European Commission

ISSN 1725-3187 (online)
ISSN 1016-8060 (print)

EUROPEAN ECONOMY

Economic Papers 518 | June 2014

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Economic and Financial Affairs

European Commission

Directorate-General for Economic and Financial Affairs

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Abstract

Why is Greece such a surprisingly closed economy? We employ a gravity model of trade to explain the appallingly poor export performance of Greece and argue that weak institutional quality accounts for a large part of this shortfall. Using a rich dataset of bilateral value-added exports of goods and services of 39 exporters and 56 importers for 18 sectors, we first estimate that Greece exports ⅓ less than what regular international trade patterns would predict on basis of Greek GDP, the size of its trading partners and geographical distance. This ranks Greece at the 31st position out of 39 export countries in the competitiveness ranking we construct based on our regressions. The most affected sectors include electrical equipment and machinery while transport, tourism and agriculture perform relatively favourable. We then augment our model with various measures of institutional quality and find that weak institutions can explain much of the missing Greek exports puzzle. We estimate that structural reforms improving the Greek institutional framework to the EU/OECD average level would close between ½ and ¾ of the Greek export gap. These findings suggest that, while Greece has already achieved major improvements in cost competitiveness since the start of the Greek adjustment programme, structural reforms must also address non-cost competitiveness factors, such as the underlying institutional deficits, to unlock Greece's export growth potential.

JEL Classification: C23; E02; F14
Keywords: Panel Data Models; Institutions and the Macroeconomy; Empirical Studies of Trade

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The paper has benefited from useful comments and suggestions by Servaas Deroose, Matthias Mors, Jorge Duran Laguna, Gabriele Giudice, Mary McCarthy, Josefina Monteagudo, João Nogueira Martins, Alessandro Turrini and Alessandra Tucci as well as seminar participants at DG ECFIN. All potential errors are ours. The views presented in the paper are exclusively those of the authors and should not be attributed to the European Commission.

1. INTRODUCTION

Greece's export performance is dramatically lagging behind. This notorious export weakness predates the current crisis as Greece has long been the European Union (EU) member state with the lowest export share in GDP. And it has been exacerbated during the crisis, with Greek export performance deteriorating significantly and lagging behind the recovery in other programme countries.

At the same time, Greece's export potential could be enormous. Greece controls 16% of international shipping, making it the world's largest shipping nation (see BCG (2013), IOBE (2013)). It is located along one of the world's busiest international shipping lanes – the Suez Canal and the Mediterranean – and at the crossroad between three continents. This makes it a natural gateway for trade between Asia and Central Europe. As part of the EU, it is a member of the world's wealthiest free trade area. It is plentifully endowed with sun, beach and culture, making it a prime tourist destination.

In this paper, we analyse the Greek exports puzzle in the context of a gravity model of trade. We exploit a WTO-OECD dataset of bilateral exports of value added in goods and services with sectoral breakdown for EU and OECD countries. Compared to gross exports, this dataset ensures that our analysis focuses on export activity that creates value and jobs in Greece, as opposed to low value-added re-exporting activity. Our econometric approach builds on Andersen and Van Wincoop (2003) and Santos and Tenreyro (2006), using both Ordinary Least Squares (OLS) and Poisson pseudo-maximum likelihood (PPML) techniques with multilateral trade resistance terms to account for omitted variable bias. We augment the model with various indicators of institutional quality to estimate Greece's potential export gain from structural reforms that lead to institutional improvements. To avoid reverse causation, we employ an instrumental variable (IV) approach in our estimations.

Constructing a competitiveness ranking based on the country fixed effects of our baseline regressions, we find that actual Greek value added exports fall short by 33% of the estimated value predicted by our model on average between 1995 and 2009. With that performance, Greece ranks 31st among the 39 countries covered. We label this the puzzle of the missing Greek exports[1]. In terms of sectoral competitiveness performance, we find that the transport, tourism and agriculture sectors exceed our model predictions while machinery and electrical equipment lag far behind.

[1] The title is inspired by a classic paper by Trefler (1995) entitled "The Case of the Missing Trade and other Mysteries". That paper documented that actual trade patterns between countries with different factor endowments were much less pronounced than a simple version of the standard Heckscher-Ohlin Model of international trade would predict.

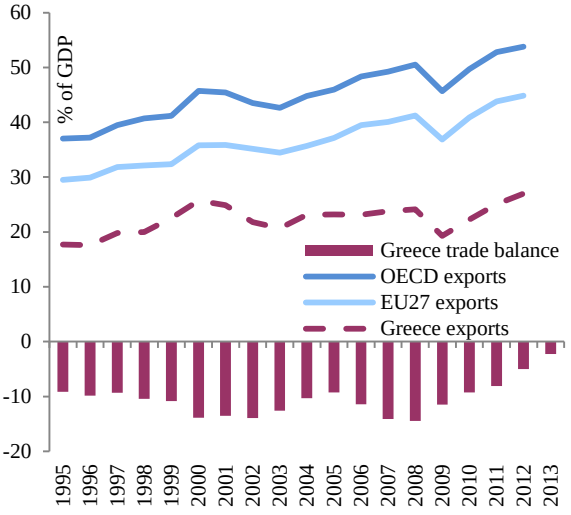
Augmented with institutional quality indicators, our gravity model shows that weak institutions can explain much of this weak Greek export performance. For Greece, we find that structural reforms that improve the institutional framework to the average level of our EU-OECD country sample have the potential to close the exports gap – the difference between actual export performance and gravity model prediction - by between 54% and 78%, depending on the choice of the institutional indicator.

The remainder of this paper is organised as follows. Section 2 presents some stylised facts of Greece's export performance in perspective. Section 3 puts our gravity model analysis in the context of the existing literature and the overall methodology. Section 4 describes our dataset and specifies our empirical approach. The results are presented in Section 5, showing that institutional quality explains large parts of the Greek exports gap. Section 6 offers a concluding discussion on the results and highlights some policy implications.

2. STYLISED FACTS: GREEK EXPORT PERFORMANCE IN PERSPECTIVE

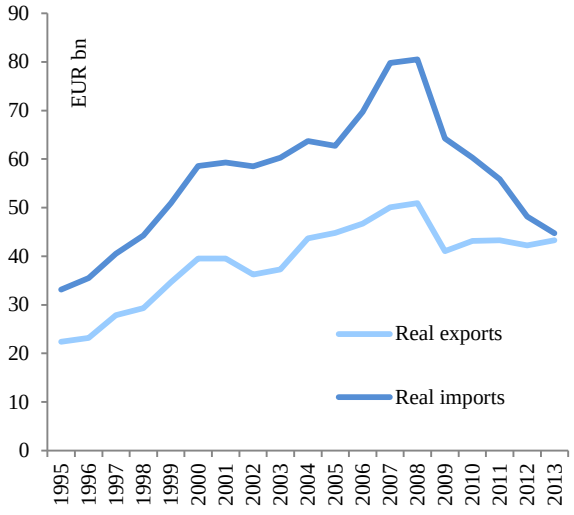
Greece has a historical record of protracted trade deficits and low openness. Graph 1 shows that Greece has been running a negative trade balance of around 10% of GDP between 1995 and the late 2000s, peaking at 14.5% in 2008. Since then, the gap has been closing. However, the increasing export-to-GDP ratio masks the effect of falling GDP. Correcting for this denominator effect reveals that the narrowing of the trade balance took place mainly on the back of falling imports while exports remained largely flat, as illustrated in Graph 2.

Graph 1: Exports of goods and services, Greece, EU and OECD, in % of GDP



Source: European Commission.

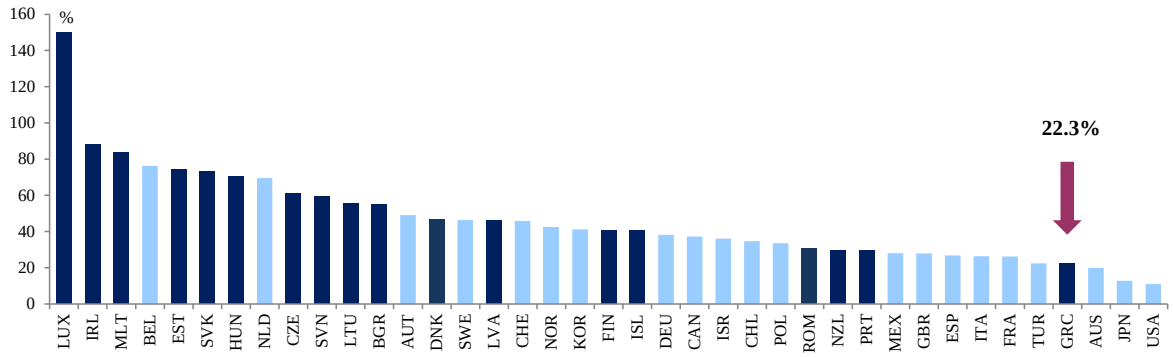
Graph 2: Exports in goods and services, Greece



Source: European Commission.

Greece has also been the most closed economy in the EU. As shown in Graph 1, the Greek export-to-GDP ratio has been falling short of both the EU and OECD average by a wide margin for more than a decade. In the OECD, only the United States, Japan and Australia are even more closed in terms of exports over GDP (Graph 3). Greece's lack of openness stands out even more when controlling for the size of the economy. Small economies are typically more open, which is reflected in Graph 3 showing below-median-sized economies shaded in dark. While most of the smaller economies among the EU/OECD countries are indeed characterised by larger export-to-GDP ratios, Greece is clearly identified as "small closed economy".

Graph 3: Average export-to-GDP ratio, 1995-2012, EU and OECD countries

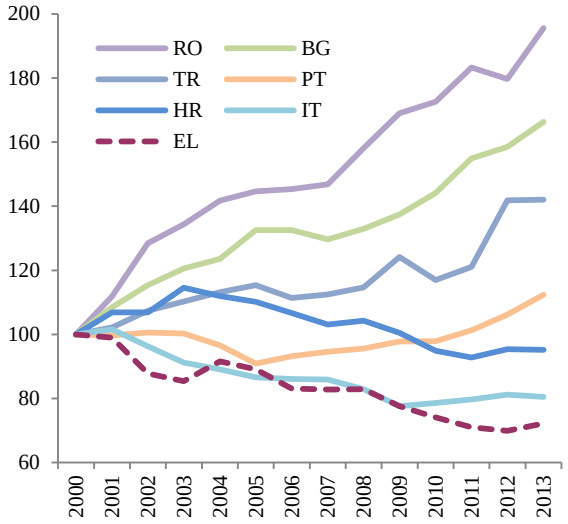


Note: Countries with average real GDP below median are shaded in dark. Sources: OECD, Eurostat.

