 1950s and 1960s. The financial liberalisation of the 1970s and 1980s has led to a marked growth in the international exchange of goods, services, and assets. Initially, this was associated with an equally dramatic increase in export risk guarantees which more than tripled from 10 billion at the beginning of the 1970s to 32 billion Swiss Francs in 1980. However, the claims resulting from this were inadequately covered by the insurance premiums collected, which manifested in losses at the Export Risk Guarantee scheme for virtually every year between 1978 and 1991. A similar deterioration of financial con-

1 This also became evident in the recent global financial crisis when the G20 countries pledged that their ECAs would provide at least 250 billion US $ of additional guarantees to mitigate against the marked decrease in global trade during the year 2009.

2 Some of this manifests itself in the notions introduced by the previous paragraph. Whilst international payment arrangements are commonly referred to as trade credits, public schemes tend to issue guarantees on export credits and insurances. The observation that exporters appear to be favoured over importers lends substance to the view that ECAs support mainly specific domestic industries.

3 See Bärtschi (2006) for an overview of the development of the Swiss Export Risk Guarantee between 1934 and 2006.

ditions could be observed for the ECA of almost every OECD country during that period (DEWIT 2001, pp.577ff.). To remove the structural deficits, during the 1980s, the Swiss Export Risk Guarantee scheme started to reduce the volume of newly issued guarantees to less than 10 billion Swiss Francs at the beginning of the 1990s. This was partly a reaction to international efforts to outlaw export subsidies when ECAs charge inappropriately low insurance premiums. In the 1990s, these efforts lead to the adoption of the OECD's "Arrangement on the Guidelines for Officially Supported Export Credits" and the WTO's "Arrangement on Subsidies and Countervailing Measures". Under the influence of economic globalisation, Swiss exports continued to grow during this period at a real rate of more than 3 per cent. Among other things, this has been made possible by the greater and broader provision of trade finance by commercial banks and other financial intermediaries starting to compete fiercely in many activities that were previously the realm of ECAs (see FINGERAND and SCHUKNECHT 1999). In Switzerland, this development provided the impetus for a fundamental overhaul of the Export Risk Guarantee scheme, which was transformed in 2007 into an independent agency under the public law. In particular, this newly established Swiss Export Risk Insurance (Schweizerische Exportrisikoversicherung, Assurance Suisse contre les Risques à l'Exportation) has been given a broader mandate including the right to adopt payment risks that are, in principle, marketable, as long as risk-appropriate premiums are charged. To avoid confusion, we will henceforth use the term "Swiss Export Risk Insurance", though in some cases we refer to conditions before 2007, and label the corresponding financial instruments covering *non-marketable* payment risks with "export risk guarantees".

Reviewing the developments of export risk guarantees in Switzerland illustrates the ambiguities between creating exports, when market failures that inhibit an adequate private supply of trade finance are corrected, and potential distortions manifesting in the abuse of such schemes to provide export subsidies to privileged industries and burden the taxpayer with the eventual losses from assuming excessive payment risks. Against this background, this paper endeavours to address two fundamental empirical questions. Firstly, how far has the Swiss Export Risk Insurance achieved its stipulated goal of promoting exports, specifically when it comes to trade with countries with aggravated payment risks? Secondly, how has this affected the export structure, meaning which industries and countries benefit most from export risk guarantees? To the best of our knowledge, these questions have not hitherto been addressed for the case of Switzerland.

Our results suggest that, due to the Swiss Export Risk Insurance, exports in the manufacturing sector have expanded by around 1 per cent. Though this increase appears modest, far greater effects arise on trade with large emerging markets and chemical products and machinery.

This paper connects with a small body of empirical literature about public export insurance schemes. In particular, a comparison across the OECD by Baltensperger and Herger (2009), uncovers a small but significant increase in exports in countries with more generous public export insurance schemes. However, this increase appears to have mainly occurred in developed rather than developing countries where the payment frictions and political risks that arguably justify interventions in trade finance tend to be more severe. Furthermore, in spite of public export insurance schemes, payment frictions have been found to be an important impediment to trade. For the case of Germany, Moser, Nestmann and Wedow (2008) find similar results. These studies are uninformative about the differential impact across industries, which is a point taken up by Egger and Url (2006). For the case of Austria, they suggest that state-guaranteed trade finance has modified the export structure, whereby the manufacturing and textile industries and Eastern and Central European countries were the main beneficiaries.

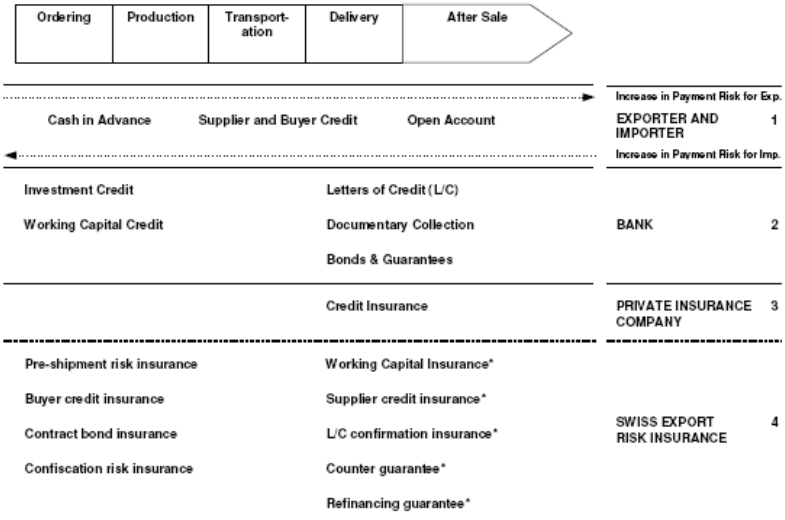
The remainder of this paper is organised as follows. Emphasising the conditions in Switzerland, section 2 provides an overview of the trade finance industry. Section 3 discusses the econometric method and introduces the data. Section 4 presents the results, and section 5 concludes.

