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Quality of government and regional trade: evidence from European Union regions

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ABSTRACT

Using a novel database of regional trade flows between 267 European regions for 2013, this paper examines how government quality affects trade between European Union (EU) regions. The results of a structural gravity cross-sectional analysis of trade show that trade across EU regions is highly influenced by differences in regional government quality. This influence varies by both sector of economic activity and the level of economic development of the region. The results indicate that if the less developed regions of the EU want to engage in greater interregional trade, improving their institutional quality is a must.

KEYWORDS

quality of government; institutions; regional policy; gravity model of trade; structural estimation

JEL E2, F15, R10

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INTRODUCTION AND MOTIVATION

There are few issues on which economists tend to agree. Trade is one of these few. It is generally acknowledged that trade is good for economic growth (e.g., Krueger, 1998) and that increases in trade are at the base of improvements in innovation (e.g., Grossman & Helpman, 1990) and productivity (e.g., Alcalá & Ciccone, 2004). Hence, most policy recommendations have been that countries should engage in trade.

However, smooth trade requires well-functioning institutions. A good institutional setting facilitates the increase of international exchanges through the reduction of transaction costs (Rodrik, 2011) and the lowering of informal trade barriers (Araujo et al., 2016). Better institutions are, thus, considered to be at the origin of increases in trade and, consequently, of the reduction in income disparities between countries and regions. By contrast, weak institutions can undermine trade flows and lead to places with weaker institutional settings losing out from trade (Levchenko, 2007). Since the works of Levchenko (2007) and Nunn (2007) there has been a growing interest in trying to understand how institutions shape trade flows (Álvarez et al., 2018; Beverelli et al., 2018; Francois & Manchin, 2013; Helble et al., 2009; Martínez-Zarzoso & Márquez-Ramos, 2019; Méon & Sekkat, 2008; Nunn & Trefler, 2014). Most of this empirical literature resorts to gravity models of bilateral trade and finds that, indeed, better quality institutions have a positive effect on trade (e.g., Álvarez et al., 2018; Helble et al., 2009; Martínez-Zarzoso & Márquez-Ramos, 2019). However, the country-level evidence is far from conclusive, with recent contributions claiming that neglecting domestic trade leads to a serious problem of omitted variable bias (Beverelli et al., 2018).

Moreover, most of the research on how institutions affect trade has been conducted at the national level, overlooking the subnational dimension. Yet, more trade happens within national borders, rather than across international ones (e.g., McCallum, 1995; Wei, 1996),

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especially in large countries. Similarly, institutional differences within countries (e.g., China; Rodríguez-Pose & Zhang, 2019) or broader continental regions, such as the European Union (EU) (Charron et al., 2014, 2015) are pronounced. Hence, how institutions affect substantial trade flows within countries or continental areas remains – mostly because of poor data availability – a significant black box in our understanding of the impact of trade on economic development.

To the best of our knowledge, this is the first paper to analyse the effect of institutions on trade at the regional level for the whole EU. By doing so, it covers an important gap in our understanding as to why some places develop faster than others. The research assesses the importance of one of the key institutions behind economic development – quality of government – in explaining trade across regions of the EU, before investigating whether the effect of institutional quality on trade varies by sectors of activity and if poor government quality – pervasive in the less developed regions of the EU – is more important for explaining trade depending on regional levels of wealth. The analysis conducted benefits from the use of a novel regional trade database. Thissen et al. (2019) provide trade flows for EU regions in 2013 disaggregated by sectors of activity. For the institutional indicators, we rely on Charron et al.'s (2015) measurement of quality of government for European regions. Both datasets are matched to create a database including both regional trade flows and quality of government indicators for 2013.

The results of the analysis show that quality of government is a fundamental determinant of trade between European regions and that institutional quality is more important for inter- than intra-national trade. The effect of the local institutional quality differs by sectors, being larger for information and communication technologies (ICT), financial services, and professional services, and lower for manufacturing, industry and the primary sector. We also find that quality of government explains trade from less developed to more developed regions better than vice versa.

THEORETICAL FRAMEWORK AND STATE OF THE ART

Understanding institutions

Interest in the role of institutions for economic development has been rife in social sciences for almost a century and a half (Tönnies, 1881; Weber, 1921). Particularly seminal for economics was the emergence of the New Institutional Economics (Coase, 1937), focusing on contract theory and the transaction costs as the instruments to explain institutions. Yet, the main breakthroughs in understanding how institutions shape economic activities have remained, at least until there recently, somewhat elusive. This is for several reasons. First, agreeing on a definition of institutions has proven difficult. Almost any research working on the topic has his/her own definition of institutions, making comparisons difficult (Rodríguez-Pose, 2013). The most widespread definition of institutions – North's (1991, p. 97) 'institutions are the humanly devised constraints that structure political, economic, and social interaction' – is far from universally accepted. Second, making the transition from definition to actual measurement of institutions is even more complex. Measurements of institutions are often imperfect and controversial. Third, institutions tend to be context and time dependent (Rodríguez-Pose, 2013) and any institutional analysis is fraught with problems of endogeneity (Rodrik, 2004). Yet, in spite of all these difficulties, our understanding of how institutions work and more solid and significant attempts at measuring them have grown apace in recent years. Most of the progress has taken place in the measurement of institutions at a national level (e.g., Kaufmann et al., 2009). However, subnational level indices have also flourished, with work by the Quality of Government Institute at the University of Gothenburg (Charron et al., 2011, 2014) being the most popular and successful in this respect.

