The determinants of bilateral trade in goods: Evidence from Russia

Abstract

We empirically test the association between exports of crude petroleum and natural gas and the goods balance of Russia with its major trade partners. Previous empirical studies stated that the key determinants of trade balance are income and exchange rate. Here, we argue that export composition is also a major explanatory variable because some export products are inelastic, for instance, oil and gas. Thus, if exports consist of inelastic products, a positive effect should be expected on trade balance. Using dynamic panel models, we found that the ratio of exports of crude petroleum and natural gas to total exports is significantly and positively associated with the Russian trade balance in goods, partially explaining the persistent surplus in the Russian trade balance and current account. Russian goods balance also responded to relative income, yet there is weak evidence of reactions to changes in the exchange rate.

JEL codes: F14, F32, C23

Keywords: export composition; external imbalance; trade balance; crude petroleum and natural gas; Russia

The determinants of bilateral trade in goods: Evidence from Russia

INTRODUCTION

Since the eighties, several countries have been involved in four generations of external imbalances of global dimension, including the United States (USA), East Asia, oil/commodities exporting countries and within the European Union/Eurozone (Belke & Schnabl, 2013; Brissimis, Hondroyiannis, Papazoglou, Tsaveas, & Vasardani, 2013; Carrasco & Hernandez-del-Valle, 2017; Carrasco & Serrano, 2015; Duarte & Schnabl, 2015; Gu, Zhou, & Beg, 2014; Navoi, 2017). By definition, the current account shows the income-expenditure relationship of a country, and the difference between national savings and investment. However, persistent current account deficits are unsustainable in the long-term since they are reflected in an increasing external debt. In some countries, the trends over the last three decades show the unsustainability of growing imbalances which could lead to an excessive indebtedness and a balance of payments crisis (Aristovnik, 2007, 2008; Carrasco & Serrano, 2015).

Russia has not been the exception in the persistence of such imbalances. Since 1994, and excluding 1997, Russia has been presenting a positive balance in its current account (5.7% of GDP on average in the period 1994-2016). Note that this surplus is explained by the trade balance performance. Since 1994 Russian trade balance, exports of goods and services minus imports of goods and services, has been positive (8.9% of GDP on average in the period 1994-2016). On the contrary, many Central and Eastern European countries and Former Soviet countries have been presenting deficits (Aristovnik, 2007, 2008). Russia clearly differs from these countries, and its case deserves a specific analysis.

As a major transition country, Russia is currently a key player participating in international trade. Several reasons explain its relevance. First, Russia, due to its size, has geographical borders with some of the leading regions in terms of trade, income, and growth such as the European Union and the dynamic economies of South Asia. Secondly, Russian exports of crude petroleum and natural gas accounted for around 27% to 47% of total exports of goods over the period 1996-2016. Note that exports of crude petroleum and natural gas are key inelastic inputs for the world productive system (Cooper, 2003; Krichene, 2002), which turns Russia as a geostrategic trade player of the world economy. Finally, starting in the 2000's, there has been a boom in the price of commodities and raw materials —including crude oil

and natural gas— which has increased significantly the amount of exports of the Russian economy. However, as other commodities and raw materials, crude petroleum and natural gas prices are highly volatile which is reflected in the variability of the share of these goods in the total trade exports of Russia.

Is the size and persistence of the Russian external surplus something to be worried about? A persistent deficit may be a problem because it can lead to an excessive indebtedness and a balance of payment crisis (Aristovnik, 2007, 2008). On the other hand, a persistent surplus may be a problem because it means a lower investment in relation to national savings. However, a surplus could reflect precautionary savings in the case of countries exporting commodities and raw materials, which are characterised by high price volatility (Bems & de Carvalho Filho, 2011; Kilian, Rebucci, & Spatafora, 2009; Le & Chang, 2013), such as the case of Russia. This strategy allows hedging against fluctuations in commodity prices. Thus, the management of the Russian external surplus is strategic for its future development, so it is necessary to know its determinants. Given this, the present research is motivated by the following question: which are the key determinants of the Russian trade balance in goods?