2 Trade Finance and Export Risk Guarantees

For the manufacturing sector, the top layer of figure 1 depicts the processing of a foreign order placed with a Swiss exporter. In particular, a stylised supply chain encompasses the stages of receipt of the order, followed by the fabrication, assembly, transportation, and delivery of the product as well as, in some cases, the provision of after-sales services such as maintenance work. The financial settlement of the transaction occurs separately, anywhere along the supply chain (in a single or in multiple instalments) whereby the remaining layers of figure 1 provide an overview of commonly used methods of payment and insurance policies. In particular, as illustrated by layer 1, payments can be arranged directly between the exporter and importer. With cash-in-advance payments, the exporter is reimbursed before

the transaction is completed with the delivery of the goods. However, in many cases, foreign buyers are reluctant to make advance payments since this essentially involves the issuing of an inter-firm trade credit. The majority of international trade is indeed financed on so-called open account where an importer can defer payments for up to 30, or sometimes even 90, days after receiving the goods commissioned and, thus, implicitly receives an inter-firm supplier credit (FINGERAND and SCHUKNECHT 1999; CHAUFFOUR and FAROLE 2009).

Figure 1: Supply Chain



Exporting on open account defers payments, absorbs a firm's internal funds, and hence creates financial risks. Therefore, exporters can have an incentive to take out an intermediated trade credit, understood here as any arrangement where a bank acts on the instruction of a firm to make an international payment, accept drafts of a foreign firm, or authorises another bank to effect such payments provided that certain terms and conditions are complied with.[4] As long as sufficient possibilities exist for mobilising funds and pooling payment risks, foreign buyers can indeed conduct payments through financial intermediaries whereby up to one third of international trade is settled by means of such indirect methods of payment (CHAUFFOUR and

4 This definition draws on the model contract in the Uniform Practices and Customs (UCP) for Documentary Credits published by the International Chamber of Commerce (ICC).

FAROLE 2009). Some popular trade credit instruments are summarised in layer 2 of figure 1. They include letters of credit where the importer's bank commits itself to pay the Swiss exporter the agreed price once conditions like the punctual and undamaged delivery of the products ordered have been met. With a documentary collection, the Swiss exporter delegates the settlement of payment to a bank (collecting bank) which handles the collection by sending corresponding instructions to the importer's bank (remitting bank). For an exporter, indirect methods of payment have the advantage of being made more quickly, relying on the expertise of a specialised intermediary to handle the financial transaction, and trusting to the creditworthiness of a known bank rather than a possibly unknown foreign buyer. Furthermore, financial intermediaries can also be involved in the export business by providing working capital or loans for investments in trade related facilities.

Regardless of whether trade is settled by direct or indirect methods of payment, the separation between pecuniary and goods transactions necessitates the issuance of some form of buyer, supplier, or bank-intermediated trade credit. For an exporting firm, this can result in substantial financial losses when delays or even an interruption occurs somewhere along the supply chain. To cover this, commercial insurance companies offer a range of policies (see layer 3 of Figure 1) on commercial risks such as damages during transportation, defaults, or foreign buyers refusing to accept the delivered goods (FINGERAND and SCHUKNECHT 1999, pp.6ff.). To take out trade credit insurance, firms or banks are sometimes obliged to provide additional securities in the form of advance payment guarantees or performance bonds on which an insurance company can draw in case losses result from careless behaviour.

It has long been recognised that various frictions affect financial and insurance markets. In particular, as regards trade credit insurance, catastrophic events such as political unrest or economic crises can lead to highly correlated losses and, thus, offer insufficient scope for risk pooling. Furthermore, it can be hazardous to obtain accurate information about a foreign buyer's creditworthiness. Therefore, insurance on exports of large and capital intensive goods, whose production and delivery may take several months or even years, as well as towards politically unstable countries is widely deemed non-marketable.[5] For these cases, officially supported Export Credit Agen-

5 See ALSEM, ANTUFJEW, HUIZINGH, KONING, STERKEN and WOLTIL (2003) for a detailed discussion about the insurability of trade credits.

cies (ECAs) have been set up to underwrite insurance policies on the government's behalf. The (explicit or implicit) state-guarantee puts such schemes in the position to assume more correlated and aggravated payment risks, since they can be backed by the governments' budget and, ultimately, a country's tax base. The bottom layer of figure 1 provides an overview of the different export risk guarantees currently offered by Swiss Export Risk Insurance. In particular, this includes coverage of losses from defaulted supplier and buyer credits, confiscation of goods abroad, claimed contract bonds and guarantees, or the production cost of incomplete export transactions (pre-shipment insurance). To offset some of the reduction in exports amid the global financial crisis, several new insurance products, that are designated with a star, have recently been launched including export risk guarantees on working capital, letters of credit, and counter and refinancing guarantees. The Swiss Export Risk Insurance has the right to issue guarantees on any payment risk, but, due to the above-mentioned international efforts to eliminate inconspicuous export subsidies in publicly supported trade finance, it has committed itself to charge market-based premiums in case private banks and insurance companies offer competing products. In general, this includes trade with most OECD countries (the exceptions being Mexico and South Korea) and deals completed within two years. Non-marketable risks are thought to arise with trade towards emerging markets and export transactions taking more than two years to be completed. It is export risk guarantees covering non-marketable payment risks that are the focus of this paper, since these guarantees arguably back trade finance that would otherwise not be offered by commercial banks and insurance companies and, hence, are thought to create additional exports.

For the years 2006 to 2008, column 1 of table 1 provides a breakdown of the newly issued export risk guarantees, whose total volume was in excess of 8 billion Swiss Francs during that period, across destination countries. Note the concentration of guarantees in large emerging markets, with Turkey alone accounting for 17 per cent of all guarantees followed by Saudi Arabia, Iran, Israel, and Russia. Conversely, the least developed areas of the world did not belong to the main beneficiaries. In total, 90 countries served as destinations for trade officially supported by the Swiss Export Risk Insurance, but most of them accounted for a tiny fraction of overall guarantees. According to column 3, a mere 1.36 per cent of all manufacturing exports were covered by some form of export risk guarantee. Today, the role of ECAs in insuring trade is equally modest in other OECD countries (see BALTENSPERGER and HERGER 2009, pp. 550ff.). Again, substantial differences arise between countries, with much higher fractions in the

emerging markets at the top of the table but also for some smaller developing countries such as Bhutan, Cambodia, Cameroon[6], Laos, or Vietnam.

