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Exchange rate elasticity of exports and the role of institutions

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Abstract

The impact of institutional quality on the exchange rate-export relation is assessed in a panel of 33 countries and quarterly time period of 1991Q1- 2016Q3. Empirical estimation is conducted in 2 steps. As a first step, using panel DOLS, FMOLS and PMG estimation techniques, it is confirmed that a negative and significant relation between exchange rates and exports exists. The estimation suggests that in the countries under study, 1% appreciation of the real effective exchange rate leads to, approximately, 0.55% decrease in total exports on average, holding other variables constant. In a separate cross-sectional estimation using simple OLS, some empirical evidence has been found to prove that institutional quality positively affects the exchange rate elasticity of exports. Also it has been shown that in oil exporting countries institutional quality has a greater impact on exchange rate-export link, compared to oil importers. But these results are only weakly significant and are not robust to the use of other proxy variables.

JEL classification: F14, F31, D73, C31, C33

Keywords: exchange rates, exports, institutional quality, oil exporters, panel data

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1. Introduction

Ensuring macroeconomic stability is one of the primary goals of central banking. In the framework of current highly unstable global economic environment, an openness of the economy imposes particular challenges in the way of attaining macroeconomic stability. Exchange rate is a main channel through which global shocks can feed through to national economy. Many countries' central banks use exchange rate policy to mitigate such shocks. Based on this idea this research will clarify the relationship between exchange rates and exports for oil exporting and oil importing countries, which are more prone to be affected by such external shocks as oil price fluctuations.

Standard theoretical models suggest a negative relationship between exchange rates and exports: that is a depreciation of currency makes local products cheaper than imported goods and thus, promotes export sectors increasing their competitiveness. A recent study by IMF summarizes literature on exchange rate and export link by saying 'a 10 percent real effective depreciation in an economy's currency is associated with a rise in real net exports of, on average, 1.5 percent of GDP, with substantial cross-country variation around this average.' (IMF, October 2015, Chapter 3, p.105). This makes currency devaluations one of the most effective monetary tools used by policymakers to boost exports. However, as historical evidence suggests, currency devaluations do not always lead to a better export performance. Especially the experience of Japan after the Global Financial Crisis cast doubts on the validity of exchange rate-exports link in practice. Recent large movements in exchange rates of developing, as well as developed countries, in the background of intense global economic situation, raise questions about likely effects of these movements on trade and especially, export performance of those countries. In line with the predictions of theoretical models, trade balances adjust to the changes in exchange rates after some lags. Therefore, it is of a particular interest for us to determine long-run relationships.

Building on this evidence, this research attempts to identify whether currency depreciation leads to increased exports in a panel of oil-exporting and oil-importing countries. Our main interest variable will be the quality of institutions. The intuition behind is that countries with high institutional quality might be automatically more exposed to trade, or the demand elasticity of exports in those countries can be higher. On the other hand, institutional barriers to market entry, such as high levels of corruption, lack of property rights, poorly enforced contracts may make it difficult for firms to enter markets, in which case the export performance will fail to improve significantly, despite large currency devaluations.

Empirical literature provides evidence that oil wealth promotes institutional problems and retards growth by generating Dutch disease. This research contributes to the strand of literature by looking at the impact of these institutional issues on the relationship of exchange rates and exports. The idea is that in oil-dependent countries currency devaluations do not lead to a better export performance, unless they are accompanied by institutional reforms. The study aims to compare the long-run effects of currency depreciation on export performance in oil exporting and oil importing countries, while especially looking at the impact of institutional quality on this relationship.

The research can have important policy implications. Recently many oil exporting countries' currencies underwent significant depreciations following oil price shocks, and this is expected to have a positive impact on countries' exports. Thus, finding out whether the link between exchange rates and export performance is lost and the identification of factors causing the loss of the link in countries having similar historical and economic backgrounds can be helpful for the policymakers in carrying out reforms intended to restore this relationship.

Results of the empirical estimation suggest that strongly significant negative relationship between exchange rates and exports still persists in the countries under study. Some evidence has been found to prove that high institutional quality is associated with tighter relationship between exchange rates and exports. Also we found evidence showing that being an oil exporting country reduces exchange rate elasticity of exports, as predicted. However, these results are only weakly significant and are not robust to the use of different proxy variables. In terms of economic intuition, these results can relate to the fact that institutional quality mainly affects the decisions of the corporations whether to enter the market or not. However, if the firm is already in the market, it can basically change their production and export levels, following exchange rate movements, and this is sufficient for the negative relationship between exchange rates and exports to be restored.

The rest of the paper is structured as follows: the second section explores the relevant literature, while sections 3 and 4 present the methodology and data sources used. Section 5 explains the results of the research, and section 6 concludes.

2. Exchange rate elasticity of exports: main determinants

According to the standard trade theory, currency depreciation leads to a decrease in the price of domestic goods expressed in foreign currency, while the price of imported goods in foreign currency increases. This causes a shift in the demand from foreign to domestic goods which, in its turn, improves trade balance. The primary shortcoming of this theory – assumption of unconditional improvement in trade balance following currency devaluation – is addressed by different theoretical models thereafter. Marshall-Lerner condition states that relationship between exchange rates and trade balance depends on the price elasticity of exports and imports. J-curve phenomenon explains the lag between the adjustments of exchange rates and the reaction of trade balance, by pointing out to the short-term stickiness of prices. Ali, Johari and Alias (2014) provide a brief chronological review of theoretical models explaining the impact of currency devaluations on trade balance.

