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**DEMOCRACY AND INTERNATIONAL  
TRADE: DIFFERENTIAL EFFECTS FROM  
A PANEL QUANTILE REGRESSION  
FRAMEWORK**

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**Democracy and International Trade:  
Differential Effects from a Panel Quantile Regression Framework**

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ABSTRACT

There has been a wide debate on whether democracy actually has an effect on economic outcomes, and especially on international trade. With a new estimation strategy, we analyze this relationship taking a look at the distribution of countries' trading activity. Using a panel quantile estimation framework from Powell (2014), we find a stronger relationship at the lower quantiles, especially for the import activity. Our results suggest that the impact of democratization on trade is more important when countries trade less: the marginal benefit of democratization decreases as countries trade more. This feature supports a widely neglected issue in the literature: economies very active in the international trading network are not necessarily the most democratic countries. The results are robust to different institutional variables and even to instrumental variables estimation. Our results demonstrate that the effect of democracy on trade is underestimated using Ordinary Least Squares estimation for the group of countries for which the effect is statistically significant for, namely those countries that are active in the lower quantiles of the trading distribution. Moreover, our results complement the findings by Barro (1996) which suggest that the effects of democracy for economic growth are not uniform for all countries.

JEL Code: C21, F14, F63, O11

Keywords: Democracy, International Trade, Panel Quantile Fixed Effects

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"WHEN PEOPLE ARE FREE TO SPEAK THEIR MINDS AND HOLD THEIR LEADERS ACCOUNTABLE, GOVERNMENTS ARE MORE RESPONSIVE AND MORE EFFECTIVE. WHEN ENTREPRENEURS ARE FREE TO CREATE AND DEVELOP NEW IDEAS, THEN ECONOMIES ARE MORE INNOVATIVE, AND ATTRACT MORE TRADE AND INVESTMENT, AND ULTIMATELY BECOME MORE PROSPEROUS."  
- PRESIDENT OBAMA, SEPTEMBER 23RD 2014<sup>1</sup>

## 1. INTRODUCTION

Democratization is seen as an essential attribute for countries' economic development and economic growth (Acemoglu et al. (2001, 2014), Barro (1996<sup>2</sup>, 1999), Gerring et al. (2005), Siegle et al. (2004)), besides their trading activity (Yu (2010), O'Rourke and Taylor (2007), Eichengreen and Leblang (2008)). Nevertheless, in the past literature contrary evidence featuring the non-significance of the link between democracy and trade has also been established (Nicolini and Paccagnini (2011) and Balding (2011)).<sup>3</sup> The literature that is in favor of a significant positive link explains that a country that has a democratic regime is generally hosting better political and economic institutions (Olson (1993), Giuliano et al. (2012)) and guaranteeing better market conditions like stronger property rights, consumer rights and rule of law (Yu 2010) or supports a legislature that ratifies trade agreements more efficiently, such that there is less space for discretion of the executive (Mansfield et al. 2000). However, as we can observe in reality, several countries in the world maintain less favorable institutional frameworks but are still very active in the global exchange network. This remains true in times of political distress and crisis. Nations are participating in strong economic exchange with countries that have less favorable institutions although this trading relationship is prone to higher transaction costs and asymmetric risks (Levchenko (2007), Nunn (2007), Greif (1993), De Groot et al (2004), Anderson and Marcoullier(2002)).

The recent turmoil between Russia and the Ukraine draws a grave picture of the worldwide dependencies in terms of political liaisons and trading activities. Russia is the world's second most important producer of oil and gas<sup>4</sup> and several countries hold strong trading ties with Russia. The partner countries are dependent on oil and gas imports while Russia is still lacking an adequate level of investments from abroad in order to support its economy. Russia used to cover about half of its food imports from abroad and as such Russia is highly dependent on other countries' economic networks, as well.<sup>5</sup> The Russian-Ukrainian conflict brought several confinements from the EU in terms of restrictions for the financial market, the closing of bank accounts and reduced exports of weapons. However, these confinements are far from being absolute. On the other hand, Russia countered by imposing restrictions on food imports. As the food prices increased and the shortage of

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<sup>1</sup> <https://www.whitehouse.gov/the-press-office/2014/09/23/remarks-president-clinton-global-initiative>

<sup>2</sup>Barro (1996) found that democracy (political rights) has a positive relationship with growth only at low levels of democracy. He argues that in the "worst dictatorships" the governmental power's limitations are extreme and an increase in democracy would exert a positive effect, while later on the effect is diminished by counterbalancing effects of the income distribution. We can think of it as when democracy is better established then concerns about how to distribute income arise and this will lead to less growth because money is re-distributed for the poor, e.g.

<sup>3</sup> As for the link between democracy and income, in their seminal paper Acemoglu et al. (2008) find no causal effects.

<sup>4</sup> This is based on export data for the year 2012. Saudi-Arabia ranked first, followed by other OPEC countries.

<sup>5</sup> Among the EU27 countries, Germany is Russia's most important partner followed by Italy, France, the Netherlands and Poland.

goods was felt in the local stores, the Russian government allowed to increasingly import Western, European products through buying them from Kazakhstan and Belarus.

In 2011, the World Trade Organization (WTO) ranked—in descending order—the twenty biggest global players in terms of world trade (exports) as: China, USA, Germany, Japan, Netherlands, France, South Korea, Italy, Russia, Belgium, UK, Hong Kong, Canada, Singapore, Saudi Arabia, Mexico, Taiwan, Spain, India and the UAE. At the same time, the World Economic Forum ranks countries according to their activities in facilitating trade in goods, assessed by their infrastructure, market access (related to own tariffs and faced ones), border administration and operating environment (quality of institutional factors)<sup>6</sup>. Their ranking for the ten best scoring countries in 2012—in descending order— was: USA, China, Germany, Japan, Netherlands, France, UK, South Korea, Hong Kong and Italy. The fact that countries like Russia, Saudi Arabia, Mexico and India which score only rank 105, 48, 61 and 96 in the so called Enabling Trade Index in the year 2014 are among the most important global traders, raises concern about the long debated link between countries' institutions and their trading activity. This mismatch suggests that institutions and democracy are not uniquely positively interlinked with trade as some studies suggest (Yu (2010), Francois and Manchin (2013), Dutt and Traca (2010)). Apart from Russia, another prominent example is China, which became the biggest trading nation in the world over time. However, its political institutions can be questioned in terms of low protection of property rights, a lower degree of civil liberties and the concentration of the power in one political party.

Among the literature, Yu (2010)<sup>7</sup> finds a positive influence of the democratic state of both the exporter and importer country on bilateral trade. On the other hand, in a recent rigorous study, Berger et al. (2013) find a positive link between CIA interventions and imports from the USA, particularly in products that the USA has a comparative disadvantage in, while there is no significant link between the interventions and countries' exports to the USA. This does partially contradict the results from Yu (2010), if we regard CIA interventions to be a sort of a negative institutional feature of the USA. Berden et al. (2014) find that a higher level of pluralism (voice and accountability) and greater political stability in the host country decrease trading activity, whereas greater regulatory quality increases trade levels. A new strand in the literature has focused on the long-run relationship and causality between institutions and trade. Nicolini and Paccagnini (2011) find no evidence of Granger causality in both directions between the variables of interest.