Table 1a: Export Risk Guarantees and Promotion across Countries

Rank	Country	Export Risk Guarantees (CHF Mio.)	Exports (CHF Mio.)	Guarantees/ Exports (%)	Payment Risk 2008	ΔY_j (%)
		(1)	(2)	(3)	(4)	(5)
1	Turkey	1,421.66	7,436.59	19.12	4	6.0
2	Saudi-Arabia	730.90	4,446.41	16.44	2	4.7
3	Iran	637.51	2,365.29	26.95	6	6.5
4	Israel	596.69	3,192.50	18.69	3	2.0
5	Russia	591.74	8,303.00	7.13	3	6.7
6	Algeria	400.21	1,158.49	34.55	3	2.7
7	Vietnam	349.08	630.68	55.35	4	4.1
8	Hungary	245.96	3,385.14	7.27	3	2.0
9	Venezuela	240.26	821.30	29.25	6	2.5
10	China	226.93	15,595.06	1.46	2	3.8
11	Argentina	210.19	1,122.14	18.73	7	2.7
12	Egypt	180.08	1,512.18	11.91	4	3.6
13	Mexico	170.83	3,957.39	4.32	2	5.0
14	Pakistan	148.53	1,059.50	14.02	6	4.8
15	Jordan	131.61	569.63	23.10	5	1.6
16	Lebanon	129.87	1,130.24	11.49	7	1.4
17	Nigeria	126.75	605.15	20.95	6	3.1
18	Kuwait	125.39	1,220.59	10.27	2	1.0
19	India	123.76	6,595.08	1.88	3	4.0
20	Oman	93.51	448.90	20.83	2	2.2
21	Indonesia	93.23	1,113.49	8.37	5	5.5
22	Colombia	91.83	842.06	10.91	4	1.5
23	Croatia	84.99	916.33	9.28	4	1.8
24	South Africa	72.53	2,313.91	3.13	3	2.9
25	Cameroon	68.84	52.05	132.25	7	2.5
26	Korea (South)	68.35	5510.91	1.24	0	2.5
27	Cuba	67.26	68.75	97.84	7	na.
28	Poland	65.12	6,355.16	1.02	2	1.5
29	Belarus	60.52	310.65	19.48	7	3.7
30	Brazil	60.40	5,748.40	1.05	3	3.2
31	Bangladesh	50.59	327.18	15.46	6	1.8
32	Bahrain	47.54	621.64	7.65	2	na.
33	Ukraine	46.90	1,577.58	2.97	5	2.3
34	Utd. Arab Em.	35.70	6,567.46	0.54	2	1.2
35	Peru	34.32	308.33	11.13	4	1.3
36	Kenya	31.34	181.81	17.24	6	1.5
37	Philippines	31.28	753.20	4.15	4	1.4
38	Albania	25.62	97.74	26.22	6	1.1
39	Ecuador	24.38	232.78	10.47	7	1.5
40	Kazakhstan	23.16	582.11	3.98	4	2.0
41	Bulgaria	20.37	969.69	2.10	3	1.6
42	Sudan	14.25	166.41	8.56	7	na.
43	Singapore	11.51	6,252.99	0.18	0	0.8
44	Serbia	11.40	734.59	1.55	7	na.
45	Cambodia	10.45	26.87	38.89	6	3
46	Uruguay	7.90	332.26	2.38	4	2

Notes. Data from Swiss Export Risk Insurance for the 2006 to 2008 period. A (*) indicates that the risk classification is taken from the SERV homepage (March 2010).

6 The guarantees issued for Cameroon cover more than 100 per cent of the corresponding exports during the 2006 to 2008 period. This is possible when guarantees were issued for the long-term and, hence, cover exports that will take place in the following years.

Table 1b: Export Risk Guarantees and Promotion across Countries

Rank	Country	Export Risk Guarantees (CHF Mio.) (1)	Exports (CHF Mio.) (2)	Guarantees/ Exports (%) (3)	Payment Risk 2008 (4)	ΔY_j (%) (5)
47	Kyrgyz Rep.	6.16	24.22	25.42	7	1.5
48	Guatemala	5.12	79.09	6.47	5	1.9
49	Azerbaijan	5.05	326.00	1.55	5	2.0
50	Hong Kong	4.89	1,6148.25	0.03	1	na.
51	Montenegro	4.75	44.53	10.67	6	na.
52	West Bank/Gaza	4.75	na.	-	-	na.
53	Ghana	4.51	84.16	5.36	6	3.1
54	Syria	4.47	514.03	0.87	7	1.9
55	Congo (Dem. R.)	3.82	12.25	31.19	7	na.
56	Bhutan	3.53	4.75	74.42	6*	na.
57	Dominican Rep.	3.41	59.06	5.78	5	1.0
58	Spain	3.40	2,1879.97	0.02	0	0.6
59	Bosnia	3.27	198.70	1.64	7	na.
60	Laos	3.14	7.28	43.07	7	1.6
61	Bolivia	3.04	34.34	8.85	7	1.4
62	Tunisia	2.60	350.20	0.74	3	1.3
63	Ivory Coast	2.38	112.70	2.11	7	1.1
64	Uzbekistan	2.38	186.46	1.27	6	1.3
65	Taiwan	2.18	4,637.86	0.05	1*	na.
66	Iraq	1.90	245.72	0.77	7	na.
67	Libya	1.90	802.68	0.24	6	0.8
68	Romania	1.90	2,476.89	0.08	3	0.8
69	Moldova	1.60	74.25	2.16	7	1.0
70	Honduras	1.56	70.31	2.22	6	1.0
71	Mauritius	1.43	149.63	0.95	3	0.8
72	Panama	1.40	808.18	0.17	3	1.3
73	Nepal	1.14	23.20	4.91	7	1.4
74	Macedonia	0.96	152.18	0.63	5	0.8
75	Madagascar	0.96	12.40	7.75	7	1.0
76	Zambia	0.95	23.67	4.01	6	1.2
77	Morocco	0.60	932.70	0.06	3	1.1
78	Tanzania	0.58	83.53	0.69	6	0.9
79	Senegal	0.48	51.28	0.93	6	0.8
80	Paraguay	0.39	40.19	0.96	6	0.9
81	Jamaica	0.38	50.33	0.76	6	0.7
82	Ethiopia	0.38	85.88	0.44	7	1.1
83	Slovak Rep.	0.36	1,512.19	0.02	1	0.5
84	Eritrea	0.29	2.57	11.08	7	na.
85	Costa Rica	0.19	192.44	0.10	3	0.5
86	Qatar	0.19	1,181.78	0.02	2	na.
87	El Salvador	0.19	44.67	0.43	4	0.6
88	Tajikistan	0.19	11.58	1.64	7	0.9
89	Thailand	0.10	3,254.03	0.003	3	0.5
90	Mongolia	0.03	5.16	0.55	6	0.5
	55 other countries	0	522,000	na.	na.	0
	Total	8,134	596,780	1.36		1.1