While theoretically there is a straightforward link from exchange rates to exports, empirically this connection is less clear-cut. This has led Obstfeld and Rogoff (2000) to name exchange rate disconnect puzzle among "the six major puzzles in international macroeconomics". Given the experiences of mainly East and Southeast Asian countries, it is widely believed that currency undervaluation boosts growth through its impact on exports. By pointing out the experiences of Uganda and Tanzania, Rodrik (2008) shows that this phenomenon is not exclusively specific to Asian countries. But author specifically stresses the fact that the countries achieving higher growth rates by undervaluing currency, at the same time have undergone significant institutional reforms.

Baldwin and Krugman (1989) also agree with the importance of institutional quality and focus on the entry costs of firms to the markets. In their seminal paper authors show that the impact of exchange rate movements on trade flows can be persistent, depending on the extent of the sunk entry cost. The argument is simple to follow: a large depreciation of currency reduces entry costs and makes it profitable for firms to enter export markets. But when currency appreciates, firms find it profitable to stay in the market despite having negative profit in the short-run, because of the sunk entry cost. The hysteresis effect depends on the extent of the entry costs: when sunk cost is small, firms have higher probability of entering export market after currency depreciation, also it is easier for them to exit after appreciation. Anderson and van Wincoop (2004) empirically prove that trade costs can have significant influences on bilateral trade flows. The authors use tariff and non-tariff barriers to trade, as well as the quality of institutions to proxy for trade costs.

Another important strand of literature explores the link between the volatility (instead of movements) of exchange rates and trade flows. Using a gravity model, Rose (2000) identifies that 1 standard deviation decrease in exchange rate volatility is associated with 13 percent increase in bilateral trade. On the other hand, employing five panel data estimation techniques, Hondroyiannis et al. (2008) fail to find any negative and significant impact of exchange-rate volatility on real exports.

The spread of global value chains has recently attracted attention in explaining the exchange rate-export link disconnect. Ahmed, Appendino and Ruta (2015) analyze the changes in the elasticity of exports with regard to exchange rates on a panel of 46 countries and the impact of the formation of global value chains to this elasticity, and find evidence that on average 40% of the fall in the elasticity is associated with increasing integration to global value chains. The intuition behind this is that as countries get more and more integrated in the global production process, the production of export goods becomes more dependent on imported inputs. Currency depreciations increase the competitiveness of domestic value added in exports, but also raise the cost of imported intermediate products and thus, the exchange rate elasticity of export falls.

3. Methodology

Empirical estimation is conducted in 2 steps.

As a first step we estimate our export function, to identify the relationship between exports and exchange rates. Standard approach to estimating an export function in the relevant literature is the use of real effective exchange rates and a measure of demand for exports as explanatory variables. In addition to these, we also control for the total imports as an additional RHS variable. The inclusion of total imports to the export function can be justified by the fact that countries with more trade openness tend to have both high exports and imports levels. Also, as already noted above, exports nowadays are more and more dependent on imported intermediate products, so total imports can represent a measure of control for these effects. The first empirical work, examining cointegrating relationship between exports and imports, was carried out by Husted (1992), who found a significant long-run relationship and concluded that export and import levels of US tend to converge in the long-term. Although subsequent research could not identify conclusive results with regard to the exports-imports link, the presence of a cointegration relationship between them is desirable to ensure the sustainability of trade deficit.

The estimating equation is specified in pooled OLS form as follows:

$$Ln(Exp)_{it} = \beta_0 + \beta_1 Ln(REER)_{it} + \beta_2 Ln(Demand)_{it} + \beta_3 LnImp_{it} + \varepsilon_{it} \qquad (1)$$

A linear trend is also incorporated into the model, to take into account the rapid globalization process around the world. However, even without the time trend, the results would not have changed much in terms of signs and significance levels, with only minor changes in the magnitude of the estimated coefficients.

To estimate the equation (1), we employ macro panel data techniques, such as panel unit root tests, panel cointegration tests and panel cointegration estimations. The main shortcoming of micro panel data methods (fixed, random effects, GMM, etc.) is that, unlike macro panel techniques, they limit heterogeneity to fixed effects and assume homogenous slopes across cross-sections. If true dynamics are heterogeneous, these methods can result in inconsistent estimation (in case of IV and GMM) or, at best, need to be reinterpreted (in case of fixed effects).

Panel unit root tests will allow us to identify the order of integration of variables and whether cointegration estimation is appropriate in our case. After making sure that cointegration relationship between variables exists, we will proceed to the estimation.

For estimation purposes group mean Dynamic Ordinary Least Squares (DOLS) (Pedroni, 2001) and group mean Fully Modified OLS (FMOLS) (Pedroni, 2000) models are employed, and the results are compared to those obtained from Pooled Mean Group (PMG) estimator (Pesaran et al., 1999). As already noted above, traditional fixed and random panel data models treat all parameters as homogenous. DOLS, FMOLS and PMG estimators, on the other hand, allow for heterogeneity in short-run dynamics, while constraining long-run parameters to be identical across cross-sections. Thus, these methods allow us to capture long-run relationships.