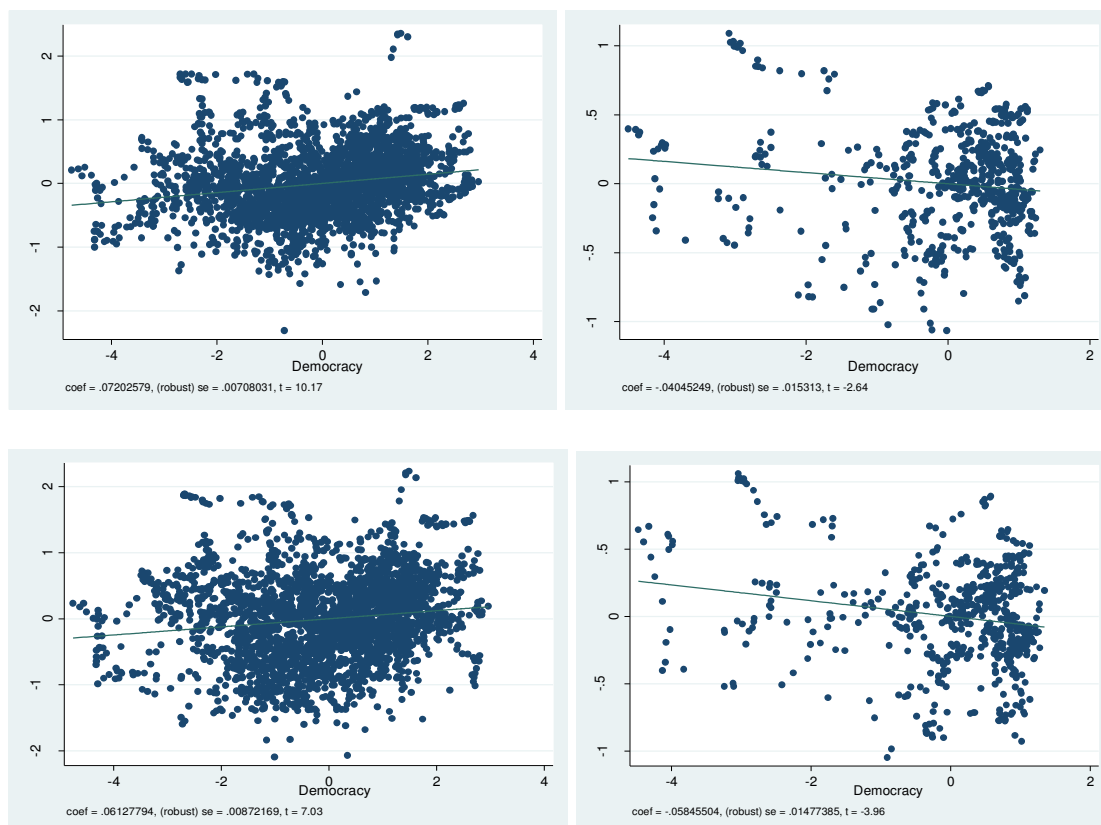
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<sup>6</sup> [http://www3.weforum.org/docs/WEF\\_GlobalEnablingTrade\\_Report\\_2014.pdf](http://www3.weforum.org/docs/WEF_GlobalEnablingTrade_Report_2014.pdf)

<sup>7</sup> These studies have been of the type where the level of democracy of the exporter and/or the importer country was included into a gravity equation (see also Berden et al. 2014). Another strand of literature focuses on the country level perspective (e.g. Milner and Kubota (2005) and Eichengreen and Leblang (2008)).

FIGURE 1

Partial Regression Plots for democracy and trade



Source: Own elaboration based on data from the World Development Indicators and the International Country Risk Guide.

Note: This figure shows the partial correlation between the log of imports, exports and democratic accountability, controlling for the log of GDP and time dummies. On the vertical axis the log of imports or exports, on the horizontal axis the degree of democratic accountability is shown. The left-hand side panels include the full sample, while the right-hand side panels include only data for those countries whose trading activity lies in the 5<sup>th</sup> quintile of the trading distribution. Data are taken for the time period from 1984-2012.

Taking a closer look at trade data from the World Development Indicators (WDI) and democratic accountability as measured by the International Country Risk Guide (ICRG)<sup>8</sup>, Figure 1 demonstrates that at a higher level of the trading activity (for both imports and exports) the correlation between trade and democracy becomes negative. In the present paper, we investigate this differential relationship in more detail.

Our aim is to disentangle the relationship between democracy and trade and to analyze the effects across the distribution of the trading activity. We use a panel quantile regression estimator that has been recently introduced in the literature by Powell (2014). In our framework, the quantile estimator is the most suitable and powerful methodology to shed light on the differential effects of democracy on trade and to figure out different effects across countries conditional on their level of trading. The implications arising from the traditional results, using econometric methods that focus on the conditional mean only, would have to be interpreted differently if

<sup>8</sup> "A measure of not just whether there are free and fair elections, but how responsive government is to its people. The less responsive it is, the more likely it will fall. Even democratically elected governments can delude themselves into thinking they know what is best for the people, regardless of clear indications to the contrary from the people." (<http://epub.prsgroup.com/list-of-all-variable-definitions>)

heterogeneous effects for the importance of democracy on trade for only high-or low-trading countries could be detected. The estimates that are based on the conditional mean are then rather uninformative. Therefore, our main contribution to the literature is to estimate the relationship between democracy and trade in a panel quantile framework and to assess the relationship at different quantiles in the distribution of the countries' trading activity.

Previewing our results, our analysis reveals that the marginal benefit of democratization decreases over the distribution of the trading activity. We focus attention to a widely neglected issue in the past literature: countries with a high trading activity are not necessarily the most democratic states in the world. This relationship complements results in the literature that found strong effects between democracy and economic growth only at a low level of economic development (Barro (1996)). Our results are able to model particularly the non-significant or even negative effects for those countries in the higher quantiles of the trading distribution.

The remainder of the paper is organized as follows. Part 2 covers the theoretical background and outlines the selection of variables for the empirical analysis. In part 3 we describe our data and provide some descriptive evidence. Part 4 comprises the regression analysis, including ordinary least squares, cross-sectional quantile regression, panel quantile regression and as a robustness check regressions using other measures of the institutional framework and panel instrumental variable quantile regression. Finally, part 5 concludes.

## 2. THEORETICAL BACKGROUND AND SELECTION OF VARIABLES

The relationship between economic outcomes and institutional measures is well documented in the Economics' literature. Acemoglu et al. (2001) show that institutions have a large effect on the generation of income per capita (instrumenting institutions with European settlers' mortality). Countries benefit from a higher accumulation of human and physical capital in places where private property is respected and secured and where consequently less distortionary policies have to be implemented to ensure these rights. Production will use these inputs more efficiently, which will enforce an increase in income per capita. The accumulation of both human and physical capital will also help to generate a competitive market, promoting high quality goods (Yu (2010), Barro (1996, 1999)). Nunn (2008) and Acemoglu (2007) provide evidence in both an empirical and theoretical setting on how contractual incompleteness, a kind of negative institutional framework, affects the production specialization pattern and hinders the adoption of new technologies. If countries possess better technology they will grow faster and achieve a higher development level. Developing countries, given the lack of technology and the abundance of agricultural resources, are prone to specialize in commodities which are less conducive to development.

Related to international trade, among the increasing literature, Rose (2005) could find a positive effect of international institutions on international trade, while Francois and Manchin (2013) find a positive link between national institutions and trade. In contrast, Nicolini and Paccagnini (2011) find no causal relationship. Berden et al. (2014) investigated for different measures from the Worldbank World Governance indicators the effects for trade and FDI. They found that higher levels of voice and accountability and the political stability in the host country decrease trading activity, whereas greater regulatory quality increases trade levels. In terms of political institutions, Yu (2010) has studied the relationship between democratic regime type and trading activity, establishing a positive link. Based on their degree of democracy, countries will show a different level of trading. The literature provides several explanations for this relationship.