The interest on institutions has spurred a healthy literature on how institutions affect economic growth at a national level (e.g., Acemoglu & Robinson, 2008; Easterly et al., 2006; Rodrik, 2004). The impact of the quality of institutions on economic growth is also contingent on the role of corruption. On corruption, a debate between two strands of literature has arisen: on the one hand, it is argued that corruption may compensate the costs associated to low government quality. This is known as the 'greasing the wheels' hypothesis (e.g., Dreher & Gassebner, 2013). On the other, corruption may expand the costs derived from low quality of government. This is known as the 'sanding the wheels' hypothesis (e.g., Méon & Sekkat, 2005).

The number of analysis of the link between subnational institutions and economic growth has been far more limited, with initial attempts focusing on informal institutions, such as family ties and culture (e.g., Duranton et al., 2009; Tabellini, 2010) and, in recent years, using more subnational government quality as a proxy for institutional quality (e.g., Rodríguez-Pose & Garcilazo, 2015; Rodríguez-Pose & Zhang, 2019). Nevertheless, although understanding how institutional quality affects economic growth necessarily implies involving trade in the process (e.g., Dollar & Kraay, 2003) to show how institutional quality variations provoke an effect of trade on growth, this type of research at subnational level has remained mostly overlooked in the literature.

Institutions and trade

The interest in how institutions shape trade patterns is more recent and has become more widespread since the studies of Levchenko (2007) and Nunn (2007). Levchenko (2007) derives a theoretical model where incomplete contracts explain the existence of institutional differences. Using data for US imports, he finds how institutional differences impact patterns of trade. Nunn (2007), using data for 146 countries and 222 industries, shows that contract enforcement explains global trade to a greater extent than physical capital and skilled labour.

Since then, research has tended to follow two approaches to the analysis of the impact of institutions

on trade. On the one hand, significant progress has been made on measuring institutional quality at country level. The World Governance Indicators (WGI) from the World Bank (Kaufmann et al., 2009, 2011) have become the most widely used indicator for analysing the effects of institutions on trade. On the other, there has been considerable progress on the empirical analysis of the link between institutions and various measures of economic development. Particular attention has been paid to the existence of colonial legacies and to the link between common institutions in the former colony and the colonial power. It is often argued that common institutions – from the existence of a common language to shared cultural factors and habits – contribute to reduce the cost of communications and transactions and shape how economic activity is conducted (Fidrmuc & Fidrmuc, 2016). By far the most influential work in this type of literature is that conducted by Acemoglu et al. (2001) and Acemoglu and Robinson (2012). They distinguish between two types of institutions based on their quality. Inclusive institutions, which lead to well-functioning formal institutions, such as property rights, the accumulation of human capital within countries, resulting in higher economic growth, versus extractive institutions, related to the extraction of resources, benefiting elites and hampering economic growth. The presence of extractive institutions in a place is also expected to dampen trade flows (Beverelli et al., 2018). Inclusive institutions, by contrast, are deemed to enable and accelerate trade.

Since the work of Acemoglu et al. (2001) the amount of research focusing on the extent to which institutional quality affects trade has multiplied. Different empirical studies have documented the existence of a positive relationship between institutional quality and trade. Earlier attempts were mainly limited to case studies and/or specific country analyses. Rauch and Trindade (2002) found an important effect of an informal institution – Chinese networks – on bilateral trade patterns. Depken and Sonora (2005) reported how the degree of economic freedom of an importing country affected US bilateral exports; while Helble et al. (2009) showed that the transparency and accountability of institutions reduced trade costs in the Asia-Pacific region. More recently, Martínez-Zarzoso and Márquez-Ramos (2019) found that good governance – proxied using the WGI indicators – had an important impact on trade in the Middle East and North Africa, but that this effect differed depending on the institutional indicator used.

Increasingly, research has tended to spread the geographical breadth of analysis to cover large swaths of the world. Examples of this are Méon and Sekkat (2008), who, again using the WGI indicators, uncovered that national institutional quality was fundamental in determining the flows of manufactured goods. Francois and Manchin (2013) used a weighted indicator of six components measuring institutional quality and reported that a low institutional quality represents a barrier to trade in developing countries. Álvarez et al. (2018) found a greater effect of institutional quality on exports of raw materials and agricultural products. Beverelli et al. (2018) reported a positive connection between institutional quality and trade.

Other research has been less concerned with governance quality and the overall quality of institutions to focus, following Acemoglu et al. (2001) on past colonial legacies. These legacies are the result of common institutions at both former colonies and colonial powers and result in lower transaction costs between them (Rodrik, 2011). Fewer studies have focused on this approach in comparison with the wealth of studies dealing with governance quality. Among the main studies in this strand is the work of Head et al. (2010), who identify an erosion of trade following independence from the metropole.