PMG estimator for panel data relies on autoregressive distributed lag (ARDL) approach to cointegration. The main advantage of ARDL approach is its suitability to be applied to the variables with different order of integration. It allows for different lag orders for different variables (Banerjee et al., 1993).

Nonetheless, FMOLS and DOLS models are preferred over PMG estimation, mainly because unlike PMG, these two models allow for complete endogeneity. In the presence of endogenous variables the use of standard fixed-effects estimation is not appropriate, because of the existence of a second-order bias, and this bias is not corrected even if the cross-sectional dimension grows large (Neal, 2013). Individual FMOLS estimators correct for endogeneity and serial correlation by directly estimating long-run covariances. Individual DOLS estimators correct for endogeneity and serial correlation parametrically, using lags and leads. Panel DOLS and FMOLS estimators are calculated as the group-mean of individual DOLS and FMOLS estimators, respectively. The fact that DOLS and FMOLS estimation provide us with individual coefficient estimates for different countries is another advantage of these methods over PMG, as these individual coefficient estimates are then used in the second step of our empirical estimation.

In this paper the preference is given to DOLS estimation and the coefficient estimates for individual countries, used in cross-sectional analysis, are also those found from DOLS estimation, since Neal (2013) states that according to Monte Carlo testing panel DOLS estimation can perform slightly better than FMOLS. Nonetheless, the estimation involving the use of individual country coefficients from FMOLS model produces similar results in terms of signs and significance levels, with only slight differences in the magnitudes of the effects (presented in Appendix section).

Second step of the estimation, involving the use of individual DOLS coefficient estimates for real effective exchange rates – β_1 in equation (1) – as the dependent variable, can be represented by the following equation:

$$\hat{\beta}_{1i} = \gamma_0 + \gamma_1 Inst.Qual._i + \gamma_2 Dummy_{OilExp} + \gamma_3 Inst.Qual * Dummy_{OilExp} + \epsilon_i \qquad (2)$$

We use 4 different specifications of equation (2): (a) only with institutional quality; (b) only with a dummy for oil exporters; (c) with both institutional quality and oil exporter dummy; and finally, (d) with institutional quality, oil exporter dummy and an interaction term between these two. The dummy variable gets the value of 1, if the country is oil-exporting and 0, if it is oil-importing. For robustness purposes, another measure of institutional quality and a variable, showing the oil dependence levels of the countries instead of the oil-exporting dummy, are employed (*see* Data description section for further details).

The impact of institutional quality and dependence on oil exports to the demand elasticity of exports is also tested, using individual country coefficient estimates for demand elasticity of exports ($\hat{\beta}_{2i}$) obtained from equation (1):

$$\hat{\beta}_{2i} = \gamma_0 + \gamma_1 Inst.Qual._i + \gamma_2 Dummy_{OilExp} + \gamma_3 Inst.Qual * Dummy_{OilExp} + \epsilon_i \qquad (3)$$

The reason, why we decided to do separate cross-sectional estimation and did not include institutional quality and oil dependence as additional variables in equation (1), relates to the stationary nature of these variables: as institutional quality in a country is relatively steady over time, the time dimension of this variable would not provide us with significant information. Therefore, it does not make sense to include institutional quality variable to the cointegrating vector, where all the other variables have trends. On the other hand, most of the available institutional quality variables are measured at an annual frequency, which constrains their use in research involving higher frequency time dimension. The idea here is to determine, if the relationship between exports and exchange rates is different in countries with permanently low quality of institutions, compared to the countries having permanently high institutional quality. The same argument holds for the oil dependence levels too.

4. Data description

Most of the literature exploring exports-exchange rates link make use of panel data, and our research is no exception. Regression analysis is conducted for 33 countries for quarterly time period of 1991Q1-2016Q3. The countries are chosen based on their net oil export levels[4], so that all the countries included are either among top 20

[4] Net oil export levels are calculated as*: Net oil exports= Oil exports – Oil imports*, where oil exports – daily crude oil exports (bbl/ day); oil imports – daily crude oil imports (bbl/ day).

net oil exporters or among top 20 net oil importers[5] (for full list of countries, *see* Appendix, Table A1). Export and import data for oil is taken from CIA, World Factbook.

Our main data source is the Global Economic Monitor (GEM) database of World Bank. Data on total merchandise exports, total merchandise imports and CPI is acquired from this dataset, and all data is seasonally adjusted by construction. Data on total exports and imports are reported in current LCU. In order to express trade statistics in real values, domestic CPI is employed, and total exports and imports are converted from current LCU to constant 2010 LCU.

To account for the demand for exports of a country, weighted average of GDPs of its 5 major export partners[6] is calculated. Data on the share of export partners in total exports as of 2015 is acquired from IMF, Direction of Trade Statistics (DOTS). GDPs of the export partner countries originally obtained from GEM dataset are seasonally adjusted and expressed in current USD. After calculating the demand for exports of each country in our sample as the weighted average GDP of its main export partners in current USD, we made use of the spot exchange rates to convert the data to current LCU. Then the data is expressed in constant 2010 LCU using domestic CPI.