A higher degree of democratization is believed to provide better institutions, which will guarantee consumer rights, product regulations, defense of property rights and law enforcement. These institutions will help to improve the quality of products (Yu, 2010). Therefore, when an exporting country possesses a high level of democracy, it will be attributed a higher degree of trust by other countries and this might reduce trade costs. On the contrary, for an importing country, through democratization trade barriers might be increased—in the richer countries through efforts for labor protection—and thus imports will be reduced (Yu (2010), Levchenko (2007)). Another explanation for a negative trade effect for the importing country is that democratization and higher institutional quality will improve the quality of local products and so make it more difficult for other countries to penetrate the market since competing with the local quality would be difficult (Yu, 2010). However, for developing countries, which export labor-intensive and import capital-intensive products, democratization will foster labor-friendly trade-policies, consequently reducing tariffs and thus fostering trade (Levchenko, 2007).

The relationship between trade and democracy can be expected to be endogenous (Yu (2005), Eichengreen and Leblang (2008), Lopez-Cordova and Meissner (2005), Milner and Kubota (2005)), since more trade could also promote better institutions and more democracy. On the other hand, international trade might lead to maintain non-democratic structures in land-abundant and capital-scarce countries. An explanation for this relationship is that land and labor owners primarily benefit from globalization (Acemoglu, 2006). These individuals are eager to prevent democratization from destroying their status-quo (Yu, 2010). We will also deal with that two-way relationship in our own regression analysis.

The literature has identified several factors that influence countries' trading activity. GDP is a proxy for the size of the economy: a bigger economy is more likely to import or export higher quantities. Though we are not estimating a gravity model itself, we could think of our model as a gravity model having the world as the trading partner, so we could expect that the coefficient for GDP will be close to 1. Population could be interpreted as



another measure for the size of the country or the market and is expected to be positively related to the trading activity, but a negative relationship might also emerge. If we consider the developed economies, a big proportion of them actually has a small population which is in line with the negative coefficient in the relationship between democracy and trade that has been found in the literature like Rose (2005) or Eichengreen and Leblang (2008). Following Eichengreen and Leblang (2008) and O'Rourke and Taylor (2007), we also address the potential contingent effect of our democracy variable on the factor endowments of the economy, based on the Heckscher-Ohlin-Stolper-Samuelson theorem. On the one hand, we expect to find a negative effect of democracy interacted with the land/labor ratio. This is due to the fact that when land is abundant, landowners will benefit from the opening of the economy but when democracy is introduced higher tariffs will be demanded from the laborers and therefore there will be less trade. On the other hand, the expected sign of the interaction term of democracy and capital/labor ratio is positive since capitalists (who own the abundant factor) would favor a regime with a more open economy, which allows them to take their capital outside the country in search for better returns. Finally, -- although the signs of these variables are not the main concern of this study since we are mainly interested on the interactions with democracy—we expect a positive effect resulting from both the capital/labor ratio and the land/labor ratio. Both ratios are included in regressions and a positive sign is expected since the variables proxy for a comparative advantage effect either in production of agricultural or of manufactured goods.

### 3. DATA DESCRIPTION AND DESCRIPTIVE EVIDENCE

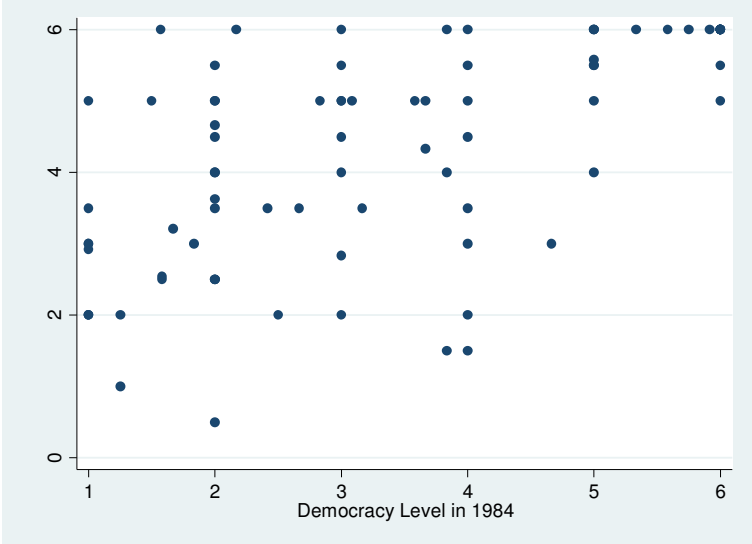
For our empirical analysis, which includes the aforementioned variables, we employ international trade data (exports and imports) from the World Bank's World Development Indicators (WDI), indices from the International Country Risk Guide (ICRG) for measuring democracy levels (democratic accountability), and variables capturing GDP, population, land use, labor force size and capital use from the WDI, respectively. A detailed description of the measurement of the variables can be found in the Appendix. As alternative measures for capturing the institutional framework, we will include further variables from the Freedom House database and the ICRG. These variables are the level of political rights, civil rights and corruption. For the robustness checks in one of the later sections, we will make use of data on the secondary schooling of females which is taken from the WDI. We run regressions for a cross-section of the year 2006<sup>9</sup> and we consider a panel of the time period between 1984 and 2012, respectively. Due to the data availability of the ICRG's democracy index, the sample period was restricted to this period. Furthermore, we will show different developments for sub-groups

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<sup>9</sup> We chose a cross-sectional sample for the year 2006 in order to circumvent external effects on trade due to the worldwide financial crisis and its aftermath.

of countries as given by the World Bank classification of 2012, namely high-income, low-income and OPEC countries. The full list of countries can be found in the Appendix.

FIGURE 2  
Correlations between democracy values in 1984 and 2012



Source: Own elaboration based on data from the International Country Risk Guide.  
Note: This Figure shows the correlation of democratic accountability values of 1984 and 2012 for all countries in our sample.

In Figure 2, we can observe the variability in the democracy variable from the ICRG, given that the points do not represent a 45 degree line (comparing the democracy values of 1984 – beginning of our sample period -- with 2012 – the end of our sample period). Taking care of a decent level of variation in the data is important to enable the identification of effects.

The figures in Table 1 reveal for the full sample that the more countries are importing, the higher generally is the share of countries that possess an index value of democratic accountability that is above average. This correlation is in line with the prior literature’s results on the positive linkage between democracy and trade. However, splitting the countries into the sample of low-income countries versus high-income countries, we can see that for the low-income countries apparently a higher share of countries that possess a better democratic institutional framework than the average is among the countries that trade only a little, but also among those that trade a lot. For the high-income countries a different picture emerges. The highest shares of countries with better democratic institutions are found for countries that are displaying middle-high trading activities as well as the highest trading activities. We cannot find, thus, a monotonic relationship between trade and democracy once we consider cross-country differences in economic size measured here in terms of per capita income! There are

countries that are highly democratic and trade only a little, as well as countries that trade a lot. This is especially true for the low-income economies.

TABLE 1  
Distribution of trading activity (imports) and share of democracy levels

				1 <sup>st</sup> Quintile	2 <sup>nd</sup> Quintile	3 <sup>rd</sup> Quintile	4 <sup>th</sup> Quintile	5 <sup>th</sup> Quintile
2006	Democracy level above average (DAA)		All countries	0.33	0.5217	0.5652	0.913	0.8
	Democracy level below average (DBA)			0.67	0.4783	0.4348	0.087	0.2
	DAA		High-income countries	0.778	1.0	0.875	0.778	1.0
	DBA			0.222	0.0	0.125	0.222	0.0
	DAA		Low-income countries	0.5	0.0	0.33	0.33	0.33
	DBA			0.5	1.0	0.67	0.67	0.67
	DAA		All countries	0.25	0.1579	0.5263	0.6364	0.8182
	DBA			0.75	0.8421	0.4737	0.3636	0.1818
DAA		High-income countries	0.875	1.0	0.8571	0.7143	1.0	
DBA			0.125	0.0	0.1429	0.2857	0.0	
DAA		Low-income countries	0.33	0.0	0.0	0.0	0.5	
DBA			0.67	1.0	1.0	1.0	0.5	

Source: Own elaboration based on the World Development Indicators and International Country Risk Guide.