In comparison to peers, Greece's export market performance has deteriorated continuously. Graph 4 shows the share of Greek exports of goods and services in relevant world markets approximated by the imports of 36 industrial markets weighted by Greek bilateral export weights. Greece's declining export performance was similar to that of Italy until 2009 and has deteriorated further until a modest pick-up in 2013. While the export performance of Croatia has also been on a downward trend since 2003, other peer economies show a more favourable picture. Portugal has managed to turn around its export performance in 2005, having regained the losses of the 2000s already, while the export performance of Bulgaria, Romania as well as Turkey has improved markedly since 2000.

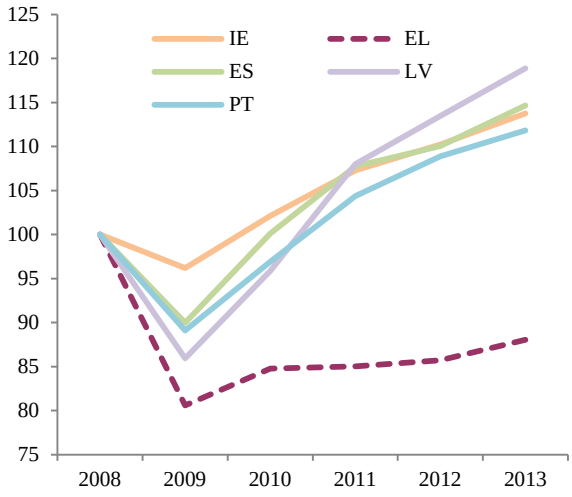
Zooming in on the more recent export developments of programme countries during the sovereign debt crisis, Graph 5 shows that Greece's exports were hit the hardest by the global economic crisis in 2008/2009. But, while other programme countries recorded strong export growth making up for the initial loss within three years or less, Greek exports have recovered only marginally since then. This occurred despite a reduction in nominal unit labour costs by -13.3% in the period 2009-2013 and reflects Greece's weak export base compared to other countries.

Graph 4: Market performance of exports on export-weighted imports (2000=100)



Source: European Commission.

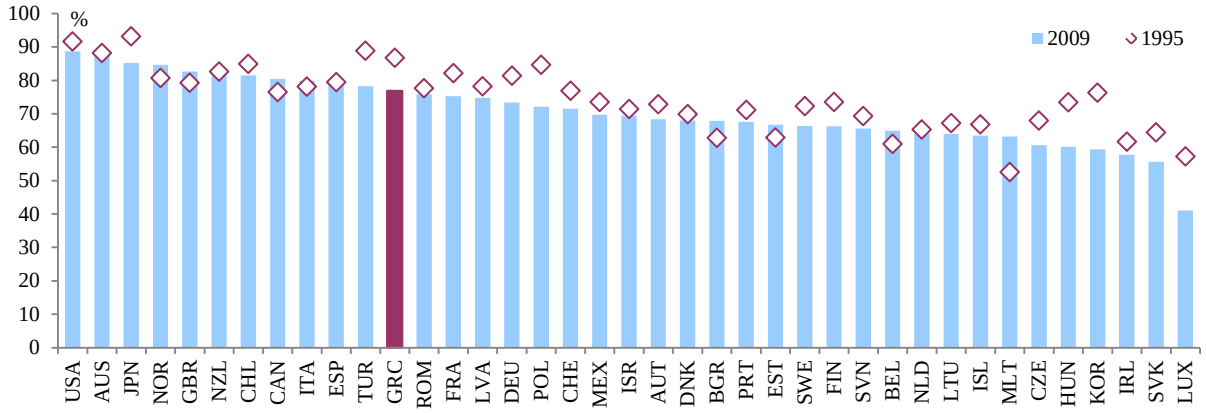
Graph 5: Real Exports, Greece and other programme countries, 2008-2013 (2008=100)



Source: European Commission.

As official export statistics are typically measured in gross terms, they tend to overstate the value of exported goods and services, masking the intensifying fragmentation of production and the increasing importance of global supply chains. To avoid double-counting, it is useful to examine export flows also in value added (VA) terms. Large foreign VA content in a country's exports may conceal the true impact of domestic production on growth and employment. At the same time, a very small foreign VA share may also be a sign of insufficient integration of a country's economy into growth-driving global supply chains (Rahman and Zhao (2013)).

Graph 6: Domestic value added content of gross exports, in % of total



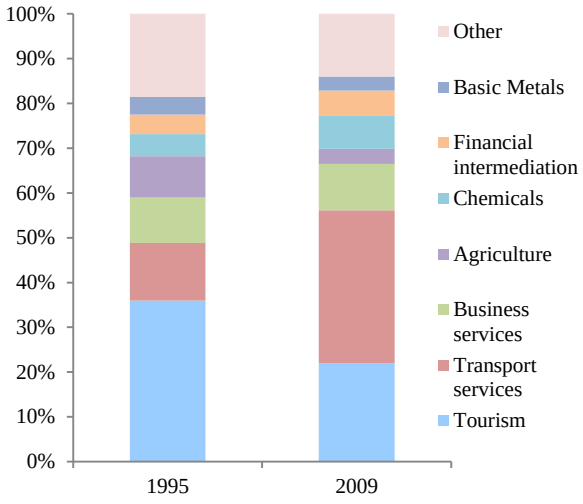
Source: OECD/WTO Trade in Value Added database.

With a domestic value added content of exports of 77% in 2009, Greece ranks above the average of the OECD countries (Graph 6) reflecting Greece's specialisation in services exports, in particular

transport and tourism-related services. The drop of around 10 percentage points since 1995 is in line with global trends and indicates an increasing integration into international value chains. In the following, we focus on the domestic VA content of Greek exports as our main objective is to assess Greece's export performance as a driver of economic growth and jobs in Greece.

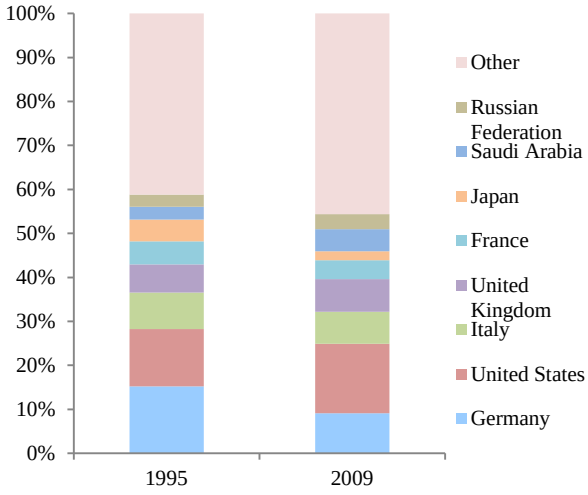
Graphs 7 and 8 present the sectoral and geographical breakdown of Greece's export VA in more detail. Comparing 2009 to 1995, the share of transport services has almost tripled while that of tourism-related services has decreased by about one third; however, taken together, both sectors still make up around half of Greek export value added.[2] Business services continue to make up around 10% while chemicals and financial intermediation have increased their shares; agriculture and basic metals have gone down somewhat. The top export VA destinations are Germany, the United States, Italy, the United Kingdom and France. Since 2000, export VA has been increasingly oriented towards extra-EU destinations, notably Saudi Arabia and the Russian Federation.

Graph 7: Export value added by sector, 1995 and 2009



Source: OECD/WTO Trade in Value Added database.

Graph 8: Export value added by geographical destination, 1995 and 2009



Source: OECD/WTO Trade in Value Added database.

[2] The dominance of transport services and tourism adds statistical uncertainty to the analysis of the Greek economy. Greece's transport services consist mainly of the shipping industry, the connection of which to the mainland economy is limited due to a large share of non-domestic workers and preferential tax treatment. As regards the tourism sector, statistics tend to be affected by underreporting in the presence of a sizable informal sector.

3. LITERATURE AND METHODOLOGY

This paper analyses Greek export performance through the lens of the trade gravity model. This empirical approach to estimating trade flows was pioneered by Tinbergen (1962). In effect, it posits that exports between originator and partner country are positively associated with the size of the two economies as measured by GDP while they depend negatively on various "trade resistance factors", geographical distance being the most prominent one. Theoretical foundations for this gravity model have been explored in the work of Anderson (1979), Helpman and Krugman (1985), Feenstra (2002), Anderson-Van Wincoop (2003) and Helpman, Melitz, Rubinstein (2008). Eaton and Kortum (2002) also develop and estimate a model that yields a regression specification similar to the standard gravity model.

The gravity model has since been used to assess the trade impact of national borders (MacCallum (1995)), currency unions (Rose (2000) and Tenreyro and Barro (2007)), WTO membership (Rose (2004)) and home market bias (Davis and Weinstein (2003)). Rahman and Zhao (2013) employ a gravity model to analyse the role of vertical supply links, using trade in VA. In terms of methodology, Anderson-Van Wincoop (2003) have highlighted that multilateral resistance terms (fixed effects for exporter and importer countries) are needed in the gravity specification to avoid omitted variable bias. Santos and Tenreyro (2006) argue that OLS regression of the log-linearised gravity model introduces bias.

In emphasising the role of institutional quality as a source of comparative advantage and trade openness, our paper joins an emerging body of literature. This strand of literature argues that trade between countries depends not just on differences in production technology (the Ricardian theory of trade formulated in its modern form in Jones (1961)), differences in factor endowments (the Heckscher-Ohlin-Samuelson theory of trade as in Samuelson (1948)) and scope for increasing returns to scale (Krugman (1979), Krugman (1980), Krugman (1981)). The competitiveness of a country cannot be summarised exhaustively by labour productivity and wage per employee, i.e. unit labour cost. Instead, competitiveness depends crucially on a more comprehensive notion of the cost of doing business – which in turn depends on the rule of law, property rights, the ability to enforce contracts, flexible labour market arrangements, the available transport infrastructure and many other factors besides the recorded cost of capital and labour. Customs formalities, administrative procedures, and regulatory transparency are directly linked to the trading process. All of these factors can impact trade performance through the cost channel.