Notes. Data from Swiss Export Risk Insurance for the 2006 to 2008 period. A (*) indicates that the risk classification is taken from the SERV homepage (March 2010).

Table 2 shows the breakdown of newly issued export risk guarantees across industries. Again, according to column 1, some of them account for a disproportionately large share with the chemical industry alone receiving almost 60 per cent of all guarantees issued. By and large, this involves short-term guarantees on the export of pharmaceutical products, pesticides, paints, and other chemical products where specialised Swiss producers sell on the

global market. The machinery industry, which can be divided into machinery and equipment accounting for 24 per cent, and electrical machinery accounting for around 10 per cent of all guarantees, was a second major beneficiary of the Swiss Export Risk Insurance. A specific focus of this has been in the area of electric power generation and transmission equipment for large dam construction undertakings, of which the Illusu project in Turkey serves today as a prominent example. Another long-established niche of Swiss companies has been in exports of textile machinery. To some degree, as shown by column 2, this distribution reflects the export structure of the Swiss economy. There are notable exceptions though, for example the precision and optical instruments industry, which encompasses watches and medical instruments, accounting for about 15 per cent of Swiss manufacturing exports but receiving less than 1 per cent of all guarantees. This can perhaps be explained by the fact that watches, for example, are shipped on a regular basis to well-known foreign wholesalers, which minimises payment frictions, and hence the demand for export insurance. Finally, the services sector has benefited from a mere 4 per cent of publicly supported export insurance (mainly in wholesale trade), though it accounts for around one fifth of Swiss exports. The agricultural sector did not receive any guarantees and barely contributed to Swiss exports.

Based on the differences between guarantees of recipient countries and industries, the remainder of the paper endeavours to estimate how far the activities of the Swiss Export Risk Insurance have expanded trade with politically unstable countries and how these interventions have changed the structure of exports across countries of destination and industries. To prepare the field, the next section discusses the econometric method.

Table 2: Export Risk Guarantees and Promotion across Industries

Industry	Export Risk Guarantees (CHF Mio.) (1)	Exports (CHF Mio.) (2)	Guarantees/ Exports (%) (3)	ΔY_s (%) (4)
[10] Mining of coal and lignite	0	0.65	0	0
[11] Extr. of crude petroleum/natural gas	0	0.22	0	0
[12] Mining of uranium and thorium ores	0	0	0	0
[13] Mining of meal ores	0	8.08	0	0
[14] Other mining and quarrying	0	196.8	0	0
[15] Food and beverages	2.29	16,953	0.01	0.2
[16] Tobacco products	0	1,785	0	0
[17] Textiles	0	6,490	0	0
[18] Wearing apparel	0	5,220	0	0
[19] Tanning and dressing of leather	0	2,380	0	0
[20] Wood/products of wood and cork	0	2,371	0	0
[21] Paper and paper products	3.54	7,786	0.05	0.3
[22] Printing/reproduction of rec. media	2.46	4,122	0.06	0.4
[23] Coke, refined petroleum products	0	2,561	0	0
[24] Chemicals and chemical products	4076	205,090	1.99	15.5
[25] Rubber and plastic products	0	13,765	0	0
[26] Other non metallic mineral prod.	0	4,047	0	0
[27] Basic metals	0	25,499	0	0
[28] Fabricated metal products	68.29	17,544	0.39	0.4
[29] Machinery and equipment	1302	90,713	1.43	5.9
[30] Office machinery	0	2,563	0	0
[31] Electrical machinery	1824	28,561	6.39	4.7
[32] Radio, television and comm. equip.	38.56	8,686	0.44	0.8
[33] Medical, precision and optical instr.	29.62	89,691	0.03	1.1
[34] Motor vehicles, trailers/semi trailers	0.33	7,660	0.004	0.2
[35] Other transport equipment	783.0	10,789	7.26	1.6
[36] Furniture	0	28,720	0	0
[37] Recycling	0	0	0	0
[40] Electricity, gas, steam, hot water	0	13,579	0	0
Total Manufacturing Sector	8,129	596,780	1.36	1.1
Total Services Sector	321	215,265	0.15	na.
Total Agriculture Sector	0	1,240	0	0
All Exports	8,450	813,285	1.04	na.

Notes. Data from Swiss Export Risk Insurance for the 2006 to 2008 period. Industries [41] Collection, purification/distribution of water and [45] Construction is not due to the lack of export data. Gaza/West Bank is not included (CHF 4.75 million over the years 2006, 2007, and 2008) due to the lack of export data. For the value of exports in the services sector, the data have been taken from the Swiss State Secretariat for Economic Affairs (SECO) rather than the COMTRADE database.