Notes: This Table displays the share of countries that possess higher or lower values of democratic accountability than the average along the distribution of  $\ln(\text{imports})$  (at different quintiles in the importing distribution). The shares for one country group consequently sum up to 1.

TABLE 2  
Degree of democratic accountability across countries measured by sample mean

	All countries	Low-income countries	High-income countries	OPEC countries	Just Malaysia, Mexico, Russia	China, and Russia
Mean value of democratic accountability 2006	4.394	3.3203	5.356	3.5417	3.688	2.125
Mean value of democratic accountability 2012	4.226	3.273	5.351	3.0059	3.375	1.75

Source: Own elaboration based on the World Development Indicators and International Country Risk Guide.

Notes: This Table displays the mean values of democratic accountability across countries.

Table 2 displays the mean values of democratic accountability across countries. The degree of democratic accountability is higher for the high-income countries and lower for the low-income countries compared to results for the full sample. For the OPEC countries, the values are lower, as well as for the sub-samples of the

countries China, Malaysia, Mexico and Russia. Paradoxically, these four countries belong to the group of the main global traders. We can conclude that the mean value of democracy is shadowing the effects that we found before for countries' different degrees of trading activity. An adequate econometric methodology has to be chosen which is capable of analyzing the impact of democracy on the trading activity at different levels of countries' economic development, This is what motivates the choice of quantile estimation which is capable of investigating effects along the distribution of the outcome variable.

Before we start with our estimation methodology, it is worthwhile to gather information on countries' specific trading activities and ties. Table 3 displays the main trading partners and traded products, as well as the shares of total exports and imports in world trade of China, Malaysia, Mexico and Russia.

TABLE 3  
Main trading partners and share of world trade of China, Malaysia, Mexico, Russia

	China	Malaysia	Mexico	Russia
<b>Exports</b>	2048714 (million US\$)	227538 (million US\$)	370643 (million US\$)	529255 (million US\$)
Main trading partners	USA, Hong Kong, Japan, Germany	Singapore, Japan, China, USA	USA, Canada, Spain, China	Netherlands, China, Germany, Ukraine
Main products	Computers, Broadcasting Equipment, Telephones	Refined Petroleum, Gas, Palm Oil, Integrated Circuits	Crude Petroleum, Cars, Computers, Video Displays	Crude Petroleum, Refined Petroleum, Gas, Coal Briquettes
<b>Imports</b>	1818405 (million US\$)	196393 (million of US\$)	380477 (million US\$)	335446 (million US\$)
Main trading partners	Japan, South Korea, Other Asia, USA	China, Singapore, Japan, Indonesia	USA, China, Japan, Germany	China, Germany, Ukraine, Belarus
Main products	Crude Petroleum, Integrated Circuits, Iron Ore, Gold	Integrated Circuits, Refined Petroleum, Crude Petroleum, Office Machine Parts	Broadcasting Accessories, Computers, Telephones, Cars	Cars, Packaged Medicaments, Vehicle Parts, Computers
<b>Share in world exports</b>	10.0%	1.0%	1.7%	1.8%
<b>Share in world imports</b>	8.3%	1.0%	1.9%	1.9%

Source: Own elaboration based on the World Development Indicators, Observatory of Economic Complexity and WTO country profiles.  
Notes: This Table displays the trading activity across the countries China, Malaysia, Mexico and Russia.

Petroleum is an important traded product—exported and imported—and as such an important driver of these countries' trading activity. According to the figures of the Country Profiles of the WTO for 2012, China is the main exporter and second largest importer in 2012. Its main trading partners include the largest economies of the world, such as EU27, USA or the developed Asian countries such as Japan or South Korea.

With data of the same source, we can find that Malaysia has a smaller participation in world exports (1% versus 10% of China). Moreover, their export baskets differ since besides manufactures Malaysia also has fuels and mining products to export.

On the other hand, Russia, which has about double the size of participation than Malaysia in world exports, mainly exports fuels and mining products. Its main trading partners—in terms of exports—involve European Union countries as well as other communist and socialist countries such as China, Ukraine or Belarus. Russia is a traditional supplier of non-renewable energies but given the non-diversified economic structure it then has to import manufactured products as cars to agricultural products.

Mexico, which deepened its trade relations with the US after joining the NAFTA in the early 90's, has the US as the main trading partner either as a destination for its exports as from its imports. Its main trading partners include Canada, China and the European Union's countries. Though looking at the composition of its exports it seems that it exports high value added goods, we have to remember that Mexico mainly assembles products, in the Maquila<sup>10</sup> industries. Mexico also possesses a significant amount of oil reserves managed by the state owned company PEMEX and hence its oil exports.

Another interesting perspective on countries' institutional frameworks and their engagement in trade can be gained by taking a look at the number of dispute settlements requested by different countries in front of the WTO, as the latest data for 2014 on their website shows. China has been requested for consultation at the WTO for 31 complaints and has filed complaints to 12 countries, while Malaysia has only filed one complaint while being requested for consultation for only one. Russia has filed only one consultation under the WTO, while it has received two. Mexico has 23 requests and 14 being defendant. If one compares the request for consultations of these countries with developed economies like the EU27 or the US, the figures are quite striking: EU27 has requested for consultation on 90 occasions while it has been requested 77 times, whereas the US has requested 106 times versus being requested 121 times. This seems to be in line with the argument of Kono (2006) where democratic countries endorse optimal obfuscation while protecting their countries with non-tariff barriers—that are usually the causes of disputes—while they promote liberalization, mainly in a reduction of tariffs<sup>11</sup>--as stipulated by the WTO.

#### 4. EMPIRICAL STRATEGY AND RESULTS

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<sup>10</sup>Maquila is a "manufacturing plant that imports and assembles duty-free components for export. The arrangement allows plant owners to take advantage of low-cost labor and to pay duty only on the "value added"—that is, on the value of the finished product minus the total cost of the components that had been imported to make it. The vast majority of maquiladoras are owned and operated by Mexican, Asian, and American companies."(Encyclopedia Britannica)

<sup>11</sup> This is leaving aside the agricultural sector, which is a sensitive issue for many countries, especially the EU and the USA.

In order to study the relationship between democracy and international trade (total exports and total imports) we will make use of a new panel quantile estimator that has been recently introduced (Powell 2014), besides using standard estimation techniques. Given the recent literature’s inconsistency about the statistical significance and the sign of the connection under study, we believe that the new estimator is able to provide a better picture of the true effects and about what has been observed in macro variables – some of the main exporters of the world are not among the most democratic countries in the world (China for example). We will start our analysis with some benchmark results that can be gained through ordinary least squares estimation and will also show results from cross-sectional quantile estimation. Our analysis concludes with robustness checks employing different variables capturing the institutional framework and running panel quantile instrumental variable regression.

#### 4.1. ORDINARY LEAST SQUARES REGRESSIONS

We first run a simple ordinary least squares regression including only democracy as an explanatory variable. We then add several further factors that were explained in Section 2, always controlling for time effects.

TABLE 4  
Ordinary least squares estimates

	ln(imports)		ln(exports)	
	(1)	(2)	(3)	(4)
constant	21.0574**	2.4207**	20.8849**	0.2053
democracy	0.5608**	0.0658**	0.5958**	0.0025
ln(GDP)		0.8621**		1.0945**
ln(population)		-0.049		-0.2487**
Land-labor ratio		0.6211		1.7245**
Democracy x land-labor ratio		-0.2332**		-0.4141**
Capital-labor ratio		0.8105		0.55
Democracy x capital-labor ratio		-0.102		-0.0897
Time fixed effects	yes	yes	yes	yes
R <sup>2</sup>	0.278	0.95	0.254	0.939
Observations	2966	2379	2966	2379

Source: Own elaboration based on the World Development Indicators and International Country Risk Guide.