New insights: the importance of regions and sectors

One of the main shortcomings of past research on the link between institutions and trade is that the literature has almost exclusively focused on this relationship at the country level (e.g., Álvarez et al., 2018; Head et al., 2010; Helble et al., 2009). However, this level is far to aggregate and does not permit capturing the large institutional quality differences that often exist within countries (Ketterer & Rodríguez-Pose, 2018). Moreover, this type of research ignores the importance of space in explaining the distribution of economic activities as brought to the fore by the revolution initiated by the New Economic Geography (Krugman, 1991a, 1991b). Firms agglomerate in specific areas within a country to take advantage of knowledge-generating activities and reap knowledge spillovers (Duranton & Puga, 2005), as well as to benefit from the best pools of labour and from the best formal and informal institutional conditions (Storper, 1997). This implies that trade flows are often very unequal within countries and involve certain regions and cities to a far greater extent than others, reproducing existing economic inequalities (Kim, 2009; Rodríguez-Pose, 2012). Trade happens not only between but also within countries. Large volumes of trade take place within national borders. Hence, understanding trade and industrial linkages requires studying intranational trade patterns as well (McCann, 2013).

However, the interest on the subnational dimension of trade – possibly because of data-availability problems – has been paltry to date. Among the earlier attempts at looking at the within-country dimension of trade, only two cases appear. Márquez-Ramos (2016) is, so far, the only one to assess the effect of institutions on trade at a regional level. Her study, however, only concerned exports from Spanish regions during the period 2000–08, focusing on the institutional dimension of trade agreements, rather than on institutional quality per se.

Yet, how local institutions shape trade may be affected by factors such as the sectoral specialization of a particular place or its level of development. In order to incorporate sectoral structure into the analysis, we opt for an intra-industry trade framework (Krugman, 1980). Given the existence of productivity differences across sectors, which determine a country's comparative advantage

(Levchenko & Zhang, 2012), the sectoral specialization of a country will affect the impact of its institutional quality on trade. In this respect, we follow Méon and Sekkat (2008), who distinguish a direct and an indirect effect of institutions on trade by sectors that explains the importance of the sectoral disaggregation. The direct effect is related to the existence of manufactured and non-manufactured goods, because, in their view, the degree of corruption may differ between sectors. The Organisation for Economic Co-operation and Development (OECD) (2014) identifies five sectors that concentrate two-thirds of the bribes: manufacturing, ICT, transportation, construction, and extractive. In contrast, the indirect effect has to do with opportunities of exploiting resources within a sector, which defies the traditional determinants of comparative advantage, such as infrastructure or productivity (Méon & Sekkat, 2008). To this extent, different authors have found a greater effect of institutions on trade for differentiated products (Méon & Sekkat, 2008; Rauch & Trindade, 2002) and for agricultural products (Álvarez et al., 2018). Given this sectoral heterogeneity, it is necessary to study the impact of institutions on trade, and how these impacts vary by sector. The level of development of a country and a region may also be strongly correlated with its overall institutional quality (Rodrik, 2004; Rodríguez-Pose, 2013).

Institutional quality is therefore key to assess the strengths and weaknesses of regions and their capacity to become competitive in a highly globalized world (Rodríguez-Pose, 2020). A region with transparent and effective institutions in a poorly governed country will be able to stand out and benefit more from international trade networks, as institutions constitute a source of comparative advantage (Nunn & Trefler, 2014). We expect institutions to play a more important role for the international openness of the regions, as comparative advantages are more important when regions must compete in the world market, rather than when their competitors are located within national borders.

EMPIRICAL APPROACH

Econometric specification and estimation strategy

Gravity equations are the main econometric technique used by the literature to analyse how different economic and political factors affect bilateral trade (Álvarez et al., 2018; Francois & Manchin, 2013; Helble et al., 2009; Martínez-Zarzoso & Márquez-Ramos, 2019). The gravity model of trade relates bilateral trade flows to the economic size of the trading partners, commonly measured using gross domestic product (GDP) and the geographical distance between the two (Tinbergen, 1962):

$$\mathrm{TRADE}_{ij} = \frac{\mathrm{GDP}_i \times \mathrm{GDP}_j}{\mathrm{DIST}_{ij}} \quad (1)$$

Gravity models are commonly augmented to include other variables of interest for both the exporter and the importer. They also tend to extend the concept of distance to a broader group of trade costs. Anderson and Van Wincoop (2003) refer to trade costs as all sets of variables that constitute potential barriers to trade, such as physical distance, the existence of borders and the like. Our basic gravity equation, in log form, is expressed as follows:

$$\begin{aligned}\ln TRADE_{ij} = {} & \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j \\ & + \beta_3 INST_i + \beta_4 INST_j \\ & + \beta_5 \ln DIST_{ij} + \beta_6 LANG_{ij} \\ & + \beta_7 REGCONTIG_{ij} \\ & + \beta_8 COUNTCONTIG_{ij} \\ & + \beta_9 NATIONAL_{ij} \\ & + \beta_{10} INTERNATIONAL_{ij} + \varepsilon_{ij} \quad (2)\end{aligned}$$