3 Data and Econometric Method

To uncover the effect of the Swiss Export Risk Insurance, we draw on BALTENSPERGER and HERGER (2009), who have introduced trade finance variables reflecting payment risks and policies of ECAs into gravity equations – the standard framework for the empirical analysis of international trade. Denoting the value of Swiss exports by industry s to country j during year t by $Y_{js,t}$ which is regressed onto the newly issued export risk guarantees $G_{js,t}$, a measure of payment risk $\lambda_{j,t}$, and a set of control variables $X_{j,t}$, the gravity equation is given by

$$Y_{js,t} = \beta_1 X_{j,t} + \beta_2 \lambda_{j,t} + \beta_3 G_{js,t} + d_s + d_t + u_{js,t}. \quad (1)$$

Here, β refers to coefficients to be estimated, d_s and d_t are specific effects pertaining to industries and years, respectively, and $u_{js,t}$ is the usual statistical error-term. Wherever possible, variables are converted into natural logarithms such that estimated coefficients represent elasticities.

To estimate (1), for each year between 2006 and 2008, data has been collected for the case of Switzerland. Table 4 of the appendix provides an overview of the definition and sources of the variables, and table 5 reports the corresponding summary statistics. The value of exports of industry *s* to country *j* during year *t* is taken from the COMTRADE database.[7] The definition of industries *s* follows the International Standard Industrial Classification (ISIC) system which disentangles, for the manufacturing sector, the activities listed in table 2. However, COMTRADE does not provide a corresponding breakdown of exports in agriculture and services. Owing to the modest volume of export risk guarantees issued in these sectors, this may not be a severe limitation. The resulting panel includes data from 145 foreign countries *j*, 29 industries *s*, and 3 years *t*.

Typically, gravity equations employ the following variables for $X_{j,t}$ to control for the economic and geographical determinants of international trade (see e.g. Baldwin and Taglioni 2006). Real GDP in foreign country *j* and year *t* proxies for economic size. The expectation would be that larger economies attract more trade. Trade costs, which are expected to reduce exports, encompass several dimensions including tariff and non-tariff barriers, which are measured here by the *inverse* of the Heritage Foundation's trade freedom index and denoted by $\tau_{j,t}$. Furthermore, to proxy for geographical trade barriers, we follow the common practice and add the bilateral distance between Bern and a foreign capital city and variables designating countries that are landlocked and share a common border with Switzerland to our set of control variables.

The commonly used variables in gravity equations are only informative about the heterogeneity of trade with respect to countries. Yet, the distribution of Swiss exports across industries, as summarised in table 2, reveals an obvious concentration in certain activities. This suggests that (1) should include variables explaining why Swiss companies have specialised in certain industries.[8] Dummy variables d_s for each industry can control for this as long as the history or comparative-advantage related determinants that

7 A value of 1 has been added to allow for logarithmic transformations with zero-valued observations.
8 Otherwise, the gravity equation would predict an even distribution of Swiss exports for all industries.

gave rise to the observed export structure are, by and large, time-constant. Since our sample includes only 3 years, this is likely to be the case. Likewise, global economic trends can affect the volume of exports during a given year. To account for this, for each year t, dummy variables d_t are introduced (compare BALDWIN and TAGLIONI 2006).

Of primary interest here is the impact of newly issued export risk guarantees $G_{js,t}$ upon exports of industry s towards foreign country j in year t. To the degree that public interventions rectify some of the above-mentioned market failures in trade finance, additional exports should be created and a positive coefficient would be expected for $G_{js,t}$ (MOSER, NESTMANN and WEDOW 2008; EGGER and URL, 2006). Recall that the financial frictions of international trade are closely related to payment and default risks abroad. Applying a scale from 0 to 7, the OECD publishes a regularly updated payment risk index $\lambda_{j,t}$. Across countries, column 4 of table 1 shows the values of this for the year 2008. If exporters could take out complete insurance against the losses from incomplete financial transactions at an actuarially fair premium, payment risks $\lambda_{j,t}$ would be irrelevant. However, even in financially developed countries, private and public insurance coverage is often incomplete and risking deferred or defaulted payments can introduce a significant impediment to trade (BALTENSPERGER and HERGER 2009; MOSER, NESTMANN and WEDOW 2008).

Two econometric issues arise when estimating (1). Firstly, Swiss manufacturing exports are highly concentrated in certain industries (chemical products 36%, machinery 20%, precision instruments 14%) and countries (Germany 20%, US 11%, France 9%, Italy 9%), whereas for many industries and countries no exports are observed at all. This manifests in a clustering of zero-valued observations that account for around one third of our sample and, hence, call for the usage of a Tobit model. Secondly, we have panel data where exports to the same groups of countries and industries js are observed across several years t. This tends to give rise to additional heterogeneity, which necessitates a split of the error term $u_{js,t}$ into a country-industry specific α_{js} effect and an idiosyncratic disturbance $\varepsilon_{js,t}$. As long as the explanatory variables contain all relevant determinants, α_{js} merely introduces additional randomness and (1) can be estimated as a random effects Tobit model, that is

$$Y_{js,t} = max\,(0, \beta_1 X_{j,t} + \beta_2 \lambda_{j,t} + \beta_3 G_{js,t} + d_s + d_t + \alpha_{js} + \varepsilon_{js,t}), \qquad (2)$$

where $\alpha_{js} \sim N(0,\sigma_\alpha^2)$ and $\varepsilon_{js,t} \sim N(0,\sigma_\varepsilon^2)$. However, when some export determinants are omitted, e.g. because they are not observable, α_{js} picks up specific effects of country-industry groups *js* and a different specification than (2) is warranted. Mundlak (1978) proposes adding the average value of all time-variant variables to (2) to reflect the non-random heterogeneity across groups. With this Mundlak-correction $\alpha_{js} = \gamma_1\bar{X}_j + \gamma_2\bar{\lambda}_j + \gamma_3\bar{G}_{js} + \psi + \upsilon_{js}$, where ψ is a constant and υ_{js} reflects the remaining additional randomness, the random effects Tobit model becomes

$$Y_{js,t} = max\,(0,\beta_1 X_{j,t} + \beta_2\lambda_{j,t} + \beta_3 G_{js,t} + d_s + d_t + \gamma_1\bar{X}_j + \gamma_2\bar{\lambda}_j + \gamma_3\bar{G}_{js} + \psi + \upsilon_{js} + \varepsilon_{js,t}, \quad (3)$$

According to Egger and Url (2006) and Moser, Nestmann and Wedow (2008), introducing each time-variant variable twice permits one to distinguish between the immediate effects of export risk guarantees, as reflected by the coefficient β_3 of $G_{js,t}$, and the corresponding gradual effect as reflected by the coefficient γ_3 of the averaged values $\bar{G}_{js}$. This may be relevant since export risk guarantees sometimes cover foreign orders taking more than one year to complete, which implies a considerable lag between the time a guarantee is issued and the time when the goods are shipped abroad.