Historical real effective exchange rates (REER), taking into account 41 trading partners for each country, is retrieved from the dataset of the Bruegel. Dataset provides us with monthly data, and we use end of quarter data points.

For the second stage of the analysis cross-sectional data for the same 33 countries in 2015 is employed.

To measure institutional quality we use 2 different indices interchangeably. Firstly, we take 6 variables from World Bank, World Governance Indicators (WGI) and calculate their simple average. The variables are Control of Corruption, Government Effectiveness, Regulatory Quality, Political Stability and Absence of Violence/Terrorism, Rule of Law, and Voice and Accountability, each of which change between [-2.5; 2.5].

For robustness purposes, an additional institutional quality variable is also calculated. 4 variables from International Country Risk Guide (ICRG) – namely Bureaucracy quality, Corruption, Investment profile, Law and order –are taken, and a single institutional quality index as the weighted average of these variables is calculated. We take the last annual data available from this dataset, which is 2009.

[5] We did not include all of those 40 countries due to the lack of data for some countries (such as Angola, Kuwait, Venezuela, etc.). Iran and Saudi Arabia are dropped from the estimation afterwards, because the estimation yielded inconceivably high coefficient estimates and as a result, created an upward bias in group-mean estimate.

[6] When GDP data for one of the 5 major export partners is not available, for some of these countries we made use of the weighted average of only 4 export partners, and for others, data on another – 6th export partner is taken instead, given that their share in exports is very close to the substituted country's (the difference between their shares in exports not exceeding 1 percentage point).

To proxy oil dependency, we use data on fuel exports as a percent of merchandise exports acquired from World Bank, World Development Indicators (WDI). To check for robustness, this variable is used interchangeably with a dummy showing oil-exporting countries.

Table 1 presents the summary statistics for the variables.

Table 1. Summary statistics of the variables

Variables	Obs	Mean	Std. Dev.	Min	Max
LnTotalExports	3208	11.76	2.94	-2.21	18.82
LnREER	3195	4.56	0.21	2.44	5.24
LnDemand	3044	15.77	2.44	6.19	21.76
LnTotalImports	3233	11.45	3.65	-5.30	18.78
Dummy_oilexp.	31	0.42	0.50	0	1
Oil dependence	31	32.58	34.31	1.46	95.22
Institutions_wgi	31	0.43	0.89	-1.07	1.77
Institutions_icrg	31	6.19	1.30	2.96	7.86

5. Results

We begin the analysis by testing the stationarity of the variables. For this purpose, unit root test developed for panel data by Im, Pesaran and Shin (2003) is employed. The main advantage of the IPS test over early generation panel unit root tests is that it allows for heterogeneity in all parameters. The test is based on estimated group mean of the parameter of interest. The null hypothesis states that each series have a unit root. Rejecting the null means some series are stationary. Serial correlation in the error term is modeled using lags. The lag length is chosen based on Bayesian Information Criterion (SIC), with a maximum of 4 lags, since our data is quarterly. The variables have mixed order of integration (Table 2). 3 of the variables – log of total exports, log of REER and log of imports are stationary at levels, while the remaining one – log of demand for exports is I(1). After seeing that the order of integration of variables is mixed and the maxiumum order of integration is 1, we proceed to testing for cointegration.

Table 2. Panel unit root test

IPS test statistics	**LnExp**	**LnREER**	**LnDemand**	**LnImp**
Levels	-1.85**	-3.32***	-0.003	-1.94**
First difference	-44.84***	-52.03***	-37.19***	-49.06***
Null hypothesis:	Unit root (Individual unit root process)			

Note: Asterisks indicate relative significance levels: *** p<0.01, ** p<0.05, * p<0.1

To test for cointegration, panel cointegration tests developed by Pedroni (1997, 1999, 2004) are employed. Pedroni test provides us with 7 test statistics – 4 pooled 'within dimension' and 3 group mean 'between dimension' tests. 'Group mean' statistics average individual country test statistics, while 'panel' test results pool the statistics along the within-dimension (Neal, 2013). The main advantage of these tests is that they allow for heterogeneity in dynamics and cointegrating vectors, also allow for full endogeneity. In practice, sometimes the results from different tests contradict with each other, and deciding which one of these tests to trust more is not straightforward. Pedroni (2004) states that when the time dimension is short (less than 100 observations), group and panel ADF test statistics have the best properties. In our case, all of the test statistics are highly significant and reject the null of no cointegration at 1% confidence level (Table 3). Based on these test results and the theoretical predictions of long-run relationship between variables, we can conclude that there is found to be a cointegrating relationship and proceed to the next step.