In this spirit, Nunn (2007), Levchenko (2007) and Costinot (2009) have presented models and empirical evidence proposing institutional quality as a source of comparative advantage. Nunn (2007)

concentrates on one channel through which contract enforcement affects the pattern of trade, which is the under-investment in relationship-specific capital, and shows that contract enforcement explains more of the global pattern of trade than countries' endowments of capital and skilled labor combined. Countries that specialise in contract intensive industries may have a greater incentive to develop and maintain a good contracting environment. Levchenko (2007) supports that institutions matter because they facilitate transactions between self-interested economic parties and shows that institutional differences are in fact a significant determinant of trade flows, as countries with better institutions specialise in goods that are institutionally dependent. Costinot (2009) develops a model where complexity is the main source of institutional dependence across industries and better institutions and higher levels of education are complementary sources of comparative advantage. He shows that countries with better institutions and/or more human capital per worker will produce and export more in the more complex industries.

Empirical studies that have augmented the gravity trade model with institutional quality indicators include Anderson & Marcoullier (2002), de Groot, Linders, Rietveld and Subramanian (2004), Ranjan and Lee (2007) and Shepherd and Wilson (2008). Anderson and Marcouiller (2002) use the gravity model to demonstrate that bilateral trade is significantly affected by the trading countries' institutional quality, with better institutions leading to larger trade volumes. They contend that trade is reduced by hidden transactions costs associated with the insecurity of international exchange: contracts may not be enforceable across jurisdictional boundaries, bribes may be extorted by customs officials, and shipments may even be hijacked. De Groot et al (2004) find that institutional quality as well as similar quality of governance has a significant, positive and substantial impact on bilateral trade flows – increasing the overall quality of institutions one standard deviation above its mean level would raise bilateral exports by 44% and bilateral imports by 30%. They support that poor governance entails negative externalities for private transactions, and consequently raises transaction costs with negative effects on international trade. A low quality of governance increases the transaction costs that are incurred in exchange. Moreover, the quality of formal rules affects the informal norms and procedures of doing business that are devised to cope with transactional uncertainty. This creates the possibility that countries with similar levels of institutional quality may be familiar with each other's business practices, and thus transaction costs are reduced. Ranjan and Lee (2007) support that understanding the determinants of actual, rather than potential, trade requires institutional analysis. They show that measures of contract enforcement in importing and exporting countries affect bilateral trade in all types of goods, having a larger impact on the trade in differentiated goods compared with homogeneous goods. Shepherd and Wilson (2008) use a gravity model for ASEAN countries and find that trade flows in Southeast Asia are particularly sensitive to transport infrastructure and information communications.

Furthermore, Greece-specific empirical studies have contributed to the body of literature related to competitiveness. Athanasoglou and Bardaka (2008) develop a demand function for Greece's exports of manufactures and show – among others – that non-price competitiveness approximated with capital stock plays a vital role in explaining export performance in the long run as well as in the short run. Papazoglou (2007) also approaches Greece's potential exports through a gravity model and finds that potential sizes exceed actual ones and their differential considerably widens over time. He attributes this to the Greek economy's chronic structural weaknesses, which are the root cause of the low competitiveness of domestic products.

4. OUR EMPIRICAL APPROACH: DATA AND MODEL SPECIFICATION

To analyse the performance of the Greek exporting industry in an estimated gravity model, we employ the joint OECD/WTO Trade in Value Added (TiVA) dataset.[3] Using this dataset instead of exports from the national accounts allows us to study not only the overall bilateral export VA in goods and services but also to break down our analysis into 18 different industry sectors of the economy.[4] To ensure relative homogeneity in our dataset, we restrict the sample of 39 exporter countries which are either members of the EU or the OECD, excluding exporters with very different factor endowments, such as Saudi-Arabia (oil) and China (labour). For the bilateral export destination countries, we use a larger dataset of up to 56 countries with includes also emerging market economies.[5] The overall dataset covers the years 1995, 2000, 2005, 2008 and 2009, yielding up to 10,450 bilateral export observations. We take GDP data from the IMF World Economic Outlook dataset. We use the bilateral country-pair distance variable and additional trade resistance factors as provided by the CEPII gravity project.[6]

Towards explaining the puzzle of the missing Greek exports, we augment the basic gravity model with four different institutional quality indicators.

- Global Competitiveness Indicator (GCI) from the World Economic Forum. This indicator ranges from 1 to 7 and is available starting in 2006.
- World Bank Doing Business Distance to Frontier indicator (DB). This scores countries from 0-100 starting in 2006.

[3] OECD/WTO Trade in Value Added dataset can be found on http://www.oecd.org/industry/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm.

[4] The appendix shows that the main result of the paper, underperformance of Greek exports in the traditional trade gravity model, holds also if we analyse gross exports.

[5] The full list of countries can be found in the Appendix.

[6] CEPII gravity project can be found on http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=8.

- World Bank Worldwide Governance Indicators (WGI).[7] The score ranges from -2.5 to 2.5 and is available since 1996.
- OECD Sustainable Governance Indicator (SGI). This gives a score from 0-10 and is available only for 2009 and 2011.

Our baseline specification includes the standard components, explaining bilateral exports (X_{ijkt}) between exporter country *i* and partner country *j* for sector *k* at time t, by GDP of exporter and partner country (Y_{it} and Y_{jt}) as well as a vector of "trade resistance factors" (d_{ijt}), including geographical distance between the two countries and dummy variables for countries that share a common land border, that were in a colonial relationship, that share a common official language and that have a regional trade agreement in force. ε_{ijkt} is the error term. In line with the literature, a logarithmic functional relation is posited.

$$X_{ijkt} = \alpha_0 Y_{it}^{\alpha_1} Y_{jt}^{\alpha_2} d_{ijt}^{\alpha_3} \varepsilon_{ijkt} \qquad \text{(Equation 1)}$$

We then augment our model by adding measures of institutional quality in the exporter and partner country, (I_{it}) and (I_{jt}).

$$X_{ijkt} = \alpha_0 Y_{it}^{\alpha_1} Y_{jt}^{\alpha_2} d_{ijt}^{\alpha_3} I_{it}^{\alpha_4} I_{jt}^{\alpha_5} \varepsilon_{ijkt} \qquad \text{(Equation 2)}$$

We estimate the basic gravity model using Ordinary Least Squares (OLS) and add country fixed effects to the regression, yielding the classic gravity model specification proposed by Anderson-Van Wincoop (2003). This controls for unobserved country fixed effects that determine the exporting performance of the country besides its size, the size of trading partners and standard “trade resistance factors”. We interpret this country fixed effect as an estimate of a country’s export competitiveness. To address the concern of Santos and Tenreyro (2006) on bias in gravity model OLS regressions, we also estimate the Anderson-van Wincoop specification without log-linearisation, using the Poisson pseudo-maximum likelihood technique (PPML). Intuitively, Santos and Tenreyro (2006) report heteroscedasticity in the disturbance term which increases in the GDP-size of trading partners. Estimating the model in log-linearised form then introduces positive correlation between the GDP statistics and the unobserved disturbance term of the transformed model, leading to biased OLS estimates. The PPML approach they propose instead is robust to this issue.

The augmented gravity model includes indicators of institutional quality. To assess the causal impact of institutional improvements on the export performance, however, we need to deal with the problem

[7] Since no summary indicator for the Worldwide Governance Indicators is published, we use an equal-weighted average of sub-indicators in the main regressions in table 2.

of reverse causality. For example, strong economic growth and export performance could generate the fiscal resources necessary to sustain an improved institutional setting. In this case, we would see positive correlation between export performance and institutional quality which would have little to do with the economic gains generated by better institutions. We therefore resort to an instrumental variable (IV) approach as in, for example, Nunn (2007), to estimate the causal effect of institutions on exports. Intuitively, we determine the variation in today's institutional quality that can be attributed to legal origin (English, French, German etc). We then use only this part of the variation to analyse the trade impact of better institutions. This avoids reverse causality in so far that strong economic performance today cannot cause a change in the historical legal origin of a country – which was determined, in most cases, centuries ago. In other words, the instrument (legal origin) is correlated with the dependent variable (export VA) only through its influence on the regressor (the institutional quality indicator).

5. RESULTS

5.1. BASELINE SPECIFICATION: ESTIMATING THE GREEK COMPETITIVENESS GAP

Regression results for estimating the overall Greek competitiveness gap, the first step of our analysis, are presented in Table 1. At this stage, we restrict the dataset to aggregate export VA flows, excluding export VA by sector for the moment. Specification 1 estimates the basic gravity model using OLS regression. The results show significant coefficients with signs in line with expectations: larger GDPs and lower distances are associated with higher export VA. Specification 2 controls for other "trade resistance factors", namely shared border, shared colonial history, common official language and membership in the same regional trade agreement (RTA) as well as time fixed effects. Their coefficients are significant and positive, except for RTA which is negative but of small magnitude. The coefficients of our key gravity variables remain virtually unchanged. In specification 3, we employ country fixed effects as multilateral resistance terms to account for omitted variable bias. Results do not change fundamentally, except for the RTA coefficient which turns positive but with weaker significance. Specification 4 adopts the Anderson-van Wincoop approach using the Poisson pseudo-maximum likelihood technique (PPML) without log-linearisation. As explained in Section 4, this estimation approach is robust to heteroscedasticity in the trade gravity model and therefore represents our preferred specification. Overall results remain similar although key coefficients tend to be somewhat smaller and shared colonial history turns negative. The overall explanatory power of the gravity model in this dataset is high as measured by the R-squared. This replicates the finding of many

previous studies: in general, the gravity model offers a parsimonious and yet highly accurate prediction for the size of bilateral international export flows.[8]