Another approach to relax the assumptions of the random effects Tobit model (2) is to treat α_{js} as fixed effect. It is well known that the resulting fixed effects model is highly robust to omitting sources of unobserved heterogeneity.[9] However, this might come at the expense of statistical efficiency to detect a nexus between exports $Y_{js,t}$ and the trade finance variables $G_{js,t}$ and $\lambda_{j,t}$. The Hausman test provides the common framework for deciding whether to favour the robustness of the fixed effects or the efficiency of the random effects Tobit model (with and without Mundlak correction).

4. Results

Column 1 of table 3 presents the results of regressing, by means of the random effects Tobit model (2), the above-mentioned control variables of gravity equations onto the value of Swiss manufacturing exports. All coefficients enter with the expected sign and are highly significant. Column 2 adds the payment risks $\lambda_{j,t}$ and export risk guarantees issued $G_{js,t}$ to the set of explanatory variables. Their significant entry suggest that frictions and

9 See Baldwin and Taglioni (2006) for a corresponding discussion of this with gravity equations.

public interventions in trade finance can explain some of the observed differences in exports between countries and industries. In particular, Swiss firms appear to be reluctant to export to countries with excessive risks of default on international payments (compare BALTENSPERGER and HERGER 2009; MOSER, NESTMANN and WEDOW 2009). Furthermore, public interventions in trade finance appear to offset some of the financial frictions in the sense that countries and industries receiving more export risk guarantees witnessed an expansion of trade. Ostensibly, the interventions by the Swiss Export Risk Insurance do not support trade flows that would have been predicted anyway from the economic and geographic conditions in foreign countries – in which case the coefficient on $G_{js,t}$ would be insignificant – but appear to be associated with additional exports.

Columns 3 and 4 of table 3 present the results estimated with the Mundlak-corrected version of the random effects Tobit model (3). As regards trade finance variables, in column 4, significant entries arise with the time-averaged values $\bar{\lambda}_j$ and $\bar{G}_{js}$, but not with the actual values $\lambda_{j,t}$ and $G_{js,t}$. Further to the discussion of section 3, this suggests that the frictions and public interventions in trade finance affect exports in a gradual, rather than an instantaneous manner. This finding is perhaps not surprising since export risk guarantees often support the trade of large units of capital intensive goods, such as machinery, whose production, assembly, and installation can take months or even years. It is arguably such long-term projects, where payment frictions provide a severe obstacle to international trade.

Finally, columns 5 and 6 of table 3 present the results of the fixed effects Tobit model. Note that time-constant variables have to be dropped from this specification. With the introduction of dummy variables for each country and industry, the entries of trade finance variables become insignificant. Still, the estimated coefficients are relatively similar to those of the Mundlak-corrected random effects Tobit models. Indeed, for specifications with and without trade finance variables, the Hausman test lends support to the random effects specification. However, this result does not hold when one drops the Mundlak-correction in columns 1 and 2, where the Hausman test favours the fixed effects model.

Table 3: Gravity Equation Results

Tobit Panel Model	Random Effects				Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)
$GDP_{j,t}$	1.122***	0.743***	2.115***	2.112***	1.998***	2.041***
	(0.012)	(0.018)	(0.399)	(0.396)	(0.343)	(0.354)
Trade Barriers $\tau_{j,t}$	-0.523***	-0.294***	0.256	0.220	0.238**	0.241**
	(0.075)	(0.081)	(0.174)	(0.171)	(0.117)	(0.118)
$Distance_j$	-0.754***	-0.890***	-0.940***	-0.801***		
	(0.019)	(0.016)	(0.019)	(0.020)		
$Landlocked_j$	-0.981***	-1.201***	-1.450***	-1.244***		
	(0.041)	(0.043)	(0.041)	(0.042)		
$Border_j$	2.431***	1.083***	2.614***	1.764***		
	(0.095)	(0.094)	(0.090)	(0.094)		
$\overline{GDP}_j$			-1.138***	-1.556***		
			(0.400)	(0.397)		
$\bar{\tau}_j$			-1.556***	-1.428***		
			(0.204)	(0.207)		
Payment Risk $\lambda_{j,t}$		-0.992***		0.108		0.102
		(0.038)		(0.215)		(0.135)
Export Guarantees $G_{js,t}$		0.034**		-0.010		-0.011
		(0.015)		(0.024)		(0.011)
$\bar{\lambda}_j$				-1.502***		
				(0.218)		
$\bar{G}_{js}$				0.337***		
				(0.020)		
σ_α	0.961***	0.959***	0.969***	0.951***		
	(0.004)	(0.004)	(0.004)	(0.004)		
σ_ε	2.075***	2.033***	2.110***	1.992***		
	(0.012)	(0.013)	(0.013)	(0.013)		
N	12,064	12,064	12,064	12,064	12,064	12,064
Industry-Country Pairs	4,205	4,205	4,205	4,205	4,205	4,205
Log Likelihood	-17,064	-16,965	-17,054	-16,842	-9,833	-9,832
Hausman Test	75.57	80.83	0.425	0.173		

Notes. The dependent variable is the value of exports of industry s to country j in year t $Y_{js,t}$. Table 4 provides an overview of the definition of all variables. All regressions include industry and year dummy variables. Estimation is by maximum likelihood based on a Tobit panel model with fixed and random effects, where σ_α reports the additional heterogeneity introduced by industry-country groups js. The Hausman statistic tests for correlation between country-industry specific effects and regressors against a χ^2 distribution with degrees of freedom equal to the number of regressors k. Robust standard errors are reported in parentheses. Coefficients are significant at the 10% level when labelled with *, at the 5% level when labelled with **, and at the 1% level when labelled with ***.