Table 3. Pedroni cointegration test

Series:	*LnExp LnREER LnDemand LnImp*		
Test statistic	**Result**	**Test statistic**	**Result**
panel v	2.53***	*group rho*	-5.78***
panel rho	-4.80***	*group pp*	-6.65***
panel pp	-5.19***	*group ADF*	-5.51***
panel ADF	-3.01***		
Null hypothesis:	No cointegration		

Note: Asterisks indicate relative significance levels: *** p<0.01, ** p<0.05, * p<0.1

Finally, we can estimate our model. All three models produce similar results in terms of signs and significance levels of the coefficient estimates, with only slight differences in the magnitudes of the effects (Table 4). Based on these results, we find a significant negative relationship between total exports and real effective exchange rates. Also demand for exports and total imports are found to be significantly positively associated with total exports

According to panel DOLS estimation results, 1% appreciation in real effective exchange rates is associated with approximately 0.55% decrease in total exports. An increase in the demand for exports by 1% leads to a 0.28% rise in total exports. The magnitude of the change in exports associated with a 1% change in a country's imports is higher – approximately 0.69%.

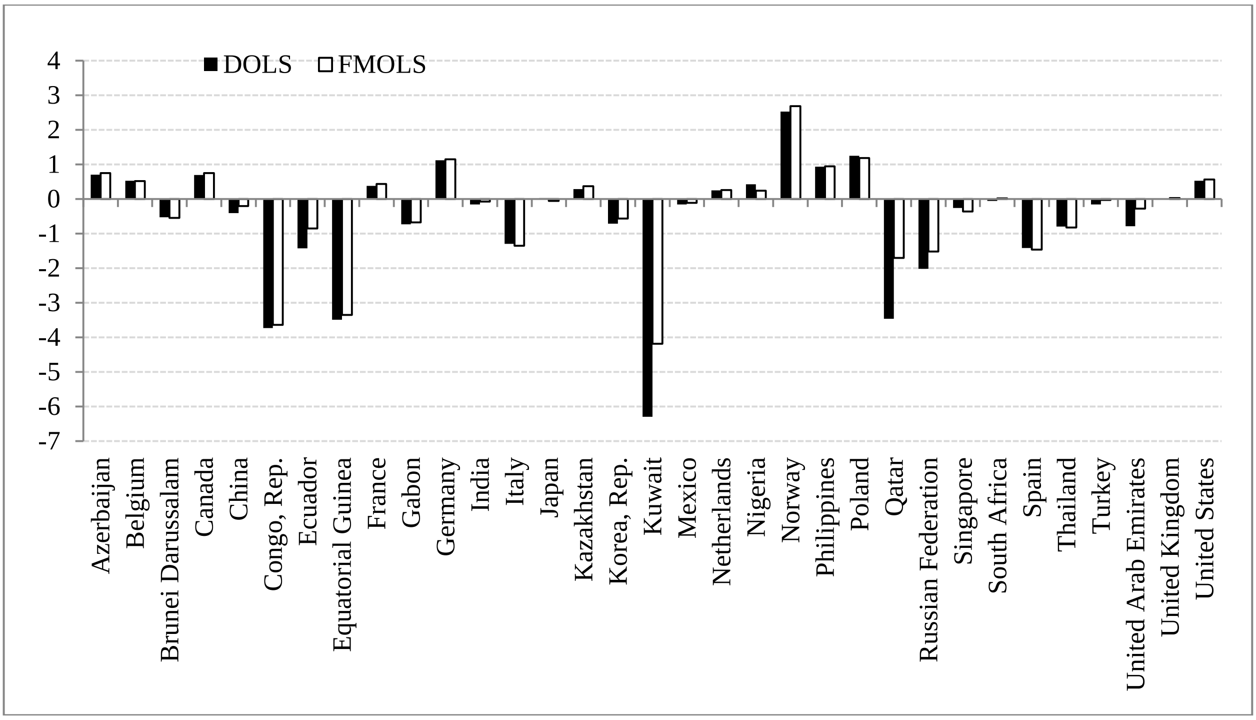
Table 4. Estimation output

Variables	Results		
	DOLS	FMOLS	PMG
LnREER	-0.55***	-0.36***	-0.46***
	(0.086)	(0.081)	(0.090)
LnDemand	0.28***	0.36***	0.15***
	(0.072)	(0.074)	(0.064)
LnImports	0.69***	0.74***	0.70***
	(0.030)	(0.026)	(0.034)
Observations	2923	2934	2932

Note: Standard errors in parentheses. Asterisks indicate relative significance levels: *** p<0.01, ** p<0.05, * p<0.1

But one should not forget that the long-run coefficient estimates for panel DOLS and FMOLS estimation, provided in Table 4, is the group-mean of individual country coefficients. We cannot draw conclusive results from these estimates without looking at the individual country coefficients. A glance at the individual country coefficient estimates (Figure 1) is enough to see that most of the countries in our sample have negative exchange rate elasticity of exports.