where the i and j subscripts denote the exporting and importing region, respectively; $TRADE_{ij}$ are trade flows between region i and j, including internal trade for $i = j$; GDP_i and GDP_j are the gross domestic product of the exporter and the importer, respectively; $INST_i$ and $INST_j$ measure the quality of institutions in the exporting and the importing region, respectively; and $DIST_{ij}$ refers to different bilateral physical distance between regions i and j. The remaining variables are a raft of controls that previous research has identified as factors affecting bilateral trade. These include: $LANG_{ij}$ representing language, which takes the value of 1 if both regions share a common official language and are located in different countries, and 0 otherwise; $REGCONTIG_{ij}$ denoting a common border within a country, which takes the value of 1 if both regions share a common border within the same country, and 0 otherwise. Similarly, $COUNTCONTIG_{ij}$ represents the existence of a common border across national borders. It takes the value of 1 if both regions are contiguous but located in different countries. $NATIONAL_{ij}$ is a national dummy that takes the value of 1 if both trading regions belong to the same country, and 0 otherwise. $INTERNATIONAL_{ij}$ is another dummy to denote cross-country trade. It takes the value of 1 if the exporting and importing regions are in different countries – indicating that trade crosses an international border – and 0 otherwise. As our dataset includes internal flows, for example, production in Brussels that it is consumed in Brussels, the national and international dummy variables do not add up to 1, as we set both $NATIONAL_{ij} = 0$ and $INTERNATIONAL_{ij} = 0$ for internal flows, which constitute the baseline for these two dummy variables. Therefore, we can expect a negative coefficient for $NATIONAL_{ij}$, as trade between regions belonging to the same country is lower than trade within regional boundaries. Similarly, the expectation is of a stronger negative coefficient for $INTERNATIONAL_{ij}$, as trade between regions in different countries is normally lower than trade between regions in the same country. Finally, ε_{ij} is the error term.

These variables are in line with the literature about institutions and trade. Given the prominent role

performed by information frictions in trade patterns (Allen, 2014; Steinwender, 2018), institutions are introduced in the model assuming that they can reduce informational frictions (Araujo et al., 2016) and, hence, trade costs.

Distance is considered as per the basic gravity models. These models assume that trade flows are higher between nearby locations. While the most common distance indicator is physical distance between the two trading patterns, we also consider a raft of other distance indicators, such as economic distance and institutional distance, which may also influence the propensity to trade between two regions.

For the remaining control variables related to contiguity and national and international borders, we follow Gallego and Llano (2014) and acknowledge that trade mainly happens within countries, and that international trade is more frequently concentrated in regions close to an international border (McCallum, 1995).

Gravity models have been subject to growing criticism in the scholarly literature as they do not capture well the so-called multilateral resistance terms (MRTs) – the barriers to trade that each exporting region faces with all its trading partners – leading to biased estimates. Different solutions have been proposed in the literature. First, Feenstra (2002) advocated setting exporter and importer fixed effects as the most suitable method. However, the inclusion of said fixed effects excludes region-specific variables, such as the institutional quality of the exporter and the importer. Hence, only bilateral variables, such as institutional distance, may be included in the model.

Fally (2015) demonstrated that the use of the Poisson pseudo-maximum likelihood (PPML) estimator, proposed by Santos-Silva and Tenreyro (2006), with exporter and importer fixed effects is the only estimator consistent with the MRTs in cross-sectional data. Other benefits of using a PPML estimator are that it mitigates heteroscedasticity problems derived from the logarithmic transformation of variables and it allows for the inclusion of zero trade flows.

Baier and Bergstrand (2009) suggest the bonus *vetus* (BV) ordinary least squares (OLS) estimator. It consists of applying a Taylor approximation to the bilateral trade costs components (i.e., distance and control variables), leading to identical estimated coefficients, as if origin and destination fixed effects were used. Trade cost variables are transformed by double-demeaning the variable by origin and by destination.

The inclusion of origin and destination fixed effects allows capturing characteristics of the exporting and importing regions that are not explicitly included in the equation. These may involve factors such as regional specialization, transport logistics and accessibility, having access to international ports, the degree of integration in global value chains, whether a region is the capital or the economic centre of a country, and some characteristics of neighbouring regions that may have an influence in shaping trade patterns. As these are region-specific factors, their effect can be captured by the fixed-effects variables.

More recently, Beverelli et al. (2018) have proposed a model to estimate the effect of institutional quality on inter- relative to intra-national trade by considering origin and destination fixed effects, and introducing the interaction of the quality of institutions variable of the exporter with the international trade dummy variable. We adapt Beverelli et al.'s (2018) country model to our regional trade framework in the following equation:

$$\begin{aligned}\ln TRADE_{ij} = {} & \beta_0 \\ & + \beta_1 INST_i * INTERNATIONAL_{ij} \\ & + \beta_3 \ln DIST_{ij} + \beta_3 LANG_{ij} \\ & + \beta_4 REGCONTIG_{ij} \\ & + \beta_5 COUNTCONTIG_{ij} \\ & + \beta_6 NATIONAL_{ij} \\ & + \beta_7 INTERNATIONAL_{ij} + \mu_i \\ & + \mu_j + \varepsilon_{ij} \end{aligned} \quad (3)$$

where μ_i and μ_j are origin and destination fixed effects.

Potential endogeneity problems between institutions and trade can arise in the analysis. Trade flows can provoke changes triggering institutional transformations (Acemoglu et al., 2005; Puga & Trefler, 2014). Another problem is the potential existence of omitted variable bias due to unobservable factors (Levchenko, 2007). The case of economic integration of Central and Eastern European countries in the EU illustrates how trade can also induce improvements in institutional quality: after the fall of the Iron Curtain, these countries were urged to implement structural reforms to facilitate trade and foster economic development. Institutional upgrading through better democratic accountability and improvements in the rule of law and in government efficiency were fundamental reforms behind increases in trade (Fabrizio et al., 2010). With these reforms, the levels of institutional quality in Eastern Europe rose faster relative to Western countries, originating a process of convergence in institutional quality that, in turn, facilitated economic convergence (Boltho, 2020). In any case, the quality of institutions in Central and Eastern Europe today remains low in comparison with Western European countries.