Notes: The sample includes all countries. Cluster-robust standard errors at the country level were computed. \*\* denotes significance at a 5% level and \* at a 10% level.

The results in Table 4 suggest that democracy exerts a significantly positive effect on both the exporting as well as the importing activity. The results still hold for the importing activity when including further covariates like GDP or population into the regression equation. A one-unit increase in the democracy index is associated with a 6.6% increase in imports (see column 2). In the case of exporting activity, no significant effect can be found. This corresponds to the evidence found in the literature (see e.g. Balding (2011)). We further added the land-labor ratio, the capital-labor ratio and their interactions with democracy, respectively. The coefficient for the

interaction of democracy with the land-labor ratio reveals that for the importing and exporting activity the effect of democracy on trade weakens when the land-labor ratio becomes higher. This is in line with the results of Eichengreen and Leblang (2008), though our coefficients are smaller in size. A reason might be that there is only 16 years overlap between both studies. As we have already explained above, rising democracy levels bear a potential that laborers demand a stronger degree of labor protection and thus trade levels decrease. For the interaction term of democracy and the capital-labor ratio only a very small value of the coefficient is obtained, bearing a negative sign, though not being statistically (nor in economic terms) significant. The effect of the population is negative, which resembles results from Eichengreen and Leblang (2008). We can also relate this negative coefficient to the fact that GDP per capita can be composed by GDP and population - since it is in logs then population would have a negative coefficient. Countries with a greater GDP will be more likely to trade more.

#### 4.2. CROSS-SECTIONAL QUANTILE ESTIMATION

In the following, we present results for cross-sectional quantile estimation. We run both regressions on the cross-section of the year 2006 and on the observations for all years between 1984 and 2012. By considering all years' data points, we are able to investigate a larger set of observations and can thus cope with a larger variation in the data.

TABLE 5  
Cross-sectional quantile estimation results for the year 2006 and pooled quantile regressions

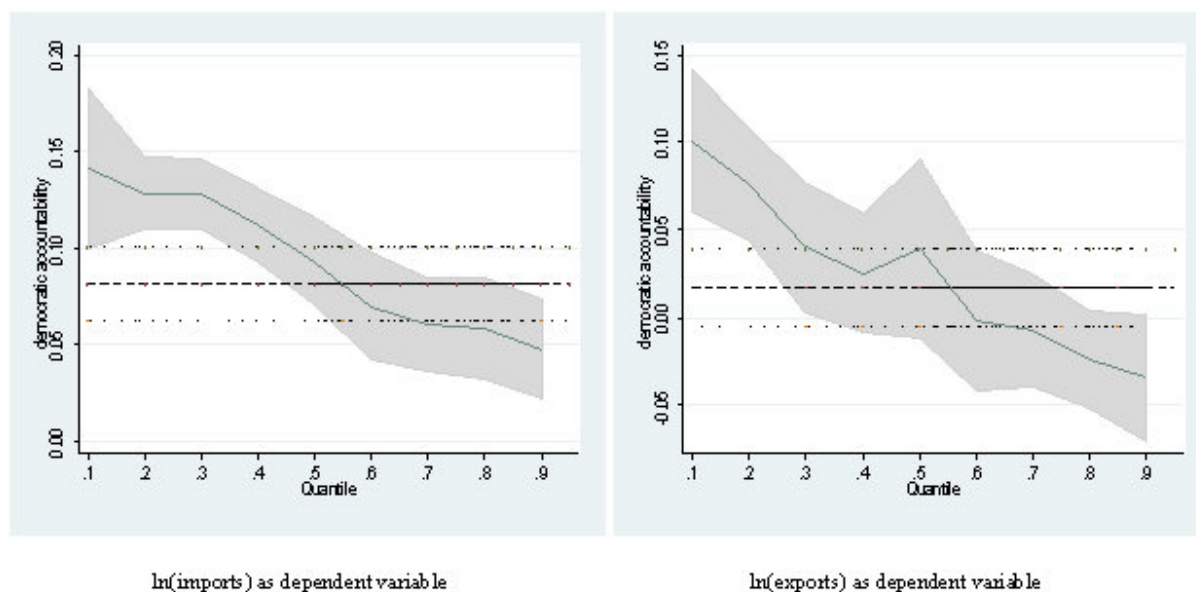
Quantiles	Year 2006		All years	
	ln(imports)	ln(exports)	ln(imports)	ln(exports)
0.10	0.0816	0.0644	0.1413**	0.1011**
0.20	0.1063**	0.0885	0.1279**	0.0764*
0.30	0.0911**	0.0379	0.1278**	0.0402
0.40	0.0873	0.0341	0.1121**	0.0255
0.50	0.0475	0.0334	0.0927**	0.0397
0.60	0.0387	-0.0209	0.0698*	-0.002
0.70	0.0495	-0.0269	0.0604*	-0.0076
0.80	0.0825**	-0.0173	0.0579	-0.0237
0.90	0.0376	-0.0043	0.0476	-0.0342
Observations	113	113	2379	2379

Source: Own elaboration based on the World Development Indicators and International Country Risk Guide.

Notes: Only coefficients for democratic accountability are shown in the Table. The full set of covariates was included in the regressions. Cluster-robust standard errors at the country level were computed. \*\* denotes significance at a 5 % level, \* denotes significance at a 10 % level.

FIGURE 3

Quantile estimation results for  $\ln(\text{imports})$  and  $\ln(\text{exports})$  –pooled regression



Source: Own elaboration based on data from the World Development Indicators and the International Country Risk Guide.  
 Note: This depiction shows the quantile estimates (blue line) for democratic accountability in the regressions for the log of imports and the log of exports. Moreover, confidence bands are plotted both for the quantile point estimate (the grey shaded area) and for the OLS estimate (the dotted lines).

The results in Table 5 only display the coefficients for the democracy variable.<sup>12</sup> For the sample of the year 2006, the effects appear to be significant only at the lower quantiles, that is the second and third quantile of the distribution of the importing activity. For the higher quantiles the effects of democracy on the trading activity get smaller or even negative for both importing and exporting activity, however these effects are not significant. One exception is a significant estimate around the eighth quantile for the importing activity, which means that there are also some countries that trade more while having higher levels of democratic accountability. However, seen over the whole range of quantile estimates, we can establish a strong diminishing tendency for the effects.

By including all years' observations in the regression analysis, we obtain a clearer picture over the whole range of variation in the data. For the importing activity, Table 5 shows a stronger impact of democracy on trade at the lower quantiles in the distribution of the trading activity. This relation diminishes along the quantiles. For the exporting activity, the relation is also shown to be stronger at the lower quantiles and diminishing over the quantiles. In fact, the coefficients become negative in the higher quantiles of the trading distribution. If the countries trade more, then a negative level of democratic institutions is associated with a higher trading activity. Figure 3 depicts this situation. We plot the distribution of the estimated coefficients for the explanatory variable democracy (blue line displays the point estimates and the grey-shaded area the confidence bands). The Figure displays that the influence of democratic accountability on both importing and exporting activity varies along the

<sup>12</sup> The results for further covariates' estimates are available from the authors upon request.



distribution of trading activity. There appears to be a positive impact at the lower quantiles, which is diminishing over the distribution of the trading activity. This correlates with results in the literature which favor no significant effect for both importing and exporting activity (Niccolini and Paccagnini (2011) in the case of institutions or Balding (2011) for democracy). The estimates appear to be statistically different from zero for most quantiles. Clearly, democratization appears to be more important at a lower degree of both importing and exporting activity. The effect diminishes over the distribution of countries' exports and imports. Moreover, we can see that the differential effects along the trading distribution are very different from the OLS estimates (dotted lines display the OLS point estimates and confidence bands).