Table 1: Basic gravity model for total export value added

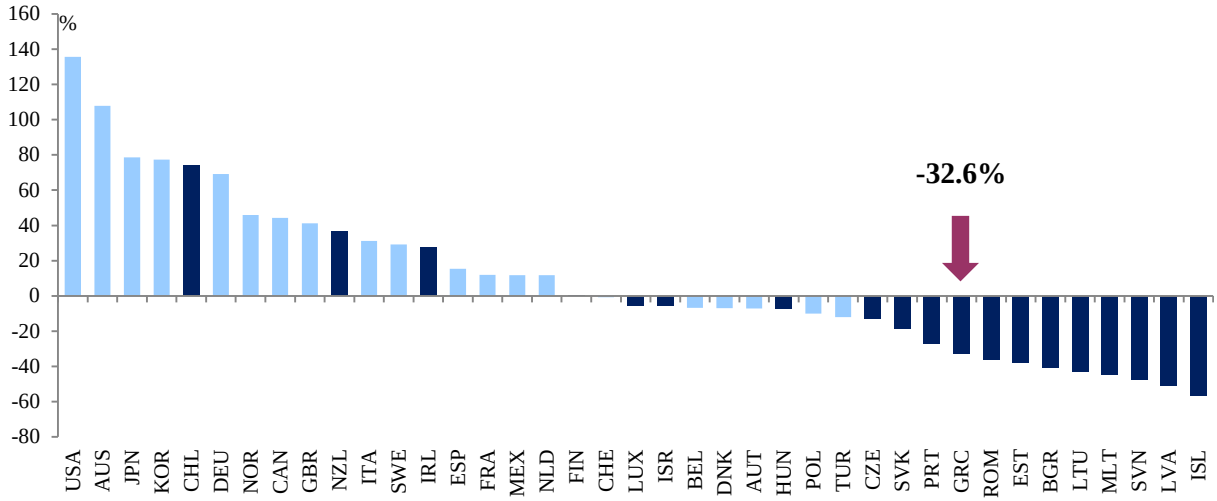
Dependent variable	Export value added (logs)			Export value added
	(01)	(02)	(03)	(04)
GDP of exporter (logs)	0.929***	0.946***	0.880***	0.684***
	(0.00382)	(0.00369)	(0.0304)	(0.0602)
GDP of partner (logs)	0.888***	0.906***	1.073***	0.831***
	(0.00403)	(0.00394)	(0.0283)	(0.0458)
Geographical distance (logs)	-0.621***	-0.611***	-0.817***	-0.675***
	(0.00686)	(0.00851)	(0.0128)	(0.0149)
Common border		0.523***	0.373***	0.318***
		(0.0414)	(0.0427)	(0.0286)
Shared colonial history		0.174***	0.251***	-0.116**
		(0.0418)	(0.0415)	(0.0360)
Common language		0.298***	0.138***	0.162***
		(0.0286)	(0.0288)	(0.0323)
Regional trade agreement		-0.0818***	0.0328*	0.0623*
		(0.0167)	(0.0147)	(0.0243)
Constant	0.985***	0.909***	2.354***	4.056***
	(0.0654)	(0.0829)	(0.351)	(0.626)
Estimation method	OLS	OLS	FE	PPML
Country dummy	No	No	Yes	Yes
Time dummy	No	Yes	Yes	Yes
Number of observations	10,448	10,448	10,448	10,450
R^2 / Pseudo-R^2	0.92	0.93	0.96	0.97

Notes: Country and time dummies suppressed. Heteroskedasticity-robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

[8] In addition to the specifications shown in Table 1, we have also considered the sensitivity of our results to augmenting the gravity model with a direct measure of cost competitiveness. While the real effective exchange rate (REER) is typically used to gauge cost competitiveness for a given country over time, its definition as an index number makes it unsuitable for cross-country comparisons in a panel dataset (see Salto and Turrini (2010)). For comparisons across countries, it is necessary to estimate the degree of misalignment, i.e. the percentage deviation of the REER from its equilibrium. We therefore augmented our model with the exchange rate misalignment statistic computed under the fundamental equilibrium exchange rate (FEER) approach of Salto and Turrini (2010). However, while this variable turned out significant and with the expected sign in the basic model, it loses its significance when added also to the augmented model which includes the institutional quality indicators explored in section 5.2 of this paper, due to multicollinearity. Neither did the inclusion of an interaction variable, consisting of the institutional quality indicator and the REER misalignment estimate, deliver significant results. A robustness check of the estimated competitiveness gap (Graph 10) building on the basic specification showed that it remains quite robust to including this cost competitiveness indicator. This leads us to believe that the bias from disregarding a direct measure of cost competitiveness is limited. We also explored an alternative measure of cost competitiveness: the bilateral differential in labour costs following the approach of Rahman and Zhao (2013). The estimated coefficients, however, again turned out as insignificant. As the main focus of our paper is to study the effects of non-cost competitiveness in the area of institutional quality, we refrain from using cost-competitiveness indicators in the remainder of this analysis.

As a next step, we construct a measure of competitiveness based on revealed export. We use specification 4 to plot the country fixed effect, in difference against the average country dummy in the dataset, for each country. The value of this statistic can be interpreted as the deviation of a country's exports from the average hypothetical country of equal trading size and equal geographical location. The results are presented in graph 9. We interpret the result as a competitiveness ranking based on revealed export performance relative to a standard gravity model rule. In other words, countries with positive values export more than our model would predict on the basis of standard determinants while negative values indicate a below-expectations export performance. Given that we control for country size, our competitiveness ranking does not automatically place small countries at the top, as it is usually the case in simple rankings based on trade openness as defined by the export to GDP ratio: the United States, Australia and Japan are at the top, while Iceland, Latvia and Slovenia are at the bottom of this competitive performance indicator. In analogy to Graph 3, economies with below-median real GDP are shaded in dark. For Greece, we find that exports are 32.6% lower than what one would predict based on the standard gravity model – we label this the puzzle of the missing Greek trade.

Graph 9: Competitiveness ranking of countries based on the Gravity Model
(PPML estimation method, averaged over the available years 1995, 2000, 2005, 2008, 2009)

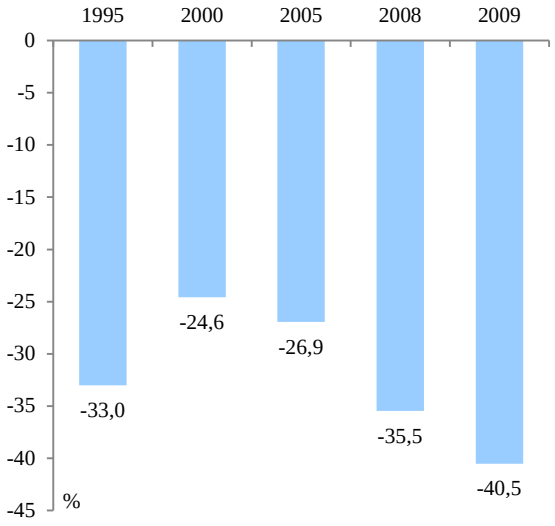


Notes: Countries with average real GDP below median are shaded in dark. Source: European Commission, OECD, own calculations.

We proceed by estimating how the Greek competitiveness gap has evolved over time, running specification 4 separately for each year in our dataset. As presented in Graph 10, the missing Greek exports puzzle has been a persistent phenomenon since at the least the mid-1990s. However, as expected, the competitiveness gap has exacerbated through the crisis, as Greece was hit by substantial policy uncertainty and the evaporation of trade credit. Strikingly, our estimated competitiveness gap is largest in 2009, when the domestic Greek banking system started experiencing large deposit outflows,

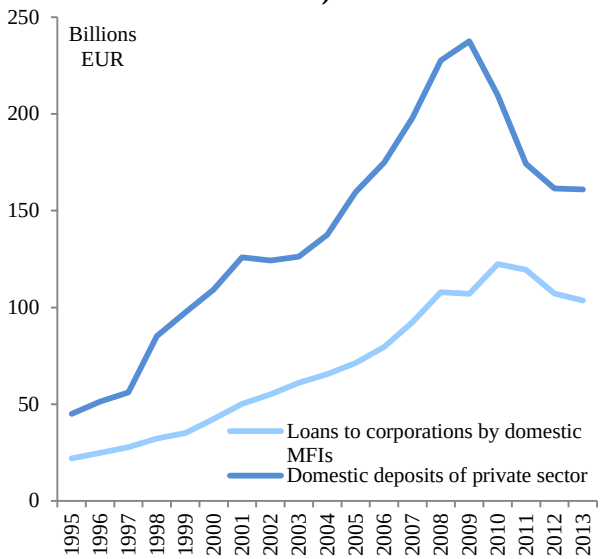
highlighting the role of liquidity and the availability of finance for performance of the Greek export sector (Graph 11).

Graph 10: Estimate of the Greek competitiveness gap by year (%)



Source: Own calculations.

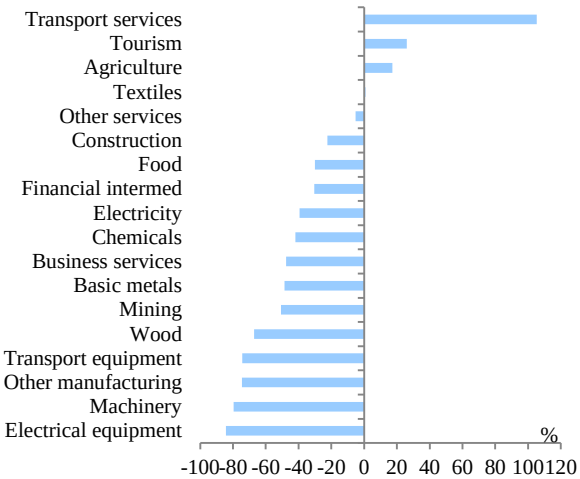
Graph 11: Loans and deposits in Greece (in billions EUR)



Source:Bank of Greece.

As the OECD/WTO TiVA dataset also contains exports by sector of the economy, we can identify the sectoral source of the Greek export underperformance. Graph 12 displays the Greek export dummy resulting from running specification 4 (PPML) separately for each major export sector in the economy. This suggests that the relatively most competitive Greek export sectors are transport services (which includes shipping), tourism (which includes hotels and restaurants) and agriculture. The competitive deficit of Greece is most acute in electrical equipment, machinery and other manufacturing.

Graph 12: Greek sector competitiveness based on the Gravity Model (PPML estimation method)



Source: Own calculations.

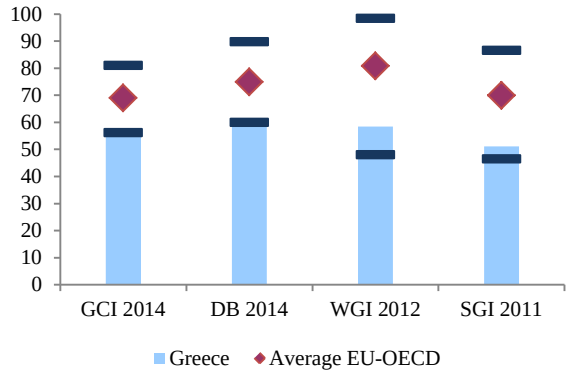
5.2. AUGMENTED SPECIFICATION: THE ROLE OF INSTITUTIONS

High and increasing labour costs during the boom of the 2000s are a common narrative to explain the Greek trade deficits accumulated before the crisis. Indeed, the Greek real effective exchange rate (in terms of unit labour costs) increased by 19.4% between 2000-2009 relative to 37 other industrialised countries. However, Graph 10 shows that the puzzle of the missing Greek exports goes back beyond the 2000s. Furthermore, despite a sharp improvement in cost competitiveness since the start of the Greek adjustment programme, Greek export performance has continued to lag behind so far.