To overcome endogeneity in our equation (3), we follow Nizalova and Murtazashvili (2016) who show that the endogeneity bias can be removed when the potentially endogenous variable is interacted with a control, if the variable of interest is uncorrelated with the treatment variable and the omitted variables. Beverelli et al. (2018), by applying this framework when the variable of interest is the interaction of institutional quality and the treatment variable is the international border control and including both exporter and importer fixed effects to reduce possible omitted variable bias, find that this specification avoids endogeneity issues. The explanation is that the international border control is independent of any region and is equal to 1 for all international flows and 0 for intranational ones. Therefore, the international border control

is uncorrelated with institutional quality, and the interaction term of quality of institutions with the international border control is a consistent estimate of the effect of institutions on inter- relative to intra-national trade.

Why focus on the EU? It represents an ideal context in which to evaluate how institutions affect trade at the regional level for several reasons. First, because it is the area of the world where the most progress has been made in terms of measuring and analysing differences in institutional quality at a subnational level (Charron et al., 2014, 2015). Differences in quality of government across countries and regions of the EU are, as elsewhere in the world, rife (Charron, 2016). Differences in institutional quality have also been proven to play a fundamental role in explaining differences in regional development and growth in the EU (Ketterer & Rodríguez-Pose, 2018; Rodríguez-Pose & Garcilazo, 2015). Economic growth and trade are intrinsically related and the regional effect of institutions on economic growth may be the result of a previous effect of institutions on trade. Moreover, institutional quality is connected to other factors that determine economic development and prosperity, such as human capital, innovation or infrastructure (Rodríguez-Pose, 2013). It is therefore highly plausible that differences in the quality of institutions have an important impact on overall trade costs, meaning that the higher the quality of the institutions in a particular place, the lower the trade costs and the higher the trade flows.

Data

The dataset used in the paper combines two databases: a novel trade database for EU regions disaggregated by sectors of activity (Thissen et al., 2019) with a regional database of indicators of the quality of government for European regions (Charron et al., 2015). In the dataset bilateral trade in intermediate and final demand goods and services are fully disaggregated. The dataset covers 61 countries, with the 28 EU member states disaggregated into 267 NUTS-2 (Nomenclature of Territorial Units for Statistics, level 2) regions for 2013 (Thissen et al., 2019).

As the measure of quality of government, we use the European quality of government index (EQI) for 2013 (Charron et al., 2014). This indicator is built by means of a large survey including citizen's perceptions and experience about corruption and quality and impartiality in public sector functions. The EQI index is designed to allow for regional comparisons both within and between countries. It is the most comprehensive and widely used indicator of quality of government for EU regions.

To measure the distance between regions, we follow Boschma (2005) in considering that geographical distance is not the only distance possible between two places. Therefore, in addition to physical distance, we include economic and institutional distance. Physical distance is computed as the that between the centroids – the central points – of two individual regions. Geographical data on regional administrative boundaries are extracted from Eurostat's Geographic Information System of the Commission (GISCO). We assume, following the overwhelming majority of trade and economic growth literature, that regions farther apart trade less. Economic distance is measured using GDP per capita at current market prices in 2013, taken from Eurostat. Similarly, we assume that a big economic gap between two regions represents an obstacle from trade. Finally, institutional distance is measured using the quality of government indicator explained above. The intuition behind the inclusion of institutional distance is the same as in all other distances: big gaps in government quality are bound to discourage trade flows.

Different methods can be used to transform region specific indicators, such as GDP and institutional quality, into bilateral distance measures. Traditional approaches in the literature use the absolute value of the difference in indicator values between the two trading partners. Martínez-Zarzoso and Márquez-Ramos (2019) propose a fuzzy similarity metric to measure the similarities in institutional quality between trading partners. In this paper, we follow their approach and transform similarity metrics into distance metrics. The economic distance, for example, between two regions i and j is computed as:

$$distGDP_{ij} = 1 - fuzzyGDP_{ij} = 1 - \left(\frac{\min(GDP_i, GDP_j) + 1}{\max(GDP_i, GDP_j) + 1}\right) \quad (4)$$

The distance indicator ranges from 0, when the two regions have the same level of GDP, and 1. The more dissimilar two regions are in terms of GDPs, the greater the value of the index. The same approach is followed to compute institutional distance. The descriptive statistics of the variables used in the model are displayed in Table A2 in Appendix A in the supplemental data online.

ESTIMATION RESULTS

Quality of government and regional trade

The estimation results of model (2) using different estimation are presented in Table 1. Columns (I) and (II) are estimated using the bonus *vetus* OLS (Baier & Bergstrand, 2009) with and without the institutional distance, respectively. Results show that the quality of government of both the exporter and the importer are positive and significant, confirming that better quality of government is associated with greater trade flows across EU regions. Institutional distance is negative and significant, indicating that the greatest trade volumes happen between regions with high and similar institutional quality. This is in line with recent findings at the country level (Álvarez et al., 2018; Martínez-Zarzoso & Márquez-Ramos, 2019). Columns (III) and (IV) estimate the model including origin and destination fixed effects using OLS and PPML, respectively. The estimated coefficient for institutional distance is around four times larger when zeros and heteroskedasticity in trade flows are taken into account in the PPML estimation. This fact reinforces the inconsistency of the OLS estimator in the presence of zeros and heteroskedasticity in trade flows.