We have estimated other specifications with additional variables such as the capital formation or the manufacturing import share in foreign countries or aggregated exports across all industries. This did not change the essence of the impact of our trade finance variable upon the export structure. For the sake of brevity, we therefore do not report these results here.

The panel data Tobit models provide robust evidence that export risk guarantees change the Swiss export structure in a statistically significant manner. The economic significance of this effect can be gauged from the fitted val-

ues of the regressions in table 3. In particular, the degree of export promotion manifests in difference between the fitted values of the full model $\tilde{Y}_{js,t}$ and a scenario where no export risk guarantees would have been issued, that is $G_{js,t}$, with associated predicted values denoted by $\tilde{Y}_{js,t}^{G=0}$.[10] Further to the diagnostic tests on the different versions of the Tobit models, we will use the coefficients of the Mundlak-corrected random effects specification of column 4 of table 3 to calculate these fitted values. This implies that the resulting export promotion reflects a gradual, rather than an immediate, effect. Against this background, the export promotion effect ΔY across all countries j, industries s, and years t is given by

$$\Delta Y = \sum_{j=1}^{J} \sum_{s=1}^{S} \sum_{t=1}^{T} \left[\frac{\tilde{Y}_{js,t}^{G=0} - \tilde{Y}_{js,t}}{\tilde{Y}_{js,t}^{G=0}} \right], \tag{4}$$

Calculating (4) for the current sample with manufacturing exports during the 2006 to 2008 period suggests that export risk guarantees have expanded the foreign demand for Swiss manufacturing firms by around 1 per cent. This result concurs with previous findings that publicly supported export insurance schemes promote trade to a significant but modest degree (Baltensperger and Herger 2009).

Some of the most relevant questions in state-guaranteed trade finance concern distributional effects, specifically how far exports are promoted with individual countries or in specific industries. Equation (4) can be modified to reflect the export promotion effect ΔY_j for each country j, which is

$$\Delta Y_j = \sum_{s=1}^{S} \sum_{t=1}^{T} \left[\frac{\tilde{Y}_{js,t}^{G=0} - \tilde{Y}_{js,t}}{\tilde{Y}_{js,t}^{G=0}} \right] \text{ for a given } j. \tag{5}$$

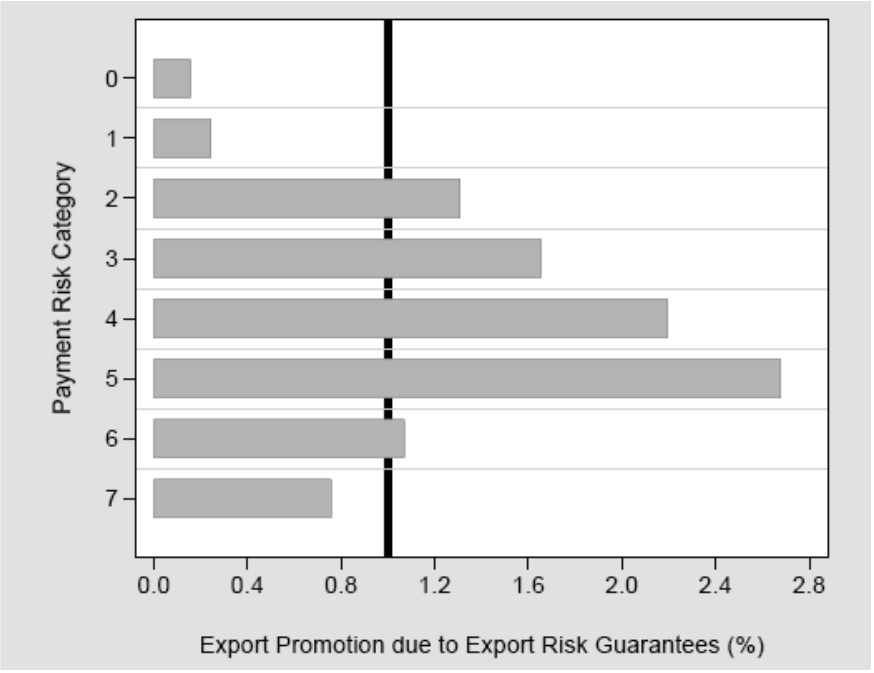
For each country receiving export risk guarantees during the 2006 to 2008 period, column 5 of table 1 shows the results of calculating (5) whereby the coefficients of the Mundlak-corrected random effects specification of column 4 of table 3 were again used for calibration. Though the average export promotion effect was only 1 per cent, there are considerable differences between countries. The biggest expansions of more than 6 per cent occurred with Russia and Iran, followed by Turkey, Indonesia, and Mexico which all saw an increase in trade due to Swiss export risk guarantees of more than 5 per cent. It is perhaps not surprising to find the biggest export promotion effects in large emerging markets since they offer substantial growth pro-

10 See Egger and Url (2006, pp.411ff.) for a similar approach.

spects, but they also have a recent history of economic and political instability. By contrast, the Swiss Export Risk Insurance appears to have a much more modest effect when it comes to the large number of small and less developed countries, which received support. Since payment risks of developed countries are deemed marketable, most of them do not appear as recipients of export risk guarantees in table 1 meaning that their export promotion effect ΔY_j is equal to zero.

The export promotion effect can also be evaluated for groups rather than individual countries. Since officially supported export insurance schemes are thought to foster trade involving relatively high payment risks, figure 2 illustrates the promotion effect across the payment risk categories of λ_j. Against the average promotion effect of 1 per cent, which is indicated by the black line, export risk guarantees appear to have expanded Swiss trade primarily with countries with medium rather than high payment risks. This result concurs with the observation that even ECAs are reluctant to adopt the risks on international transactions with notoriously unstable countries (Baltensperger and Herger, 2009). However, by far the smallest effects arise with countries falling into the lowest payment risk categories.