This section therefore explores whether non-cost competitiveness factors, specifically the intrinsic Greek institutional deficit, can help explain the puzzle of the missing Greek exports. Intuitively, we expect that weak public institutions raise the effective cost of doing business, and in particular, the cost of engaging in export activities. This could explain why, after controlling for basic geographic and political properties, some countries are more closed than others even over long horizons. For example, public institutions are required to ensure effective and efficient access to network industries (such as rail and motorway, but also electricity and water). Rule of law is required for contract enforcement and the willingness of banks to provide trade credit. Sophisticated exports rely on access to the international value chain and the ability to import – requiring light customs procedures.

Graph 13 shows the position of Greece for each institutional quality indicator used in this study (latest year available) relative to the average EU-OECD country, as well the lowest and highest ranking in the dataset. For presentational reasons, all indicators were rescaled to 100. Greece's institutional quality is rated as extremely poor by all four indicators, clearly below the sample averages and partly at the very bottom of the distributions.

Graph 13: Institutional quality indicators for Greece and EU-OECD

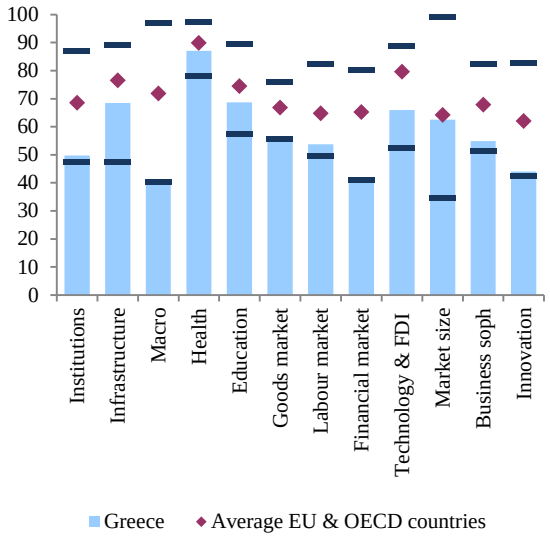


Note: Minimum and maximum values are shown as horizontal bars.
Sources: World Economic Forum, World Bank, OECD, own calculations.

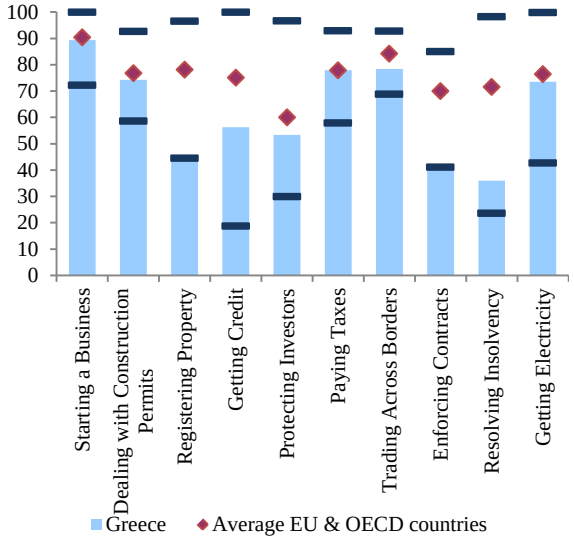
The sub-dimensions of each indicator shed more light on Greece's poor performance, as shown in Graph 14. The institutional deficit is reflected in many cases by Greek values at the bottom range of the distribution or in fact equal to the minimum observation.

Graph 14: Decomposition of institutional indicators

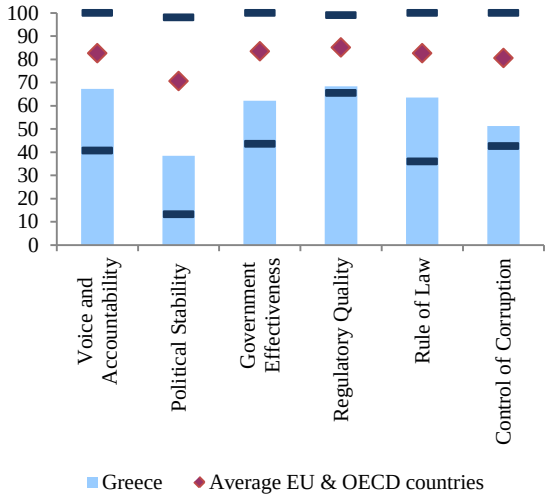
i. World Economic Forum; *Global Competitiveness Indicator subcomponents, 2013-2014*



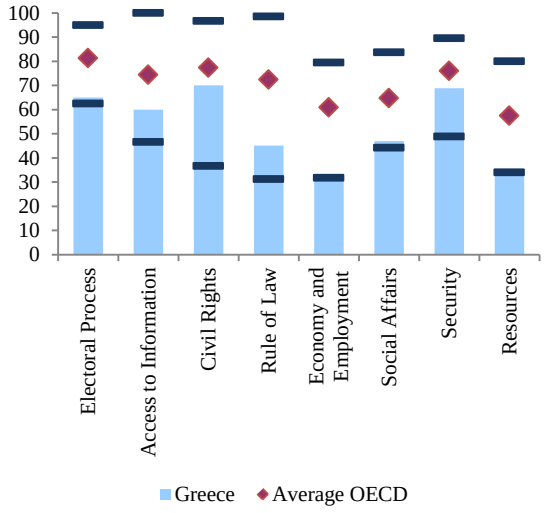
ii. World Bank Doing Business Report; *Distance to Frontier Indicator subcomponents, 2014*



iii. World Bank; *Worldwide Governance Indicator subcomponents, 2012*



iv. OECD: *Sustainable Governance Indicator subcomponents, 2011*



Note: Minimum and maximum values are shown as horizontal bars.
Sources: World Economic Forum, World Bank, OECD, own calculations.

This is most obvious for "institutions", "goods market" and "innovation" (GCI), "registering property" and "enforcing contracts" (DB), "regulatory quality" (WGI) as well as "resources" (SGI). Some low

values, however, can be rather attributed to the consequences of the economic crisis, such as "macro" and "financial market" (GCI) or "economy and employment" and "social affairs"(SGI). On the side of better-performing dimensions, "health" (GCI) reflects the relatively well-developed, although rather unequal, Greek healthcare system. The favourable "market size" (GCI) score is due to membership in the EU single market. Some DB indicators reflect recent progress on several fronts, e.g. in "starting a business" and "paying taxes" where Greece has already caught up to EU/OECD average. Overall, however, the underperformance of Greece's institutional set-up is obvious and still offers plenty of room for improvement.

Table 2: Augmented gravity model for total export value added, IV PPML estimation method

Dependent variable:	Export value added			
	GCI (WEF)	DB (WB)	WGI (WB)	SGI (OECD)
GDP of exporter (logs)	0.787***	0.819***	0.843***	0.869***
	(0.0135)	(0.0105)	(0.00869)	(0.0212)
GDP of partner (logs)	0.849***	0.854***	0.860***	0.905***
	(0.0140)	(0.0129)	(0.0115)	(0.0217)
Geographical distance (logs)	-0.509***	-0.516***	-0.529***	-0.579***
	(0.0220)	(0.0196)	(0.0183)	(0.0371)
Common border	0.207**	0.325***	0.190***	0.130
	(0.0732)	(0.0637)	(0.0565)	(0.116)
Shared colonial history	-0.0741	-0.156**	-0.0848*	-0.149
	(0.0554)	(0.0523)	(0.0431)	(0.0815)
Common langauge	0.374***	0.296***	0.403***	0.407***
	(0.0632)	(0.0555)	(0.0499)	(0.100)
Regional trade agreement	0.0590	-0.0189	0.00739	-0.0307
	(0.0607)	(0.0482)	(0.0506)	(0.0833)
Institutional quality of exporter	0.355***	0.0169***	0.325***	0.139***
	(0.0498)	(0.00243)	(0.0352)	(0.0367)
Institutional quality of partner	0.0310	0.00772***	-0.0186	0.0554
	(0.0412)	(0.00190)	(0.0209)	(0.0291)
Constant	-0.818*	-0.857**	0.900***	-0.719
	(0.400)	(0.315)	(0.211)	(0.555)
Exporter countries	OECD-EU	OECD-EU	OECD-EU	OECD (30)
Partner countries	All (56)	All (56)	All (56)	OECD (30)
Years	08, 09	08, 09	00, 05, 08, 09	09
Number of observations	4,180	3,885	8,360	812
R^2	0.88	0.91	0.88	0.90

Notes: Time dummies and instruments suppressed. Heteroskedasticity-robust standard errors. in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

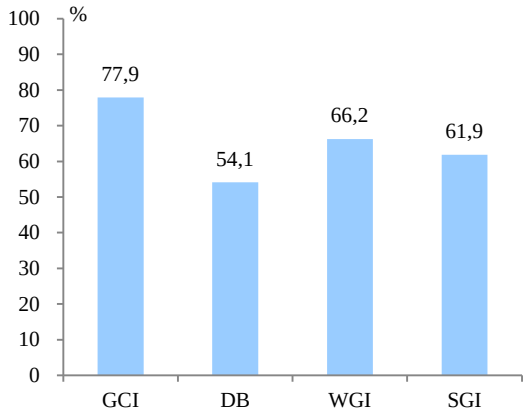
Table 2 presents the results of the augmented gravity model with measures of institutional quality in exporter and partner country using our preferred methodology, i.e. instrumental variable Poisson pseudo-maximum likelihood (IV PPML). The regression period under consideration is determined by availability of trade data in the OECD/WTO TiVA database and the relevant institutional indicator.

The regressions establish the second key result of our paper: institutional quality of the exporter is shown to be a highly significant factor in determining a country's export performance. The institutional quality of the partner country, however, shows only partially significant results, as presumably fewer elements of institutional quality would be relevant regarding the destination country than the origin country of an exporter. Relevant aspects in the partner country likely include contract enforcement and investor protection.

To determine the quantitative role of institutions in explaining the Greek competitiveness puzzle, we need however two additional pieces of information. First, we take account of the scale of the relevant institutional quality variables. For example, given same economic significance, the coefficient on the regression including the GCI indicator will be larger than the one involving the DB indicator, since the former ranges from 0-7 while the latter ranges from 0-100. Second, we need to take into account the scope for improvement for Greek institutions.