Table 1: Estimations results for total trade flows.

	(I) BV-OLS	(II) BV-OLS	(III) OLS	(IV) PPML
QoG Origin	0.203***	0.203***		
	(0.005)	(0.005)		
QoG Destination	0.064***	0.064***		
	(0.005)	(0.005)		
Institutional Distance		−0.148***	−0.146***	−0.582***
		(0.036)	(0.029)	(0.056)
log GDP Origin	0.651***	0.651***		
	(0.005)	(0.005)		
log GDP Destination	0.808***	0.808***		
	(0.004)	(0.004)		
GDP per capita Distance	−0.042*	0.005	−0.002	−0.116**
	(0.025)	(0.027)	(0.021)	(0.046)
log Physical Distance	−0.571***	−0.561***	−0.559***	−0.433***
	(0.011)	(0.011)	(0.008)	(0.043)
Common Language	0.251***	0.249***	0.249***	0.397***
	(0.021)	(0.021)	(0.017)	(0.055)
Neighbour Region	0.764***	0.771***	0.773***	0.466***
	(0.037)	(0.039)	(0.038)	(0.054)
Neighbour Country	−0.382***	−0.366***	−0.365***	−0.164
	(0.070)	(0.070)	(0.058)	(0.113)
International Trade	−6.257***	−6.279***	−6.285***	−6.093***
	(0.058)	(0.058)	(0.058)	(0.172)
National Trade	−3.610***	−3.641***	−3.647***	−3.254***
	(0.054)	(0.053)	(0.057)	(0.135)
Constant	−12.640***	−12.640***	12.41***	6.152***
	(0.062)	(0.062)	(0.053)	(0.109)
Observations	71,145	71,145	71,145	71,289
Fixed effects	No	No	Yes	Yes
R^2	0.681	0.681	0.833	0.926

Notes: Robust standard errors are shown in parentheses. *, ** and ***Statistically significant at the 0.01, 0.05 and 0.10 levels, respectively. The dependent variable in columns (I) to (III) is the log of trade flows, whereas in column (IV) it is trade flows.
OLS, ordinary least squares; BV-OLS, bonus *vetus* OLS; PPML, pseudo-Poisson maximum likelihood.

The negative and significant coefficient for physical distance is in line with expectations in gravity equation models. Trade flows decrease as distance grows as a consequence of higher trade costs. Economic distance, measured as GDP per capita distance, is also negative and significant, indicating that regions with similar income per capita trade more with one another, corroborating the Linder hypothesis (Linder, 1961).

The control variables go with expectations. Regions sharing the same language or a common border within a country trade more. The negative coefficient for the national trade variable reflects that internal trade flows – domestic production that is consumed in the region – is higher than external trade flows. The estimated coefficient for international trade is negative and significant, revealing the existence of a border effect. It also signals that, although many firms can participate in intra-national trade, not all of them can compete in the international market. However, this border effect is mitigated when the two regions share a common language, as shown by the positive and significant coefficient of the common language variable. As this pattern of coefficients is similar across the additional results, we omit the non-institutional variables for the sake of brevity when discussing the implications in terms of quality of government.

Inter- versus intra-national trade

The estimation results of equation (3) are presented in Table 2. The independent variable of interest is the interaction of quality of government with the international trade control variable. The coefficient for this variable is positive and statistically significant in models (I) to (III), being robust to the use of different estimation methods. This points that better institutions are more important

Table 2: Estimations results for inter- relative to intra-national trade.

	(I) OLS	(II) PPML	(III) PPML	(IV) PPML
QoG Origin*International Trade	0.550***	0.114***	0.039*	−0.010
	(0.025)	(0.018)	(0.020)	(0.023)
QoG Origin*International Trade Lagging to Rich				0.489***
				(0.063)
QoG Origin*International Trade Rich to Lagging				0.143**
				(0.072)
Institutional Distance	0.092***		−0.515***	−0.297***
	(0.027)		(0.062)	(0.076)
GDP per capita Distance	−0.010	−0.203***	−0.103**	0.012
	(0.021)	(0.045)	(0.047)	(0.052)
log Physical Distance	−0.577***	−0.437***	−0.433***	−0.429***
	(0.008)	(0.043)	(0.043)	(0.042)
Common Language	0.213***	0.416***	0.389***	0.394***
	(0.017)	(0.057)	(0.056)	(0.056)
Neighbour Region	0.699***	0.461***	0.466***	0.473***
	(0.036)	(0.054)	(0.054)	(0.054)
Neighbour Country	−0.370***	−0.147	−0.157	−0.155
	(0.057)	(0.115)	(0.113)	(0.114)
International Trade	−6.273***	−6.215***	−6.120***	−6.161***
	(0.058)	(0.177)	(0.172)	(0.171)
National Trade	−3.503***	−3.239***	−3.253***	−3.270***
	(0.057)	(0.136)	(0.136)	(0.135)
Constant	12.453***	6.164***	6.153***	6.143***
	(0.054)	(0.110)	(0.110)	(0.109)
Observations	71,145	71,289	71,289	71,289
R^2	0.836	0.927	0.927	0.927

Notes: Robust standard errors are shown in parentheses. ***, ** and *Significance at the 0.01, 0.05 and 0.10 levels, respectively. The dependent variable in column (I) is the log of trade flows, whereas in columns (II) to (IV) is trade flows. All regressions include origin and destination fixed effects.
OLS, ordinary least squares; PPML, pseudo-Poisson maximum likelihood.

in explaining inter- than intra-national trade. The PPML estimation in columns (II) and (III) leads to lower estimated coefficients for the interaction of the quality of government with the international trade variable.