Figure 2: Export Promotion according to Payment Risk



Similar to (5), the export promotion effect can be evaluated for each industry, that is

$$\Delta Y_s = \sum_{j=1}^{J} \sum_{t=1}^{T} \left[\frac{\tilde{Y}_{jst}^{G=0} - \tilde{Y}_{jst}}{\tilde{Y}_{jst}^{G=0}} \right] \text{ for a given } s. \qquad (6)$$

Column 4 of table 2 reports the corresponding results. Unsurprisingly, the biggest promotion effect accrued to the chemical and machinery industries, which were also by far the largest recipients of newly issued export risk guarantees during the period under consideration. In particular, with more than 15 per cent, the promotion effect for chemical and pharmaceutical products appears to be large. Recall, however, from section 2 that guarantees for the chemical industry tend to be issued for the short-term whereas ΔY_s has been calculated with the time-averaged variables of the Mundlak-corrected random effects Tobit model. This may have resulted in an overestimation of the export promotion effect for the chemical industry. For machinery, where export risk guarantees are mainly issued for the long-term, the promotion effect was around 6 per cent (machinery and equipment) and 5 per cent (electric machinery).

5 Summary and Conclusion

Though international agreements have markedly lowered tariff barriers and eliminated many forms of export subsidies, public interventions continue e.g. in the area of trade finance. In particular, many countries have established Export Credit Agencies (ECAs), which issue guarantees on trade when commercial banks and insurance companies are reluctant to adopt the corresponding payment risks.

Taking the case of Switzerland, this paper has estimated the impact of such state-guaranteed trade finance on the volume as well as on the structure of exports across countries and industries. Between 2006 and 2008, the Swiss Export Risk Insurance covered payment risks of more than 8 billion Swiss Francs. According to the results of gravity equations, these export risk guarantees have led to an overall increase of exports in the manufacturing sector of around 1 per cent. This promotion effect is not evenly distributed. As regards countries, the main beneficiaries were large emerging markets such as Russia, Iran, Turkey, Mexico, or Indonesia. As regards sectors, export promotion occurred almost entirely within the manufacturing sector and mainly in the chemical and machinery industry. Finally, newly issued export risk

guarantees appear to reveal their impact only gradually. The reason for this might be that aggravated payment frictions, and therefore the scope for publicly supported trade finance, arise mainly with the export of large units of capital intensive goods of which the production, assembly, and delivery can take several months or even years.

Does the Swiss Export Risk Insurance contribute to economic welfare? The answer to this question depends on a political judgement between the benefits of export promotion and the payment risks assumed, ultimately, by the public. The aim of this paper was to inform this political debate by providing an estimate of the export promotion effect and assessing how state-guaranteed trade finance shapes the Swiss export structure as regards countries of destination and industries.

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Data Appendix

Table 4: Description of the Data Set

This table provides an overview of the data. Variables cover an (unbalanced) panel of 145 target countries (indexed with *j*), 29 industries (indexed with *s*), and the years between 2006 and 2008 (indexed with *t*).

Variable	Description
Exports $Y_{js,t}$	Value of Swiss exports of industry s, to country j in year t. The data were sourced from COMTRADE database and are classified according to ISIC Rev. 3 system. Only bilateral trade data up to sector 40 are reported. Original values are reported in US$. They have been converted into Swiss Francs according to exchange rates of the Monthly Statistical Bulletin of the Swiss National Bank (averages from monthly exchange rate data).
$GDP_{j,t}$	Real GDP of country j in year t. GDP data are from the World Development Indicators of the World Bank. The original data are measured in constant prices US$ (base year 2000). They have been converted into Swiss Francs according to exchange rates of the Monthly Statistical Bulletin of the Swiss National Bank (averages from monthly exchange rate data).
Trade Barriers $\tau_{j,t}$	Tariff and non-tariff barriers to trade as measured by the inverse of the Heritage Foundation's trade freedom index.
$Distance_{j,t}$	Distance between Bern and foreign capital cities in 1,000 km. Data from CIA World Factbook.
$Landlocked_j$	Nominal variable indicating whether or not a country is landlocked.
$Border_j$	Nominal variable for countries sharing a border with Switzerland.
Payment Risk $\lambda_{j,t}$	OECD Country Risk Classification with 0 indicating the lowest and 7 the highest payment risk.
Export Risk Guarantees $G_{js,t}$	Value of newly issued export risk guarantees. Data are from the Swiss Export Risk Insurance (new engagement). The original data are classified according to NOGA industry codes (ISIC Rev. 4) and have been re-classified according to ISIC Rev. 3. Whenever possible, UNCTAD conversion tables from http://unstats.un.org/unsd/class/default.asp were used. In cases where the mapping was not unique, the classifications were matched according to *NOGA 2008: Allg. Systematik der Wirtschaftszweige* of the Swiss Federal Statistic Office and the ISIC Rev. 3.1 respectively ISIC Rev. 3 tables provided by the United Nations Statistics Division (UNSTATS).

Table 5: Summary Statistics

	$Y_{js,t}$	$GDP_{j,t}$	$\tau_{j,t}$	$Distance_{j,t}$	$Landlocked_j$	$Border_j$	$\lambda_{j,t}$	$G_{js,t}$
Mean	4.86	7.98	4.25	1.35	0.22	0.03	1.44	0.17
Std.	4.21	1.58	0.20	0.89	0.42	0.17	0.75	1.23
Min	0	4.79	2.83	-0.88	0	0	0	0
Max	16.2	11.1	4.50	2.94	1	1	2.08	13.2
	Correlation Matrix							
$GDP_{j,t}$	0.42							
$\tau_{j,t}$	0.22	0.40						
$Distance_{j,t}$	-0.28	-0.37	-0.25					
$Landlocked_j$	-0.19	-0.35	0.003	-0.05				
$Border_j$	0.22	0.25	0.14	-0.34	0.01			
$\lambda_{j,t}$	-0.43	-0.83	-0.46	0.42	0.22	-0.33		
$G_{js,t}$	0.20	-0.01	-0.03	0.02	-0.03	0.02	0.04	

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