To tackle both of these problems, we plot in Graph 15 the implied closing of the Greek competitiveness gap by bringing the institutional quality of Greece to the EU-OECD average for each of the indicators considered. Based on specifications of Table 2, export VA would grow between 26% and 38% - hence closing between 54% and 78% of the Greek competitiveness gap identified in section 5.1.

Graph 15: Potential closing of the Greek competitiveness gap, as a consequence of the improvement of institutional indicators to the EU-OECD average



Source: Own calculations.

Institutional quality includes a large variety of aspects. For policy makers, it is therefore crucial to pin-point those institutional dimensions most relevant for economic growth and export performance. Unfortunately, various dimensions of institutional quality are highly correlated making this identification exercise imprecise. Nonetheless, we also run the regressions for each sub-dimension of the four institutional indicators separately. The results are shown in Annex Tables B2-B5. On the exporter side, "goods markets" and "business sophistication" (GCI) as well as "enforcing contracts" and "trading across borders" (DB) stand out with relatively large significant coefficients. Also "political stability" and "regulatory quality" (WGI) appear to come with a relatively strong impact on exports. Other sub-dimensions with significant influence are related to cyclical developments, such as "macro" (GCI) and "economy and employment" (SGI).

On the side of the partner country, institutional quality plays a lesser role than in the exporter country, although significant positive coefficients can be observed for "market size" (GCI), "protecting investors" (DB) and "regulatory quality" (WGI).

Finally, we exploit also the sectoral dimension of our dataset by estimating the impact of the four institutional indicators on each export sector individually. Results are presented in Annex Table B6 and reveal that institutional improvements appear particularly relevant for the service sectors (business services, financial intermediation, transport services and other service) which all display positive, significant coefficients across institutional indicators. On the goods side, electrical equipment, machinery and wood stand out with consistently positive, significant coefficients. We also observe negative coefficients, mainly in the areas of construction and textiles. For construction, we suspect that institutional improvements benefit first and foremost the domestic construction activity which may be crowding out the exports in this sector. For textiles, being a relatively low-tech sector, a potential crowding out effect could be at work in favour of higher-tech exports.

6. CONCLUDING DISCUSSION

This paper shows that Greece exports significantly less than what a standard gravity model would predict. According to our preferred specification, the gap in Greek export VA amounts to 33% compared to what regular international trade patterns would predict on basis of Greek GDP, the size of its trading partners and geographical distance. This ranks Greece at the 31st position out of 39 export countries in the competitiveness ranking we construct based on our regressions. We label this the puzzle of the missing Greek exports. This competitiveness gap has in fact persisted since the mid-1990s although it has further deteriorated since the onset of the Greek crisis. The most affected sectors

include electrical equipment and machinery while transport, tourism and agriculture perform relatively favourable.

Furthermore, we analyse in how far the Greek institutional deficit can explain the Greek competitiveness gap. Our regression results suggest that an improvement in the quality of Greek institutions up to the EU/OECD average would close the Greek competitiveness gap by between 54% and 78%, explaining large parts of the puzzle of the missing Greek exports.

These results suggest a range of issues for further research. First, our competitiveness gap measure identifies the sectors in which Greece enjoys a comparative advantage (international shipping, tourism and agriculture) and the sectors in which Greece is lagging behind (manufacturing). This opens questions for the design of a growth strategy. Should Greece focus efforts on nurturing and expanding its current competitive advantage, or should it focus efforts on laggards, thereby diversifying its economy and possibly benefiting from quick reform gains and "low hanging fruits"?

Second, for policy action, it would be useful to identify more in depth exactly which specific institutions are essential for export growth. Empirically, this will require tackling the strong correlation between different sub-indicators of institutional quality we found in the data, which made pin-pointing the role of any specific institutional dimension in export growth difficult.

Finally, a key question is how quickly Greece can tackle its institutional deficits and how quickly reforms will translate to change on the ground. In the short run, cyclical factors such as heightened economic uncertainty as well as tight trade credit during the Greek sovereign debt crisis have hurt Greek exports. These temporary factors may have the effect of delaying the revival of the Greek export industry in the context of the current major institutional reform effort under the Economic Adjustment Programme for Greece, suggesting that once the economic cycle reverses, a stronger rebound of exports may become visible, more clearly reflecting the reforms undertaken.

Significant progress has already been made in implementing structural reforms. According to the World Bank Doing Business report for example, between 2010 and 2013, Greece reduced the steps necessary to start a business from 15 to 5. While it took 20 days to get clearance for export activities in 2010, the Doing Business report 2013 reports that clearance can now be obtained in 16 days. In this period, the number of days to gain a construction permit fell from 170 to 105. Further reforms have been undertaken in 2014 which will increase Greece's ranking in cross-country structural reform assessments further. These encouraging steps need to be followed up with resolute further policy action. The results of this paper suggest that structural reforms can yield significant long-term rewards in terms of opening up worldwide markets for Greek exporters.

APPENDIX A

Table A1: List of countries used in the analysis

Countries (exporters/partners)	Code	OECD	EU
Australia	AUS	✓	☐
Austria	AUT	✓	✓
Belgium	BEL	✓	✓
Bulgaria	BGR	☐	✓
Canada	CAN	✓	☐
Chile	CHL	✓	☐
Czech Republic	CZE	✓	✓
Denmark	DNK	✓	✓
Estonia	EST	✓	✓
Finland	FIN	✓	✓
France	FRA	✓	✓
Germany	DEU	✓	✓
Greece	GRC	✓	✓
Hungary	HUN	✓	✓
Iceland	ISL	✓	☐
Ireland	IRL	✓	✓
Israel	ISR	✓	☐
Italy	ITA	✓	✓
Japan	JPN	✓	☐
Korea	KOR	✓	☐
Latvia	LVA	☐	✓
Lithuania	LTU	☐	✓
Luxembourg	LUX	✓	✓
Malta	MLT	☐	✓
Mexico	MEX	✓	☐
Netherlands	NLD	✓	✓
New Zealand	NZL	✓	☐
Norway	NOR	✓	☐
Poland	POL	✓	✓
Portugal	PRT	✓	✓
Romania	ROM	☐	✓
Slovakia	SVK	✓	✓
Slovenia	SVN	✓	✓
Spain	ESP	✓	✓
Sweden	SWE	✓	✓
Switzerland	CHE	✓	☐
Turkey	TUR	✓	☐
United Kingdom	GBR	✓	✓
United States	USA	✓	☐

Additional non-OECD/EU partners	Code	OECD	EU
Argentina	ARG		
Brazil	BRA		
Brunei Darussalam	BRN		
China	CHN		
Cyprus*	CYP	✓	✓
Cambodia	KHM		
Chinese Taipei	TWN		
India	IND		
Malaysia	MYS		
Russian Federation	RUS		
Saudi Arabia	SAU		
Singapore	SGP		
South Africa	ZAF		
Thailand	THA		
Viet Nam	VNM		

* Cyprus in not included in the exporter countries due to lack of data.

Table A2. Basic Gravity Model for gross exports

Dependent variable:	Gross exports (logs)			Gross exports
	(01)	(02)	(03)	(04)
GDP of exporter (logs)	1.006***	1.003***	0.807***	0.476***
	(0.00220)	(0.00222)	(0.0220)	(0.0218)
GDP of partner (logs)	0.893***	0.890***	0.913***	0.752***
	(0.00228)	(0.00235)	(0.0185)	(0.0223)
Geographical distance (logs)	-1.057***	-1.050***	-1.385***	-0.944***
	(0.00346)	(0.00461)	(0.00633)	(0.00556)
Common border		0.419***	0.262***	0.408***
		(0.0181)	(0.0190)	(0.0109)
Shared colonial history		0.257***	0.557***	-0.252***
		(0.0199)	(0.0208)	(0.0152)
Common language		0.748***	0.141***	0.149***
		(0.0155)	(0.0152)	(0.0118)
Regional trade agreement		-0.0746***	0.0504***	0.0792***
		(0.00910)	(0.00801)	(0.00782)
Constant	4.240***	4.215***	8.724***	8.486***
	(0.0284)	(0.0411)	(0.239)	(0.219)
Estimation method	OLS	OLS	FE	PPML
Country dummy	No	No	Yes	Yes
Time dummy	No	Yes	Yes	Yes
Number of observations	118,028	118,028	118,028	118,959
R^2 / Pseudo-R^2	0.81	0.82	0.88	0.95

Notes: Country and time dummies suppressed. Heteroskedasticity robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table A2 replicates the basic gravity model regressions using gross exports as dependent variable instead of the valued added of exports.

Table A3: Gravity Model for total exports by year (PPML estimation method)

Dependent variable:	Export value added				
	1995	2000	2005	2008	2009
GDP of exporter (logs)	0.972***	0.959***	0.960***	0.999***	0.953***
	(0.0952)	(0.096)	(0.104)	(0.101)	(0.0929)
GDP of partner (logs)	0.606***	0.486***	0.288	0.166	-0.0133
	(0.101)	(0.118)	(0.209)	(0.199)	(0.225)
Geographical distance (logs)	-0.709***	-0.619***	-0.697***	-0.658***	-0.657***
	(0.0644)	(0.0636)	(0.0615)	(0.0533)	(0.0546)
Common border	0.348**	0.353**	0.318*	0.303*	0.306*
	(0.134)	(0.133)	(0.125)	(0.119)	(0.121)
Shared colonial history	-0.213	-0.0647	-0.146	-0.0819	-0.06
	(0.158)	(0.159)	(0.149)	(0.131)	(0.139)
Common language	0.181	0.082	0.156	0.183	0.156
	(0.13)	(0.142)	(0.135)	(0.125)	(0.129)
Regional trade agreement	-0.0496	0.26	0.0372	0.132	0.109
	(0.142)	(0.138)	(0.127)	(0.141)	(0.12)
Constant	0.853	0.739	2.057	2.251	3.537*
	(0.969)	(1.057)	(1.349)	(1.393)	(1.424)
Country dummy	Yes	Yes	Yes	Yes	Yes
Time dummy	Yes	Yes	Yes	Yes	Yes
Number of observations	39,710	39,710	39,710	39,710	39,710
R2 / Pseudo-R2	0.63	0.64	0.61	0.58	0.58
Greek exports underperformance	**-33.0%**	**-24.6%**	**-26.9%**	**-35.5%**	**-40.5%**

Notes: Country and time dummies suppressed. Heteroskedasticity robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table A3 shows the regression results for estimating the overall Greek competitiveness gap by year, using the PPML estimation method.