### 4.3 PANEL QUANTILE ESTIMATION

#### 4.3.1. METHODOLOGY

Our empirical analysis employs a new panel quantile estimator as introduced by Powell (2014)<sup>13</sup>. The idea behind the use of the quantile regressions is to disentangle the differences of the impact of democracy on trade along the distribution of the trading activity across countries. The methodology refrains from the standard econometric techniques that focus on the conditional mean of the dependent variable. We can model the impact of an explanatory variable across the entire distribution of the dependent variable and thus capture the heterogeneity of effects. The analysis allows us to draw conclusions about whether the difference in trade between the democratic and the non-democratic countries is higher at the lower or upper end of the distribution of the trading activity. A simple OLS-estimator would deliver the average effect over the whole distribution, a relation that might not be representative for the outcome distribution. Moreover, a quantile estimator is also more robust to outliers and to non-normal errors than OLS.

Let us consider the following cross-sectional regression model:

$$y_i = D_i \beta(u_i^*) \quad . \quad (1)$$

In this set-up,  $y_i$  refers to either total exports or total imports,  $D_i$  is our explanatory variable of interest, democracy, and  $u_i^*$  is the error term. The democracy variable varies based on the total disturbance.

In the cross-sectional case, Koenker and Basset (1978) introduced a quantile estimator, which is based on the following idea. The mean is an adequate measure to describe the location of the mass of data points only if observations are stemming from a common normal distribution. If the observations' distribution, however, is skewed, or otherwise exceptional, other cut-offs in the distribution are needed to be investigated, the different

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<sup>13</sup> See Powell and Wagner (2014) for a recent publication that makes use of this methodology.

quantiles, to capture all aspects of variation in the data. By investigating the different quantiles, one might thus find that an effect is significant only for data observations in the left or right tail of the data's distribution.

For a regression framework as given in Equation (1), we can model a quantile function:

$$Q_{y_i}(q|d_i) = D_i'\beta(q) \quad (2)$$

where  $q$  stands for the quantile,  $q \in (0,1)$ , in the distribution of the dependent variable  $y$  and  $u^* \sim U(0,1)$  is randomly selected.

For the panel analysis, we employ an unconditional quantile regression estimator for fixed effects models as proposed by Powell (2014), named QRPD estimator. The benefit of applying the unconditional estimator is that we will be able to model how the variable of interest (the treatment variable) impacts the distribution of the outcome variable and not the distribution of the outcome variable conditional on all possible covariates. We thus gain unconditional quantile treatment effects. In addition, using the Powell estimator we can condition on country fixed effects. Powell (2013) describes that the inclusion of further covariates can produce biased estimates of the panel quantile function. Moreover, if  $\varepsilon_{it} | D \sim U(0,1)$ , ( $D$  is the democracy variable and  $\varepsilon_{it}$  is the disturbance term in a panel setting) conditioning on further covariates would not be necessary (Powell 2013). Conditioning on further covariates in a panel context creates problems related to the interpretation of the coefficients. Quantile regression allows investigating the effects for the variation in the outcome variable due to unobserved factors. If one adds further explanatory variables to the regression framework, some of this unobserved variation would be explained through the covariates, and this is consequently changing the interpretation of results (Powell 2012). Moreover, the traditional panel data estimator that we know from methodologies that focus on the conditional mean concentrates on the within variation of the data. However, in quantile regression, the correlation between fixed effects and further covariates will change the interpretation of the coefficients. In the traditional panel methodology, the data are demeaned. This, however, will change the distribution of the outcome variable. In our context, for example, think about the group of countries that bear the highest gains (considering the trade difference between countries according to a change in the democracy level) in trading activity. These might be countries not only in the upper tail of the data distribution, but also some countries in the lower tail of the trading distribution. After the demeaning procedure we will have an ordering of data points which ranks from those countries with lowest gains in trade up to those countries with highest gains in trade. The original order of countries from low to high trading activity is then destroyed! Consequently, we cannot demean the data, as we would thus change the country's placement in the data distribution. Instead, high

quantiles should refer to observations in the upper tail of the trading distribution and not to those observations that experience large increases in the outcome variable, higher than the mean effect.

When using panel data and conditioning on country fixed effects, by applying the Powell estimator we can capture cross-country heterogeneity (that does not change over time) and further unobserved factors that might influence the relationship between trade and democracy, especially those factors that influence trade but correlate with democracy. Therefore, we can cope with endogeneity concerns related to omitted variables that are correlated with democracy. Time fixed effects are considered in the model, as well.

In the panel framework the following regression model is considered:

$$y_{it} = D_{it}\beta(\varepsilon_{it}) \quad (3)$$

with  $D$  capturing the democracy variable. This translates to the following quantile function:

$$Q_{y_{it}}(q|D) = \delta_t(q) + D\beta(q) \quad (4)$$

with  $\delta_t$  as the time dummies and  $u_{it}^* = f(\alpha_i, u_{it})$  for an unknown function  $f$ . This is a main benefit of the Powell estimator, since other quantile estimators that use additive fixed effects will restrict the parameter of interest to vary only on the separated disturbance term  $u_{it}$ . Instead the QRPD estimator allows the parameters to vary based on the non-separable disturbance term  $u_{it}^*$ .

In this setting the estimates can be interpreted like traditional cross-sectional quantile estimates, and at the same time we can condition on fixed effects for identification purposes (Powell 2012, 2014).

To address the endogeneity that is suspected to be inherent in the democracy variable, we can further make use of a quantile instrumental variable regression methodology, also introduced by Powell (2014). We use a similar instrument in the spirit to that of Milner and Kubota (2005) (level of secondary school completion among the population over 15 years) but for females -- i.e female secondary schooling. With this measure we are able to capture the degree of gender inequality which has been found in the literature to exert a significant impact on economic development. The instrument was partly motivated from the study of Inglehart et al. (2002) that analyzes the relationship between gender equality and democracy. As they state in their research, the link is straightforward: given the high participation of the female gender in the total population, if women do not have the same political rights as men, the society cannot be characterized as democratic. This argument can also be extended to the female secondary schooling, if we believe that it is related to the real possibility that females have to receive an education. Inglehart et al. (2002) document a positive correlation between female participation in parliament and democratic institutions, and although there is no strong evidence on one determining the other, the "cultural" factors that reflect the position of society towards gender equality (as measured by their "survival

values" such as "men make better political leaders than women") and (in some specifications) religion seem to be a determinant of both. Given the importance of the cultural variables that depict the emphasis on gender equality and their association with democratization we believe that our proxy could suffice as instrument for democracy. Moreover, Barro (1996) has found a positive relationship between the years of females' schooling (of age 15 and above) and democracy and finally Fish (2002) has shown the negative relationship between female subordination to men (could be interpreted as "gender inequality" ) -- even controlling for economic development-- and democratic deficit. In the following, we will prove different valid statistics to control for the quality of the instrument.

#### 4.3.2. RESULTS

The panel quantile estimation methodology that is employed in our analysis is able to capture both country heterogeneity and further influences that are not taken up in the regression framework by means of including fixed effects. The results, which are given in Table 6, display that democratization generally is more important at the lower quantiles of the countries' distribution of the trading activity. When running an instrumental variable regression that is taking secondary education of females from the WDI (see also the Appendix) as the instrument, the results reveal again a diminishing tendency over the quantiles in the case of imports. Note, however, that the coefficient at the 7th or 8th quantile is an exception, resembling the results from Table 5. This indicates a positive link for some countries in the right tail of the trading distribution, as well.<sup>14</sup> For the exporting activity no clear evidence can be found which corresponds to the weak effects for exports already found by ordinary least squares regressions and to results from the past research literature (Balding (2011) e.g.).