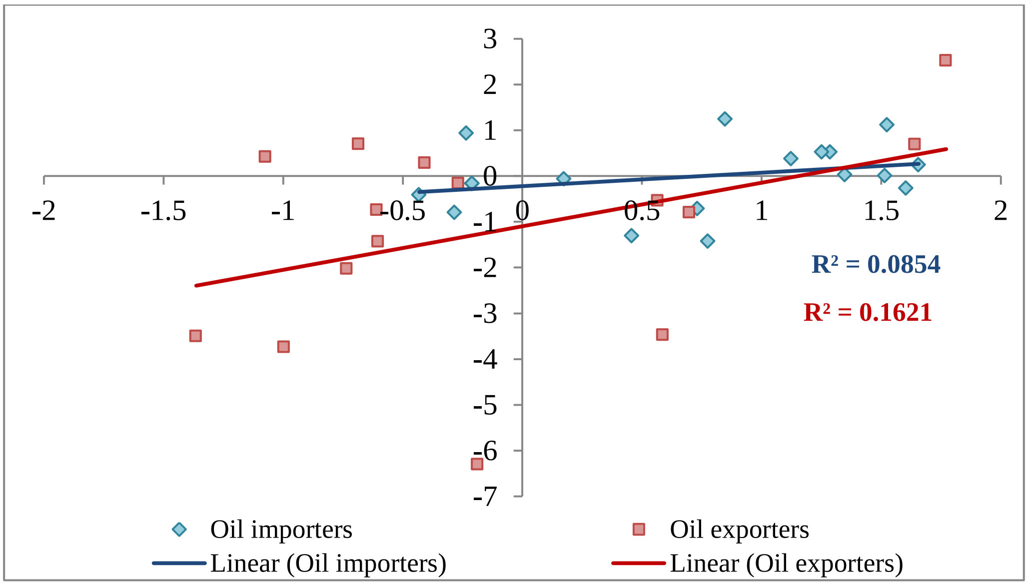
Figure 1. Individual country coefficient estimates for exchange rate elasticity of exports



Only a handful of countries have coefficient estimates that can be seen as an outlier, considering the magnitude of the estimate. These are Congo Republic, Equatorial Guinea, Kuwait, Norway and Qatar. One cannot help but notice that all of these countries are oil exporters, which is in line with our intuition that in oil exporting countries the link between exports and exchange rates differ from that of other countries. Whether this is related to the quality of institutions in those countries is another point of interest for us.

The scatterplot of the relationship between estimated coefficients and the quality of institutions discloses an interesting tendency (Figure 2). For this purpose we employed institutional quality index from WGI (*see* Data description). The scatter plot for oil importers has an R-squared value of 0.085, while for oil exporters this value is 0.162 – almost 2 times higher. In other words, in oil exporting countries difference in exchange rate elasticity of exports is twice more likely to be explained by the institutional quality, than in oil importing countries.

Figure 2. Institutional quality of the countries (WGI) versus exchange rate elasticity of exports ($\hat{\beta}_{i1}$)



Note: Coefficient estimates are those obtained from panel DOLS estimation for REER.

This leads us to the 2nd stage of the regression, where individual country coefficient estimates for REER from the panel DOLS estimation ($\hat{\beta}_{i1}$) are regressed on institutional quality and on a dummy, showing oil-exporting countries, using simple OLS (with Newey-West heteroskedasticity consistent standard errors).

The estimation results overall prove our intuition about the effects of institutional quality on exchange rate-exports link. The first specification, using institutional quality as the only explanatory variable, shows that there is a strongly significant and positive effect of institutional quality on exchange rate elasticity of exports: 1 unit increase in institutional quality strengthens the relationship between exports and exchange rates by 0.83 percentage points (Table 5, Column I). In oil exporting countries the link between exchange rates and exports is 1.19 percentage points weaker compared to oil importing ones (Table 5, Column II). When these two are incorporated into the same estimating equation, only institutional quality preserves its significance, with a slight fall in the magnitude of the effect, while oil exporters dummy loses its significance (Table 5, Column III). This can be an indication that institutional quality is the reason behind weaker exchange rate-exports connection in oil exporters. To test this supposition, an interaction term is incorporated into the model. Although only weakly significant, the interaction term proves our surmise: in oil exporting countries institutional quality is 0.66 percentage points more associated with exchange rate elasticity of exports than in oil importing countries (Table 5, Column IV). Looking at the R-squared, the specification with the interaction term has the highest explanatory power among others. Also, the F-statistics prove joint significance of the variables in all specifications.

Table 5. Determinants of exchange rate elasticity of exports

Dependent variable:	**coef. estimates for REER from DOLS ($\hat{\beta}_{i1}$)**			
	(I)	**(II)**	**(III)**	**(IV)**
institutions_wgi	0.83***	-	0.67***	0.29*
	(0.214)	-	*(0.217)*	*(0.165)*
dummy_oilexporter	-	-1.19**	-0.63	-0.87
	-	*(0.580)*	*(0.544)*	*(0.533)*
interaction (inst; oilexporters)	-	-	-	0.66*
	-	-	-	*(0.356)*
Constant	-0.84***	-0.013	-0.50**	-0.23
	(0.295)	*(0.207)*	*(0.228)*	*(0.269)*
R-squared	0.205	0.125	0.233	0.259
F-statistic	8.008***	4.422**	4.568**	3.37**

Note: Standard errors in parentheses. Asterisks indicate relative significance levels: *** p<0.01, ** p<0.05, * p<0.1

The results obtained from using demand elasticity of exports ($\hat{\beta}_{i2}$) estimated from equation (1) suggests that institutional quality is positively related to the demand elasticity of exports (Table 6, Column I), while being oil exporter does not have significant effect on the demand elasticity (Table 6, Column 2). When both institutional quality and oil exporting dummy are incorporated into the model, only institutional quality enters the estimating equation significantly, keeping both its sign and magnitude: 1 unit increase in the quality of institutions leads to an average of 0.53 percentage points increase in the demand elasticity of exports (Table 6, Column III). And finally, when incorporated into the model, interaction term between institutional quality and oil exporting dummy enters the estimating equation with positive sign and is significant at 10% confidence level. This suggests that in oil exporters the impact of institutional quality on demand elasticity is on average 0.73 percentage points higher compared to oil importers (Table 6, Column IV).