Table A4: Compare ranking of countries based on exports-to-GDP ratio against the gravity model competitiveness ranking

Ranking of countries based on…					
...exports-to-GDP ratio				**…gravity model**	
1	Luxembourg	LUX	1	United States	USA
2	Ireland	IRL	2	Australia	AUS
3	Malta	MLT	3	Japan	JPN
4	Belgium	BEL	4	Korea	KOR
5	Estonia	EST	5	Chile	CHL
6	Slovakia	SVK	6	Germany	DEU
7	Hungary	HUN	7	Norway	NOR
8	Netherlands	NLD	8	Canada	CAN
9	Czech Republic	CZE	9	United Kingdom	GBR
10	Slovenia	SVN	10	New Zealand	NZL
11	Lithuania	LTU	11	Italy	ITA
12	Bulgaria	BGR	12	Sweden	SWE
13	Austria	AUT	13	Ireland	IRL
14	Denmark	DNK	14	Spain	ESP
15	Sweden	SWE	15	France	FRA
16	Latvia	LVA	16	Mexico	MEX
17	Switzerland	CHE	17	Netherlands	NLD
18	Norway	NOR	18	Finland	FIN
19	Korea	KOR	19	Switzerland	CHE
20	Finland	FIN	20	Luxembourg	LUX
21	Iceland	ISL	21	Israel	ISR
22	Germany	DEU	22	Belgium	BEL
23	Canada	CAN	23	Denmark	DNK
24	Israel	ISR	24	Austria	AUT
25	Chile	CHL	25	Hungary	HUN
26	Poland	POL	26	Poland	POL
27	Romania	ROM	27	Turkey	TUR
28	New Zealand	NZL	28	Czech Republic	CZE
29	Portugal	PRT	29	Slovakia	SVK
30	Mexico	MEX	30	Portugal	PRT
31	United Kingdom	GBR	31	Greece	GRC
32	Spain	ESP	32	Romania	ROM
33	Italy	ITA	33	Estonia	EST
34	France	FRA	34	Bulgaria	BGR
35	Turkey	TUR	35	Lithuania	LTU
36	Greece	GRC	36	Malta	MLT
37	Australia	AUS	37	Slovenia	SVN
38	Japan	JPN	38	Latvia	LVA
39	United States	USA	39	Iceland	ISL

APPENDIX B

Table B1: Augmented Gravity Model for total exports using GCI

Dependent variable:	Export value added (logs)			Export value added	
	(05)	(06)	(07)	(08)	(09)
GDP of exporter (logs)	0.873***	0.865***	0.870***	0.811***	0.787***
	(0.00732)	(0.00720)	(0.00749)	(0.0113)	(0.0135)
GDP of partner (logs)	0.910***	0.900***	0.889***	0.862***	0.849***
	(0.00658)	(0.00669)	(0.00705)	(0.0142)	(0.0140)
Geographical distance (logs)	-0.638***	-0.611***	-0.608***	-0.466***	-0.509***
	(0.0106)	(0.0131)	(0.0132)	(0.0214)	(0.0220)
Common border		0.540***	0.549***	0.381***	0.207**
		(0.0702)	(0.0702)	(0.0736)	(0.0732)
Shared colonial history		0.139*	0.143*	-0.0726	-0.0741
		(0.0598)	(0.0598)	(0.0543)	(0.0554)
Common language		0.236***	0.224***	0.287***	0.374***
		(0.0459)	(0.0461)	(0.0582)	(0.0632)
Regional trade agreement		-0.0532*	-0.0612*	0.0652	0.0590
		(0.0251)	(0.0252)	(0.0508)	(0.0607)
GCI of exporter	0.399***	0.388***	0.352***	0.169***	0.355***
	(0.0216)	(0.0215)	(0.0271)	(0.0437)	(0.0498)
GCI of partner	0.0647**	0.0655***	0.149***	0.0145	0.0310
	(0.0197)	(0.0193)	(0.0257)	(0.0322)	(0.0412)
Constant	-1.136***	-1.235***	-1.439***	-0.376	-0.818*
	(0.172)	(0.187)	(0.213)	(0.313)	(0.400)
Estimation method	OLS	OLS	IV	PPML	IV PPML
Time dummy	No	Yes	Yes	Yes	Yes
Number of observations	4,180	4,180	4,180	4,180	4,180
R^2 / Pseudo-R^2	0.92	0.93	0.93	0.94	0.88

Notes: Time dummies suppressed. Instruments used for specifications 07 and 09 suppressed. Heteroskedasticity robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table B1 shows regression results of the augmented gravity model using different estimation methods for a selected institutional indicator (GCI).

Table B2. Gravity Model for total exports augmented with the GCI sub-indicators (IV PPML estimation method)

Dependent variable:	Export value added											
	Institutions	Infrastructure	Macro	Health	Education	Goods market	Labour market	Financial market	Technology & FDI	Market size	Business soph	Innovation
GDP of exporter (logs)	0.851***	0.791***	0.893***	0.823***	0.843***	0.814***	0.820***	0.833***	0.821***	1.058***	0.771***	0.777***
	(0.0112)	(0.0158)	(0.0144)	(0.0127)	(0.0108)	(0.0115)	(0.0103)	(0.0106)	(0.0112)	(0.0710)	(0.0155)	(0.0137)
GDP of partner (logs)	0.846***	0.864***	0.827***	0.875***	0.860***	0.850***	0.815***	0.848***	0.851***	0.537***	0.848***	0.851***
	(0.0144)	(0.0145)	(0.0178)	(0.0162)	(0.0146)	(0.0136)	(0.0111)	(0.0138)	(0.0142)	(0.0546)	(0.0149)	(0.0143)
Geographical distance (logs)	-0.512***	-0.476***	-0.507***	-0.537***	-0.507***	-0.502***	-0.501***	-0.473***	-0.500***	-0.547***	-0.507***	-0.514***
	(0.0229)	(0.0219)	(0.0225)	(0.0298)	(0.0219)	(0.0223)	(0.0179)	(0.0223)	(0.0228)	(0.0213)	(0.0233)	(0.0220)
Common border	0.164*	0.242**	0.244***	0.356***	0.279***	0.249***	0.468***	0.415***	0.255***	0.299***	0.138	0.163*
	(0.0742)	(0.0750)	(0.0731)	(0.0674)	(0.0698)	(0.0721)	(0.0573)	(0.0712)	(0.0713)	(0.0586)	(0.0777)	(0.0756)
Shared colonial history	-0.0514	-0.0553	-0.0319	0.0868	-0.134*	-0.0617	-0.0921	-0.131*	-0.119*	-0.0159	-0.00510	-0.0548
	(0.0546)	(0.0596)	(0.0614)	(0.0653)	(0.0582)	(0.0548)	(0.0474)	(0.0585)	(0.0552)	(0.0513)	(0.0560)	(0.0569)
Common language	0.409***	0.389***	0.323***	0.143	0.360***	0.331***	0.122*	0.222***	0.392***	0.347***	0.399***	0.395***
	(0.0677)	(0.0657)	(0.0702)	(0.0868)	(0.0602)	(0.0644)	(0.0520)	(0.0607)	(0.0627)	(0.0651)	(0.0774)	(0.0652)
Regional trade agreement	0.0601	0.119*	0.0425	0.0592	-0.00227	0.0378	0.0441	-0.0224	0.0169	0.0320	0.0753	0.104
	(0.0637)	(0.0608)	(0.0609)	(0.0690)	(0.0564)	(0.0612)	(0.0421)	(0.0525)	(0.0603)	(0.0562)	(0.0703)	(0.0646)
GCI of exporter	0.168***	0.160***	0.354***	0.463***	0.216***	0.425***	0.199***	0.246***	0.209***	-0.316**	0.335***	0.228***
	(0.0239)	(0.0294)	(0.0490)	(0.103)	(0.0460)	(0.0663)	(0.0308)	(0.0463)	(0.0320)	(0.118)	(0.0480)	(0.0295)
GCI of partner	-0.0161	-0.0320	-0.0559	-0.233**	0.0665	0.0981	0.310***	0.185***	0.0138	0.511***	-0.0593	0.00573
	(0.0217)	(0.0207)	(0.0464)	(0.0826)	(0.0363)	(0.0502)	(0.0337)	(0.0385)	(0.0223)	(0.0895)	(0.0311)	(0.0235)
Constant	-0.0289	0.0349	-1.030	-0.510	-0.777	-1.683***	-1.291***	-1.631***	-0.300	0.664*	-0.210	0.165
	(0.344)	(0.285)	(0.547)	(0.927)	(0.401)	(0.501)	(0.258)	(0.431)	(0.335)	(0.284)	(0.371)	(0.284)
Number of observations	4,180	4,180	4,180	4,180	4,180	4,181	4,182	4,183	4,184	4,185	4,186	4,187
R2 / Pseudo-R2	0.88	0.88	0.88	0.86	0.89	0.88	0.92	0.89	0.89	0.88	0.86	0.88

Table B2 shows regression results of the augmented with GCI sub-indicators gravity model using our preferred estimation method (IV PPML).