As concerns the quality of the instrument, we run several tests. We computed the Cragg-Donald Wald F (CDWF) test to check for weak identification and the Angrist-Pischke (AP) and Kleibergen-Paap (KP) tests for identification of the reduced-form equation. The last two tests are able to assess whether the excluded instrument is correlated with the endogenous regressor. The statistics suggest that we can reject the null of weak instruments and of underidentification. For a regression of trade (imports or exports) on democratic accountability the statistics were CDWF: 553.63, AP: 785.97,  $p(0.000)$  and KP: 319.58,  $p(0.000)$  . With these tests we can acknowledge the strength and exogeneity of the instrument. Note that since we have exactly one instrumental variable for our endogenous regressor democracy, our testing equation is by definition exactly identified.

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<sup>14</sup> Note that exceptions in quantile estimations are common (see e.g. Powell and Wagner, 2014).

TABLE 6  
Panel quantile estimation

	Panel quantile estimator		Panel quantile instrumental variables estimator (secondary education of females)	
	ln(imports)	ln(exports)	ln(imports)	ln(exports)
Quantiles				
0.10	0.072	0.25**	-0.271	-1.186
0.20	0.126**	0.178**	0.807**	-0.628
0.30	0.036	0.009	0.933	-0.402
0.40	0.039	0.02	0.8**	-1.393
0.50	0.012	-0.038	0.711	-0.543
0.60	0.035	0.046	0.727**	-1.861
0.70	0.063	0.111*	0.369	0.971
0.80	0.013	0.062	1.713**	0.895**
0.90	0.041	-0.013	0.504**	0.565**
Observations	2966	2966	2365	2365

Source: Own elaboration based on the World Development Indicators and International Country Risk Guide..

Notes: Coefficients for democratic accountability are shown in the Table. The only treatment variable that was included in regressions was democratic accountability due to the course of methodology. The sample includes all countries. Cluster-robust standard errors were computed at the country level. For the panel IV quantile regressions secondary education of females was taken as instrumental variable.

General conclusions can be drawn from our regressions. The relationship between trade and democracy appears to be stronger for countries less involved in the trading activity, especially for imports. Moreover, our coefficients are not too different in size to the ones found in the literature. If one simply investigates the results conditional on the mean, the results of the relationship between democracy and trade could lead to wrong conclusions, since there appear to be heterogeneous effects across countries. Importantly, the effect of democracy on trade is in fact underestimated with OLS procedures for the group for which the effect is statistically significant for, namely those countries that are active in the lower quantiles of the trading distribution!

#### 4.4. FURTHER ROBUSTNESS CHECKS

To examine the robustness of our results, we conducted some further regression analyses. We ran further regressions with other measures capturing institutional quality, namely political liberties, civil liberties and corruption. Therefore, we extracted data on political liberties and civil liberties from the Freedom House database, as well as a variable measuring corruption from the ICRG. We recoded the Freedom House indices to bear higher values in case of a higher degree of political or civil liberties. A higher value on the index of corruption implies that there exists a lower degree of corruption in the countries. In the Appendix the range of values for these variables is documented.

TABLE 7  
Different institutional variables

		Political Liberties	Civil liberties	Corruption
<b>In imports</b>				
Pooled OLS		0.0116	0.0219	0.0078
		Quantile		
Cross-sectional quantile (2006)	0.25	0.0263	0.0409	-0.0199
	0.5	0.0178	0.0401	-0.0305
	0.75	0.0092	0.0338	-0.0063
	0.9	-0.0492	-0.0347	-0.0659
Pooled quantile	0.25	0.0272	0.0512	-0.0985**
	0.5	0.0036	0.0328	-0.0926**
	0.75	0.0055	0.0367	-0.0868**
	0.9	-0.0022	0.0306	-0.1044**
Panel quantile	0.25	0.133**	0.079	0.03
	0.5	-0.035	0.024	-0.08
	0.75	-0.101**	-0.096	-0.129
	0.9	0.022	0.041	-0.116
<b>In exports</b>				
Pooled OLS		-0.0363	-0.0338	-0.0289
		Quantile		
Cross-sectional quantile (2006)	0.25	-0.0103	-0.0154	0.1223*
	0.5	-0.0631	-0.0506	0.013
	0.75	-0.0483	-0.0597	-0.0787
	0.9	-0.0928**	-0.0673	-0.0988**
Pooled quantile	0.25	-0.0441	-0.0126	-0.1211**
	0.5	-0.0699**	-0.0669	-0.1213**
	0.75	-0.0477	-0.0359	-0.1145**
	0.9	-0.0733**	-0.0543	-0.1145**
Panel quantile	0.25	0.106	0.163**	0.007
	0.5	-0.074	-0.05	0.037
	0.75	-0.058	-0.059	-0.163
	0.9	0.038	0.098**	-0.16

Source: Own elaboration based on the World Development Indicators, International Country Risk Guide and Freedom House.

Notes: The Table only displays the coefficients for the institutional variables in regressions on either  $\ln(\text{imports})$  or  $\ln(\text{exports})$ . The sample includes all countries. The regressions include all covariates except for panel quantile estimation. Civil and Political Liberties were taken from Freedom House data; Corruption was taken from the International Country Risk Guide. Cluster-robust standard errors at the country level were computed. \*\* denotes significance at a 5% level, \* denotes significance at a 10% level.

The results that are given in Table 7, reveal that generally a diminishing relationship between institutions and trade over the distribution of countries' trading activity persists, no matter what the institutional variable that we control for is. The coefficients for all three alternative measures of institutional quality through OLS estimation remain insignificant.

Our results for the coefficient of corruption (for cross-sectional and pooled quantile estimates) are in line with evidence found in the literature for a positive relationship between corruption and trade (see Dutt and Traca 2009 who explain that corruption can have a trade-enhancing effect). The negative coefficient indicates that a higher level of corruption is conducive for the trading activity of countries.

To summarize, our results indicate that one has to separate the effects between the importing and exporting activity, as seen for the effects of civil and political liberties on either importing or exporting activity. Furthermore, the robustness checks display that there is obviously a diminishing effect of institutions on trade.

## 5. CONCLUSIONS

Institutions —democracy, the rule of law, type of governmental system etc.-- and their effects on economic outcomes have been an important research topic in the past decades. Rodrik (1997, p.2 and p.3) has demonstrated that “democracies yield long-run growth rates that are more predictable; produce greater stability in economic performance; handle adverse shocks much better; and pay higher wages”. Aside from the investigations about the influence of institutions on economic growth and development, a strand of the literature has focused on the effect of democratization on countries’ trading activity and has mostly established a positive link. However, scholars have acknowledged that the relationship might be subject to endogeneity, suggesting that the link between democracy and trade is not as stable and absolute as general traditional econometric estimates would suggest. The literature has neglected in several occasions to take into account the cross-country heterogeneity of the effects. Democratization is said to enhance the trading activity through guaranteeing favorable institutions that will provide better market conditions like a higher degree of property rights or rule of law or in another context by restricting the political rulers’ power and space for discretion. Nevertheless, there are countries in the world that are important players in the global economic network and for them the relationship between democratization and trading activity appears to be another one than what the traditional results in the literature would imply. Our analysis therefore contributes to the literature by quantifying these differential effects. Therefore, we have introduced a new panel quantile estimator by Powell (2014) to the trade literature. Our results are able to model particularly the non-significant or even negative effects for those countries that are active in the higher quantiles of the trading distribution.