Table 6. Determinants of demand elasticity of exports

Dependent variable:	**coef. estimates for LnDemand from DOLS ($\widehat{\beta}_{i2}$)**			
	(I)	**(II)**	**(III)**	**(IV)**
institutions_wgi	0.51**	-	0.53**	0.12
	(0.228)	-	*(0.233)*	*(0.247)*
dummy_oilexporter	-	-0.36	0.09	-0.18
	-	*(0.341)*	*(0.189)*	*(0.234)*
interaction (inst; dummy_oilexp.)	-	-	-	0.73*
	-	-	-	*(0.374)*
Constant	0.10	0.44**	0.06	0.36
	(0.210)	*(0.200)*	*(0.239)*	*(0.223)*
R-squared	0.183	0.026	0.185	0.257
F-statistic	6.96**	0.82	3.39**	3.34**

Even though the regression output confirms our predictions, the results are not robust to the use of other proxy variables.

6. Robustness checks

To check for the robustness of the results, different institutional quality and oil dependence measures are employed. An index of institutional quality from International Country Risk Guide (ICRG) is used instead of WGI index. The share of fuel exports in total merchandise exports (%) is employed instead of a dummy variable showing oil exporters (*see* Data description).

Firstly, we check the robustness of the results obtained from the cross-sectional regression of the coefficient estimates for REER from DOLS estimation on our interest variables. While institutional quality and oil dependence separately produce results with the same signs as in Table 5, the results are only weakly significant and the magnitude of the effect is much lower (Table 7, Column I and II). When incorporated jointly, both of the variables lose their significance (Table 7, Column III). Interestingly, when interaction term is included, institutional quality enters the estimating equation highly significantly and with a much higher magnitude of the effect. However, the interaction term itself is insignificant and with the opposite sign than expected (Table 7, Column

IV). Even if the explanatory power of the model is the highest when interaction term is incorporated, according to the F-statistic, the variables are jointly insignificant.

Table 7. Robustness check for the determinants of exchange rate elasticity of exports

Dependent variable:	coef. estimates for REER from DOLS ($\hat{\beta}_{i1}$)			
	(I)	(II)	(III)	(IV)
institutions_icrg	0.29*	-	0.17	0.45***
	(0.144)	-	*(0.204)*	*(0.154)*
oil_dependence	-	-0.02*	-0.02	0.03
	-	*(0.011)*	*(0.013)*	*(0.039)*
interaction (inst; oil_dep.)	-	-	-	-0.007
	-	-	-	*(0.008)*
Constant	-2.23**	0.17	-0.93	-2.70***
	(0.860)	*(0.246)*	*(1.378)*	*(0.916)*
R-squared	0.052	0.155	0.172	0.202
F-statistic	1.64	5.33**	2.90*	2.28

Note: Standard errors in parentheses. Asterisks indicate relative significance levels: *** p<0.01, ** p<0.05, * p<0.1

Secondly, we check for the robustness of the results obtained from regression of individual country demand elasticity coefficients obtained from step 1 ($\hat{\beta}_{i2}$) on our interest variables. As can be seen from Table 8, none of the coefficient estimates has significant effect on the dependent variable, in neither of the specifications. F-statistics also show that the variables are jointly insignificant

Table 8. Robustness check for the determinants of demand elasticity of exports

Dependent variable:	coef. estimates for LnDemand from DOLS ($\hat{\beta}_{i2}$)			
	(I)	(II)	(III)	(IV)
institutions_icrg	0.07	-	0.07	0.10
	(0.116)	-	*(0.134)*	*(0.125)*
oil_dependence	-	-0.002	-0.002	0.004
	-	*(0.005)*	*((0.005)*	*(0.027)*
interaction (inst; oil_dep.)	-	-	-	-0.001
	-	-	-	*(0.005)*

Constant	-0.06	0.44**	0.02	-0.21
	(0.690)	*(0.194)*	*(0.857)*	*(0.701)*
R-squared	0.009	0.005	0.011	0.013
F-statistic	0.27	0.15	0.17	0.12

Based on the results of the estimations, we can conclude that there is found to be a negative and significant long-run relationship between exchange rates and exports. We could find some evidence that overall high institutional quality is associated with stronger connection between exchange rates and exports, and in oil exporting countries the effect of institutional quality on this connection is higher compared to oil importing countries. Also quality of institutions is found to be positively related to the demand elasticity of exports. However, these effects are only weakly significant and are not robust to the use of different proxy variables.

On one hand these results can arise from data problems. As we know, institutional quality indicators are highly subjective and especially in countries with low institutional quality, the reliability of these indicators is under question. On the other hand, these results can stem from economic reasons. The main channel by which we assume institutional quality affects the link between exchange rates and exports, is through the barriers to the market entry: high administrative costs of entering markets prevents businesses to enter markets, even if the exchange rate is depreciated. But when the corporations are already in the market, they can increase their export levels following currency depreciation to benefit from cheap currency, or decrease their export levels, after currency appreciation, because of a fall in foreign demand. Thus, institutional quality cannot distort the link between exchange rates and export performance.