Table B3. Gravity Model for total exports augmented with the DB sub-indicators (IV PPML estimation method)

Dependent variable:	Export value added								
	Starting a Business	Registering Property	Getting Credit	Enforcing Contracts	Resolving Insolvency	Dealing with Construction Permits	Protecting Investors	Paying Taxes	Trading Across Borders
GDP of exporter (logs)	0.836***	0.839***	0.824***	0.813***	0.797***	0.809***	0.831***	0.848***	0.822***
	(0.00953)	(0.00848)	(0.00868)	(0.0116)	(0.00913)	(0.0129)	(0.0123)	(0.0107)	(0.0116)
GDP of partner (logs)	0.857***	0.860***	0.827***	0.869***	0.865***	0.834***	0.823***	0.883***	0.857***
	(0.0118)	(0.0125)	(0.0109)	(0.0146)	(0.0107)	(0.0157)	(0.0109)	(0.014)	(0.0146)
Geographical distance (logs)	-0.489***	-0.561***	-0.482***	-0.512***	-0.502***	-0.530***	-0.525***	-0.456***	-0.513***
	(0.0215)	(0.0183)	(0.0172)	(0.0233)	(0.018)	(0.0213)	(0.0169)	(0.0234)	(0.0219)
Common border	0.277***	0.254***	0.466***	0.234**	0.322***	0.143	0.496***	0.457***	0.183**
	(0.065)	(0.0555)	(0.0481)	(0.0726)	(0.0557)	(0.0868)	(0.0489)	(0.0719)	(0.0702)
Shared colonial history	-0.116*	-0.102*	-0.180***	-0.125*	-0.118**	-0.0336	-0.083	-0.188***	-0.0917
	(0.0577)	(0.051)	(0.0437)	(0.0625)	(0.0449)	(0.0685)	(0.0532)	(0.0545)	(0.059)
Common language	0.201**	0.387***	0.155***	0.303***	0.398***	0.370***	0.0724	0.244***	0.413***
	(0.0614)	(0.0496)	(0.045)	(0.0638)	(0.0479)	(0.0809)	(0.05)	(0.0609)	(0.0689)
Regional trade agreement	-0.0857	0.0147	-0.0228	0.0237	0.0243	0.0172	-0.00993	-0.0309	0.0416
	(0.0563)	(0.0459)	(0.0409)	(0.0668)	(0.043)	(0.0672)	(0.0403)	(0.0505)	(0.0644)
DB of exporter	0.000109	0.0132***	0.00757***	0.0324***	0.00742***	0.0151***	0.00450**	0.00866***	0.0302***
	(0.00273)	(0.00157)	(0.00116)	(0.00532)	(0.000843)	(0.00302)	(0.0016)	(0.0016)	(0.00453)
DB of partner	0.00938***	0.00425**	0.0111***	-0.00317	0.000864	-0.00257*	0.0144***	0.00940***	-0.00205
	(0.00225)	(0.00157)	(0.00104)	(0.00266)	(0.00072)	(0.00106)	(0.00138)	(0.0016)	(0.00198)
Constant	0.0518	-0.0183	-0.365	-1.019*	0.449*	0.264	0.0104	-1.173***	-1.492**
	(0.409)	(0.255)	(0.211)	(0.48)	(0.194)	(0.33)	(0.186)	(0.344)	(0.499)
Number of observations	5,772	5,772	5,772	5,772	5,772	3,885	3,885	3,885	3,885
R2 / Pseudo-R2	0.88	0.89	0.91	0.80	0.91	0.86	0.92	0.90	0.88

Table B3 shows regression results of the augmented with DB sub-indicators gravity model using our preferred estimation method (IV PPML).

Table B4. Gravity Model for total exports augmented with the WGI sub-indicators (IV PPML estimation method)

Dependent variable:	value added					
	Voice and Accountability	Political Stability	Rule of law	Regulatory Quality	Government Effectiveness	Control of Corruption
GDP of exporter (logs)	0.850***	0.897***	0.835***	0.843***	0.839***	0.843***
	(0.00879)	(0.0102)	(0.00873)	(0.00858)	(0.00873)	(0.00873)
GDP of partner (logs)	0.861***	0.842***	0.864***	0.872***	0.868***	0.861***
	(0.0120)	(0.0108)	(0.0113)	(0.0110)	(0.0114)	(0.0114)
Geographical distance (logs)	-0.522***	-0.543***	-0.525***	-0.488***	-0.522***	-0.526***
	(0.0176)	(0.0210)	(0.0184)	(0.0183)	(0.0174)	(0.0180)
Common border	0.253***	0.0485	0.199***	0.365***	0.249***	0.218***
	(0.0522)	(0.0660)	(0.0573)	(0.0532)	(0.0542)	(0.0559)
Shared colonial history	-0.0839	0.0291	-0.125**	-0.171***	-0.122**	-0.0888*
	(0.0436)	(0.0465)	(0.0434)	(0.0436)	(0.0429)	(0.0427)
Common language	0.397***	0.415***	0.406***	0.288***	0.392***	0.397***
	(0.0495)	(0.0585)	(0.0492)	(0.0454)	(0.0470)	(0.0490)
Regional trade agreement	0.00323	0.108	-0.00410	-0.0361	-0.00139	0.000522
	(0.0495)	(0.0601)	(0.0498)	(0.0428)	(0.0457)	(0.0485)
WGI of exporter	0.393***	0.538***	0.271***	0.362***	0.229***	0.178***
	(0.0582)	(0.0476)	(0.0297)	(0.0490)	(0.0288)	(0.0208)
WGI of partner	-0.0414*	-0.106***	0.00561	0.101***	0.00430	-0.00903
	(0.0180)	(0.0249)	(0.0191)	(0.0296)	(0.0216)	(0.0155)
Constant	0.766***	0.669**	0.944***	0.336	0.861***	1.020***
	(0.211)	(0.237)	(0.206)	(0.212)	(0.201)	(0.203)
Number of observations	8,360	8,360	8,360	8,360	8,360	8,360
R2	0.87	0.86	0.88	0.89	0.88	0.88

Table B4 shows regression results of the augmented with WGI sub-indicators gravity model using our preferred estimation method (IV PPML).

Table B5. Gravity Model for total exports augmented with the SGI sub-indicators (IV PPML estimation method)

Dependent variable:	value added							
	Electoral Process	Access to Information	Civil Rights	Rule of Law	Economy and Employment	Social Affairs	Security	Resources
GDP of exporter (logs)	0.849***	0.845***	0.862***	0.860***	0.854***	0.870***	0.888***	0.861***
	(0.0250)	(0.0193)	(0.0231)	(0.0215)	(0.0177)	(0.0213)	(0.0233)	(0.0208)
GDP of partner (logs)	0.864***	0.902***	0.884***	0.901***	0.916***	0.931***	0.871***	0.897***
	(0.0215)	(0.0198)	(0.0218)	(0.0220)	(0.0179)	(0.0250)	(0.0188)	(0.0210)
Geographical distance (logs)	-0.576***	-0.564***	-0.584***	-0.561***	-0.547***	-0.556***	-0.568***	-0.574***
	(0.0389)	(0.0357)	(0.0384)	(0.0389)	(0.0314)	(0.0377)	(0.0352)	(0.0392)
Common border	0.107	0.205*	0.0250	0.163	0.320**	0.174	0.252*	0.130
	(0.122)	(0.103)	(0.123)	(0.117)	(0.0988)	(0.118)	(0.102)	(0.128)
Shared colonial history	-0.00324	-0.0869	-0.0809	-0.154	-0.145*	-0.195*	-0.171	-0.205*
	(0.0894)	(0.0755)	(0.0912)	(0.0839)	(0.0737)	(0.0827)	(0.0886)	(0.0820)
Common language	0.370**	0.364***	0.435***	0.395***	0.249**	0.386***	0.409***	0.483***
	(0.123)	(0.0903)	(0.114)	(0.108)	(0.0865)	(0.0973)	(0.0954)	(0.107)
Regional trade agreement	-0.0708	0.0497	-0.0739	-0.0268	0.0810	-0.0261	-0.0294	-0.0244
	(0.0960)	(0.0818)	(0.0858)	(0.0883)	(0.0667)	(0.0826)	(0.0773)	(0.0857)
SGI of exporter	0.212***	0.118***	0.126**	0.0815***	0.103***	0.0945*	0.0743	0.124***
	(0.0629)	(0.0305)	(0.0418)	(0.0227)	(0.0252)	(0.0371)	(0.0444)	(0.0352)
SGI of partner	0.00961	0.0678**	0.0482	0.0338	0.131***	0.138***	-0.126***	0.00475
	(0.0476)	(0.0256)	(0.0302)	(0.0177)	(0.0240)	(0.0366)	(0.0380)	(0.0261)
Constant	-0.780	-0.750	-0.418	-0.222	-1.085**	-1.195	1.052	-0.0217
	(0.829)	(0.518)	(0.631)	(0.504)	(0.392)	(0.610)	(0.645)	(0.445)
Number of observations	812	812	812	812	812	812	812	812
R2	0.87	0.91	0.88	0.89	0.93	0.91	0.92	0.90

Table B5 shows regression results of the augmented with SGI sub-indicators gravity model using our preferred estimation method (IV PPML).

Table B6: Coefficients of institutional indiactors for exporter by sector (derived from the IVPPML estimation method)

	GCI	DB	WGI	SGI
Agriculture	-0.315***	-0.00742	-0.0863	-0.382**
	(0.0699)	(0.00392)	(0.0457)	(0.124)
Basic Metals	0.0969	0.000567	0.000617	-0.0292
	(0.0592)	(0.00307)	(0.0419)	(0.0438)
Business services	0.427***	0.0212***	0.434***	0.174***
	(0.0476)	(0.00240)	(0.0346)	(0.0357)
Chemicals	0.0609	0.00424	0.0190	-0.0112
	(0.0511)	(0.00292)	(0.0378)	(0.0368)
Construction	-0.300***	-0.0168***	-0.278***	-0.0898*
	(0.0557)	(0.00343)	(0.0439)	(0.0382)
Electrical Equipment	0.691***	0.0340***	0.422***	0.329***
	(0.101)	(0.00438)	(0.0713)	(0.0789)
Electricity	0.0772	0.00242	0.0476	-0.000406
	(0.0508)	(0.00283)	(0.0361)	(0.0371)
Financial Intermediation	0.505***	0.0292***	0.569***	0.282***
	(0.107)	(0.00508)	(0.0639)	(0.0636)
Food	-0.229*	0.00485	0.0354	-0.137
	(0.102)	(0.00515)	(0.0740)	(0.0860)
Machinery	0.346***	0.00645	0.418***	0.112**
	(0.0705)	(0.00413)	(0.0487)	(0.0435)
Manufacturing	-0.136	-0.00696	-0.201**	-0.0898
	(0.104)	(0.00557)	(0.0753)	(0.0790)
Other services	0.394***	0.0196***	0.327***	0.210***
	(0.0653)	(0.00364)	(0.0441)	(0.0456)
Textiles	-1.664***	-0.0926***	-1.477***	-0.734***
	(0.0786)	(0.00531)	(0.0609)	(0.0469)
Transport Services	0.296***	0.00996***	0.321***	0.114**
	(0.0482)	(0.00242)	(0.0353)	(0.0367)
Whosesale and retail	0.0121	-0.00155	-0.0615	-0.0354
	(0.0440)	(0.00247)	(0.0326)	(0.0311)
Wood	0.679***	0.0366***	0.668***	0.441***
	(0.0780)	(0.00376)	(0.0622)	(0.0725)

Table B6 shows coefficients of the institutional indicators of exporter from regression run by sector using our preferred estimation method (IV PPML).

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