In this paper we have analyzed the impact of democracy on trade along the distribution of countries’ trading activity. We find a strong relationship at the lower quantiles, especially for the importing activity. We can show that the degree of democratization is more capable to explain the trading activity at its lower level. This correlates to the effect that Barro (1996) found for democracy and economic growth – democracy does not matter equally for all countries. We focus on a widely neglected issue in the past literature: countries with a high trading activity are not necessarily the most democratic states in the world. To rephrase it, some economies that bear less favorable institutions might be more important in the worldwide economic network and trade intensively. Looking at the conditional mean only leads to the wrong conclusion that the relationship between

democracy and trade is the same across different countries. Importantly, our results imply that the effect of democracy on trade is underestimated with OLS procedures for the group of countries for which the effect is statistically significant, namely those countries that are active in the lower quantiles of the trading distribution. The past literature suggests that the evidence for the link between democracy and trade is not so clear and even contradictory in terms of the sign of the relationship. Our differential results also hold when performing several robustness checks like taking other measures for the institutional framework and panel quantile instrumental variable estimation, respectively.

Our analysis enriches the literature about the nexus between globalization and democratization by drawing attention to heterogeneous cross-country effects, besides taking into account the potential endogeneity concern. For those countries that are participating less in the global exchange network, an increase in democratization will bear a sizable impact on the trading activity, especially for the imports. Helping the democratization of a country that is not yet too open to international trade will thus enable a differential increase of other countries' exports. This favors several institutions' efforts—like the World Bank or the IMF—to strengthen institutional frameworks in developing countries, in particular.

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## 7. APPENDIX

### 7.1 LISTS OF COUNTRIES

#### **Full sample**

Albania Algeria Angola Argentina Armenia Australia Austria Azerbaijan Bahamas. Bangladesh Belarus Belgium Bolivia Botswana Brazil Brunei Darussalam Bulgaria Burkina Faso Cameroon Canada Chile China Colombia Congo. Dem. Rep. Congo. Rep. Costa Rica Cote d'Ivoire Croatia Cuba Cyprus Czech Republic Denmark Dominican Republic Ecuador Egypt. Arab Rep. El Salvador Estonia Ethiopia Finland France Gabon Gambia. The Germany Greece Guatemala Haiti Honduras Hungary Iceland India Indonesia Iran Ireland Israel Italy Japan Jordan Kazakhstan Kenya Korea. Rep. Latvia Lebanon Liberia Lithuania Luxembourg Madagascar Malaysia Mali Malta Mexico Moldova Morocco Mozambique Namibia Netherlands New Zealand Nicaragua Nigeria Norway Pakistan Panama Paraguay Peru Philippines Poland Portugal Romania Russian Federation Senegal Sierra Leone Singapore Slovak Republic Slovenia South Africa Spain Sri Lanka Sweden Switzerland Syria Tanzania Thailand Togo Trinidad and Tobago Tunisia Turkey Uganda Ukraine United Arab Emirates United Kingdom United States Uruguay Venezuela, RB Vietnam Yemen, Rep. Zambia Zimbabwe

#### **OPEC (Organization of the Petroleum Exporting Countries)**

Algeria, Angola, Ecuador, Iran, Nigeria, United Arab Emirates, Venezuela

#### **High-income countries (World Bank definition, 2012)**

Australia, Austria, Bahamas, Belgium, Brunei Darussalam, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan Korea Rep., Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Russian Federation, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States, Uruguay

#### **Low-income countries (World Bank definition, 2012)**

Bangladesh, Burkina Faso, Congo Dem. Rep., Ethiopia, Gambia, Haiti, Kenya, Liberia, Madagascar, Mali, Mozambique, Sierra Leone, Tanzania, Togo, Uganda, Zimbabwe

## 7.2 DESCRIPTIVE STATISTICS

TABLE A.1

Variable		Mean	Std. Dev.	Min	Max	Observations
ln(imports)	overall	23.45421	1.85718	18.72399	28.43502	N = 3076
	between		1.760899	19.43091	27.78918	n = 116
	within		.556765	20.50077	25.28292	T-bar = 26.5172
ln(exports)	overall	23.36831	2.020871	18.12847	28.24482	N = 3076
	between		1.944447	18.74703	27.53832	n = 116
	within		.55149	20.44652	25.33321	T-bar = 26.5172
Democratic accountability	overall	3.980636	1.599362	0	6	N = 3140
	between		1.357036	.9382184	6	n = 116
	within		.8643651	.9030496	6.966268	T-bar = 27.069
ln(GDP)	overall	24.51003	1.984636	18.46071	30.28649	N = 3253
	between		1.950714	20.0189	29.962	n = 116
	within		.3289757	22.95183	25.83804	T-bar = 28.0431
ln(population)	overall	16.29464	1.588106	12.28712	21.02389	N = 3364
	between		1.586824	12.53286	20.92093	n = 116
	within		.1582219	15.44263	17.4177	T = 29
land-labor ratio	overall	.0962607	.1827849	.0002317	1.84579	N = 2668
	between		.1800241	.0003275	1.29877	n = 116
	within		.0356229	-.2202494	.6432802	T = 23
capital-labor ratio	overall	.5102899	.6463172	.0013628	4.423858	N = 2479
	between		.616684	.0013628	3.375043	n = 116
	within		.1651163	-.534113	2.185261	T-bar = 21.3707
Political liberties	overall	4.721418	2.10514	1	7	N = 3245
	between		1.912115	1.068966	7	n = 116
	within		.898072	.2386589	8.273142	T-bar = 27.9741
Civil liberties	overall	4.653929	1.78692	1	7	N = 3245
	between		1.620934	1.172414	7	n = 116
	within		.7553842	1.033239	7.199384	T-bar = 27.9741
Corruption	overall	3.113031	1.381139	0	6	N = 3140
	between		1.163684	.6364943	5.988506	n = 116
	within		.7328772	.2796975	5.334295	T-bar = 27.069
Secondary education of females	overall	48.22816	5.583228	23.45567	64.63734	N=2594
	between		5.252336	29.44592	58.47588	n=116
	within		2.400711	31.59019	58.21243	T-bar=22.3621

### 7.3 DATA SOURCES AND VARIABLE DESCRIPTION

Table A.2

Variables	Source	Description
Exports	World Development Indicators	Exports of goods and services (constant 2005 US\$)
Imports	World Development Indicators	Imports of goods and services (constant 2005 US\$)
GDP	World Development Indicators	GDP (constant 2005 US\$)
Population	World Development Indicators	Population (Total)
Land/ labor ratio	World Development Indicators	= Land area (sq. km) / Labor force, total
Capital / laborratio	World Development Indicators	=Gross capital formation (constant 2005 US\$) (divided by 10000)/ Labor force, total
Secondary schooling of females	World Development Indicators	Secondary education, general pupils (% female)
Political Liberties	Freedom House	The index was inverted such that higher values represent a higher degree of political rights
Civil Liberties	Freedom House	The index was inverted such that higher values represent a higher degree of civil rights
Democratic Accountability	International Country Risk Guide	Higher values represent a higher degree of democratic accountability
Corruption	International Country Risk Guide	Higher values represent a lower degree of corruption

### 7.4 CORRELATION MATRIX

TABLE A.3

	Inimports	Inexports	democracy	Second.Educ. Females	Political liberties	Civil liberties	Corruption
Inimports							
Inexports	0.9793						
democracy	0.5199	0.5021					
Second.Educ. Females	0.3569	0.3951	0.4357				
Political liberties	0.4357	0.4295	0.7948	0.446			
Civil liberties	0.4468	0.445	0.7813	0.4591	0.9264		
Corruption	0.3583	0.3663	0.52	0.3274	0.512	0.5272	