Quality of government distance is positive and significant in the OLS estimations and negative and statistically significant in the PPML estimations. This reinforces the use of the PPML estimation. When institutional distance is included, the estimated coefficient for quality of government at the origin is smaller, but still positive and significant. This shows that both the quality of institutions and the different institutional environment between the exporting and importing regions matters for trade.

Finally, column (IV) shows the effect of institutional quality on international trade distinguishing by level of economic development of the region. The analysis includes (1) exports from rich to lagging regions and (2) exports from lagging to rich regions.[1] For this analysis, the econometric model is enlarged with the inclusion of an interaction term involving quality of government and the variables capturing both international trade from lagging regions to rich regions, and vice versa. The estimated coefficient of the interaction of quality of government with international trade from lagging to rich regions is around 3.4 times larger than from rich to lagging regions. This is opposite to what Beverelli et al. (2018) obtain when analysing poor and rich countries, revealing the importance of studying regional trade patterns, as their behaviour may differ from what is known for countries.

Quality of government and sectoral trade

Once the existence of a positive effect of government quality on aggregate trade and its more important effect in inter- relative to intra-national trade has been documented, we turn to explaining if this latter effect may be heterogeneous by sector. Table 3 displays the estimation results of equation (3) distinguishing among 10 sectors of economic activity and by level of regional development.

The scenarios for different sectors yield two major implications. First, the greatest positive coefficient is found for international exports from rich to lagging regions in the case of financial services. This fact is not

Table 3: Estimations results for inter- relative to intra-national trade by sectors of economic activity and level of regional development.

Sector	(I) Primary	(II) Other Industry	(III) Manufacturing	(IV) Construction	(V) Wholesales and Accommodation	(VI) ICT	(VII) Financial Services	(VIII) Professional Services	(IX) Public Services	(X) Other Services
QoG Origin*International	0.114**	0.072	−0.024	−1.166***	0.110**	0.255***	0.635***	0.264***	0.070	−0.010
Trade	(0.053)	(0.050)	(0.022)	(0.075)	(0.051)	(0.039)	(0.120)	(0.047)	(0.127)	(0.050)
QoG Origin*International	0.430***	0.402***	0.577***	−0.549***	0.072	0.963***	0.496***	0.947***	1.025***	0.620***
Trade Lagging to Rich	(0.112)	(0.103)	(0.053)	(0.137)	(0.114)	(0.087)	(0.132)	(0.077)	(0.173)	(0.098)
QoG Origin*International	0.310*	0.278**	0.053	−0.385**	0.694***	0.177	1.300***	0.251***	−0.081	−0.171*
Trade Rich to Lagging	(0.172)	(0.114)	(0.062)	(0.190)	(0.108)	(0.125)	(0.201)	(0.095)	(0.589)	(0.102)
Institutional Distance	−0.749***	−0.039	−0.418***	−3.000***	−0.321**	−0.231	0.713**	0.071	1.444***	0.554***
	(0.182)	(0.144)	(0.078)	(0.396)	(0.156)	(0.159)	(0.349)	(0.156)	(0.431)	(0.212)
GDP per capita Distance	−0.430***	0.577***	−0.135**	2.758***	−0.008	−0.142	0.904	−0.117	−0.210	−0.867***
	(0.121)	(0.108)	(0.055)	(0.465)	(0.169)	(0.115)	(0.690)	(0.123)	(0.282)	(0.144)
log Physical Distance	−0.368***	−0.283***	−0.537***	−0.328***	−0.418***	−0.414***	−0.259***	−0.442***	−0.483***	−0.326***
	(0.044)	(0.052)	(0.035)	(0.034)	(0.043)	(0.034)	(0.094)	(0.036)	(0.051)	(0.052)
Common Language	−0.668***	1.357***	0.028	1.737***	1.377***	0.486***	1.601***	0.438***	−0.401**	−0.048
	(0.111)	(0.075)	(0.039)	(0.218)	(0.105)	(0.085)	(0.235)	(0.080)	(0.168)	(0.172)
Neighbour Region	1.287***	0.336***	0.647***	0.224***	0.484***	0.021	0.218**	0.070	0.365***	0.384***
	(0.076)	(0.069)	(0.056)	(0.057)	(0.074)	(0.047)	(0.097)	(0.052)	(0.069)	(0.060)
Neighbour Country	−0.916***	−0.014	−0.508***	0.867**	−0.189	0.415***	0.028	0.421***	0.900***	0.763***
	(0.205)	(0.184)	(0.115)	(0.404)	(0.134)	(0.142)	(0.337)	(0.133)	(0.309)	(0.197)
International Trade	−6.170***	−7.689***	−4.441***	−12.516***	−7.538***	−6.860***	−9.215***	−7.236***	−12.294***	−9.103***
	(0.181)	(0.220)	(0.142)	(0.242)	(0.186)	(0.148)	(0.400)	(0.162)	(0.244)	(0.220)
National Trade	−3.663***	−3.540***	−2.449***	−4.094***	−3.605***	−3.379***	−3.872***	−3.465***	−3.855***	−4.288***
	(0.150)	(0.154)	(0.115)	(0.113)	(0.138)	(0.112)	(0.275)	(0.120)	(0.165)	(0.164)
Constant	9.048***	9.887***	11.875***	10.318***	11.500***	10.356***	10.574***	11.126***	11.312***	9.450***
	(0.120)	(0.135)	(0.094)	(0.087)	(0.108)	(0.086)	(0.229)	(0.090)	(0.130)	(0.135)
Observations	71,289	71,289	71,289	71,289	71,289	71,289	71,289	71,289	71,289	71,289
R^2	0.943	0.973	0.958	0.991	0.987	0.981	0.979	0.988	0.991	0.988