7. Conclusion

At the time of highly unstable global economic environment, maintaining macroeconomic stability has become one of the crucial tasks challenging central banks. Especially, oil exporting countries are under a lot of pressure, considering the destabilizing effects of recent oil price fluctuations on their economy. One of the major policy tools employed by central banks in these countries is the exchange rate. According to theoretical knowledge and country experiences, variation in exchange rates should have direct effects on trade balance.

On the other hand, empirical evidence suggests that oil exporting countries are more prone to suffer from institutional problems compared to other countries. Low institutional quality, in its turn, can decrease the effectiveness of the exchange rate policy, leading to a distortion of the negative link between exchange rates and export performance. The main channel by which quality of institutions can affect this link is considered to be through its effect on the decisions of the firms, whether to enter the market or not. In other words, when the market entry costs in the form of institutional barriers, such as high corruption, lack of property rights, poorly enforced contracts, are high, firms are reluctant to enter markets, even if the currency depreciates. Taking into account the abovementioned points, this study aims to assess if negative relation between real effective exchange rates and total exports exists in a panel of 33 oil exporting and oil importing countries, and whether quality of institutions has significant impacts on this relation.

Empirical estimation is carried out in 2 steps. Firstly, panel data DOLS, FMOLS and PMG estimations suggest that there is, in fact, strongly significant negative relationship between REER and total exports in these countries, controlling for total imports and the demand for exports: 1% appreciation in real effective exchange rate is related to a 0.55% decrease in total exports, holding other variables constant.

As a result of the final cross-sectional regression, institutional quality is found to have positive effect on exchange rate-exports link. It is also confirmed that in oil exporting countries the impact of institutional quality on exchange rate-export link is higher, compared to oil importers. But these results are found to be only weakly significant and not robust to the use of different proxy variables. One plausible explanation for these results is the issues concerning data quality: the measurement of institutional quality indicators is a very tedious task and is subject to errors and omissions, due to its subjective nature. On the other hand, it can be argued that our main channel through which institutional quality affects exchange rate-export link is through its impact on the decision of the firms whether or not to enter the market. But even if high institutional entry costs to the markets can prevent firms from entering the market following currency depreciations, the firms that are already in the market will respond by increasing their export, to benefit from an increased foreign demand due to the cheapening of the currency. Thus, the quality of institutions will fail to have impact on the relationship of exchange rates and exports.

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APPENDIX

Table A1. List of the countries used for estimation purposes:

№	Country Name	№	Country Name
1	Azerbaijan	18	Mexico
2	Belgium	19	Netherlands
3	Brunei Darussalam	20	Nigeria
4	Canada	21	Norway
5	China	22	Philippines
6	Congo, Rep.	23	Poland
7	Ecuador	24	Qatar
8	Equatorial Guinea	25	Russian Federation
9	France	26	Singapore
10	Gabon	27	South Africa
11	Germany	28	Spain
12	India	29	Thailand
13	Italy	30	Turkey
14	Japan	31	United Arab Emirates
15	Kazakhstan	32	United Kingdom
16	Korea, Rep.	33	United States
17	Kuwait		

Table A2. Determinants of exchange rate elasticity of exports using coefficient estimates from FMOLS

Dependent variable:	**coef. estimates for LnREER from FMOLS ($\widehat{\beta}_{i1}$)**			
	(I)	**(II)**	**(III)**	**(IV)**
institutions_wgi	0.76***	-	0.70***	0.24
	(0.213)	-	*(0.203)*	*(0.164)*
dummy_oilexporter	-	-0.81	-0.24	-0.53
	-	*(0.501)*	*(0.406)*	*(0.425)*
Interaction (inst; oilexporters)	-	-	-	0.80**
	-	-	-	*(0.343)*
Constant	-0.62**	0.009	-0.49**	-0.16
	(0.248)	*(0.207)*	*(0.211)*	*(0.264)*
R-squared	0.254	0.087	0.260	0.315
F-statistic	10.55***	2.937*	5.263**	4.441**

Note: Standard errors in parentheses. Asterisks indicate relative significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table A3. Robustness check for determinants of exchange rate elasticity of exports using coefficient estimates from FMOLS

Dependent variable:	**coef. estimates for LnREER from FMOLS ($\widehat{\beta}_{i2}$)**			
	(I)	**(II)**	**(III)**	**(IV)**
institutions_icrg	0.27**	-	0.20	0.34**
	(0.121)	-	*(0.156)*	*(0.133)*
oil_dependence	-	-0.01	-0.01	0.01
	-	*(0.008)*	*(0.009)*	*(0.031)*
Interaction (inst; oil_dep.)	-	-	-	-0.004
	-	-	-	*(0.006)*
Constant	-1.90**	0.13	-1.15	-2.02**
	(0.704)	*(0.226)*	*(1.009)*	*(0.788)*
R-squared	0.070	0.094	0.128	0.140
F-statistic	2.255	3.007*	2.053	1.461