Note: Robust standard errors are shown in parentheses. ***, ** and *Significance at the 0.01, 0.05 and 0.10 levels, respectively. The dependent on each model is trade flows in that sector. All models include origin and destination fixed effects.

surprising, since the major financial centres in the EU, such as Frankfurt, Paris, Madrid or, formerly, London, are in rich regions. On the other hand, however, the overall effects are greater for the case of exports from lagging to rich regions, where the coefficients of institutional quality are close to 1 for three specific sectors: ICT, professional services and public services. In addition, the number of sectors where the coefficients of institutional quality are negative or non-significant are greater for international exports from rich to lagging regions.

The results by sector differ both in magnitude and by level of economic development. The significant positive effects range from 0.402 in other industry and 0.430 in agriculture to 0.947 in professional services, 0.963 in ICT and 1.025 in public services, for trade from lagging to rich regions. In contrast, positive and significant estimated coefficients for trade from rich to lagging regions range from 0.251 in professional services and 0.278 in other industry, to 0.694 for wholesale and 1.300 for financial services. The negative and significant effect for the construction sector indicates that, for this sector, institutions are more important in explaining intra- than international trade. This is expected as construction is a sector that is less exposed to international trade and more prone to intra-national trade.

The estimated coefficients are higher for financial services, professional services and ICT, and lower for manufacturing and industry, and the primary sector. This is relevant in the current context of deregulation and liberalization of services in the EU, and relative to the aim of creating a digital single market where consumers and businesses can access online goods and services regardless of where they live.

Overall, these results confirm that regions with a lower government quality (generally, lagging behind regions) can benefit to a greater extent from improvements in institutional quality. As lagging regions have greater room for manoeuvre to improve their quality of government, gains from trade will be higher. Rich regions with better government quality will, by contrast, benefit less from higher trade flows, as they are closer to the point of saturation in terms of institutional quality in comparison with lagging regions. The same pattern is obtained by Rodríguez-Pose and Ketterer (2020) when analysing regional growth trends.

CONCLUSIONS

This is the first study to assess, from a comparative cross-country perspective, how variations in subnational quality of government affect trade flows. Using a novel dataset of regional trade for EU regions, we have demonstrated that better governments represent a boon for trade between EU regions, that institutions affect more the capacity of regions to participate in inter- than in intra-national trade, and that this positive effect differs by sector and level of development. Institutions constitute a source of comparative advantage (Nunn & Trefler, 2014) and by improving its quality, regions can become players in the international trade network. EU regions with greater specialization in ICT, financial services and professional services stand to gain more from improvements in government quality than those more specialized in manufacturing, industry and the primary sector. Regions more dependent on construction are unlikely to gain in terms of international trade because of improvements in government quality. Furthermore, lagging regions will benefit considerably more from improving their government quality.

Important policy implications can be derived from these results. First, institutional quality at a regional level is a factor that needs to be taken seriously into consideration when considering changes to trade policies, as the returns of opening to trade are highly dependent on local variations in government quality. Second, given the regional heterogeneity of the effects of institutional quality on trade, the implementation of place-based territorial policies becomes relevant to maximize gains from trade. The targeted improvement of local government quality, particularly in less developed regions depending on their sectoral specialization, is therefore fundamental to maximize trade flows and a positive integration of many EU regions into the European economy. In particular, regions whose economic structure is more dependent on sectors that are weakly integrated in international markets and that suffer from low-quality institutions have much more to gain from improving their quality of government and shifting their economic production structure to market services sectors. Lagging regions, usually with a lower quality of institutions, will also benefit considerably more from improvements in government quality (Rodríguez-Pose & Ketterer, 2020). In these areas, improvements in government quality will lead to increases in trade flows that, in turn, will result in higher economic growth and less overall inequality for lagging regions. This will also contribute to enhance the returns of public investment policies, such as the European Cohesion Policy.

While this research has pushed the boundaries of what we know about the relationship between institutions and trade at a subnational level, it is not without limitations. Perhaps the most important limitation is that trade data are only available for 2013. Improvements in the timeframe of data on regional trade within the EU will allow future studies to deal with the regional link between institutional quality and trade from a dynamic perspective, also taking into consideration how changes in the quality of institutions affect the evolution of trade patterns over time, as improvements in government quality have been proven to drive regional development (Rodríguez-Pose & Ketterer, 2020). The sectoral analysis presented is a first attempt to gain new insights into the role played by institutions in international exports by sectors. Future research could deep dive into different sectors. In doing so, the analysis may be extended to differentiate trade in intermediate goods and final goods in order to capture the position of European regions in global production networks, as well as the existence of spatial dynamics and trade interdependencies.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

NOTE

1. Table A3 in Appendix A in the supplemental data online lists the lagging regions according to the low-growth and low-income criteria.

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