To analyse the Russian external surplus determinants, the bilateral nature of trade sheds light on the role of the relative differences between trade partners. As stated in Khan and Hossain (2012), the determinants of the overall external balance differ from the determinants of the bilateral balance. Thus, we focus on the bilateral trade relationship of Russia with 54 trade partners[1] accounting for the 89% of Russian exports in 2016.

Previous studies included bilateral real exchange rate, the ratio of external-to-domestic income, import-weighted distance, bilateral foreign direct investment, and relative labour costs as potential determinants of bilateral trade balance (Bineau, 2016; Çelik & Kaya, 2010; Gu et al., 2014; Khan & Hossain, 2010, 2012). Building on this empirical literature, our paper focuses on the determinants of the Russian bilateral trade balance to account for relative differences with trade partners.

At a theoretical level, the key determinants of Russian trade balance surplus should be relative income to its major partners and the exchange rate. Nonetheless, these associations have not been tested before; thus, the estimation of the impact of these variables is the first contribution

[1] List of trade partners: Argentina, Australia, Austria, Belarus, Belgium, Brazil, Bulgaria, Canada, China, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Kyrgyzstan, Latvia, Lithuania, Mexico, Moldova, Mongolia, Netherlands, New Zealand, Norway, Pakistan, Poland, Portugal, Romania, Saudi Arabia, Singapore, Slovak Republic, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, Ukraine, United States, and Venezuela.

of this research. Secondly, this is the first study including export composition as an explanatory variable. A recent study for Eurozone countries stated that export composition is positively linked to export performance, specifically when exports consist of high-tech products (Wierts, Van Kerkhoff, & De Haan, 2014). Accordingly, this research extends the relevance of export composition in explaining trade balance. It is expected that Russian exports greatly consisting of petroleum and natural gas can also explain bilateral trade balance, because of the inelastic nature of this kind of product. Finally, this research used dynamic panel data models, which has been recommended before to study external imbalances, but its use was neglected due to particular concerns on the key assumptions of the methods (Duarte & Schnabl, 2015; Khan & Hossain, 2012).

THE RECENT PERFORMANCE OF RUSSIAN EXTERNAL BALANCE

A relevant fact about the Russian economy is the diversification of its trade partners. Since the breakdown of the USSR, Russia has been a relatively more open economy while changing the importance of its trade partners. In the past, its major partners were ex-Soviet and ex-Socialist countries (Djankov & Freund, 2002; Langhammer, 1991). This past is still a key determinant of Russia's major partners. Currently, around 12% of Russian international trade occurs with the Commonwealth of Independent States (CIS), mainly with Belarus, Kazakhstan, and Ukraine. However, by economic bloc, the European Union is the most important of Russia's partners (42.9% of international trade), mainly Netherlands, Germany, Italy, France, and Poland. Other major partners are the dynamic South Asian countries (with an increasing share) and the USA (Federal'naya tamozhennaya sluzhba, 2017).

Figure 1 shows the share of Russian goods exports to different regions (% of total goods exports). In our sample, we include seven regions[2] consisting of 54 trade partners. European countries are the main destination of Russian exports (between 39.6% and 61.2% during the period 1996-2016). Moreover, Asian countries have been gaining share in the last years (from 13% in 1998 to a peak of 25.9% in 2016). On the contrary, non-EU post-Soviet countries

[2] Trade blocs: Latin American and Caribbean (Argentina, Brazil, Mexico, Venezuela); Oceania (Australia, New Zealand); European Union plus Norway and Switzerland (Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Slovak Republic, Spain, Sweden, United Kingdom, Norway, Switzerland); USA and Canada; Asia (China, India, Indonesia, Iran, Israel, Japan, Korea, Mongolia, Pakistan, Saudi Arabia, Singapore, Turkey, Thailand); Non-EU post-Soviet states (Belarus, Georgia, Kazakhstan, Kyrgystan, Moldova, Ukraine); Africa (Egypt, South Africa)

have been losing relevance (from 17.6% in 1998 to 11.4% in 2016). Another relevant trade partner bloc is the USA and Canada with a share between 2.0% and 7.3% in the same period.

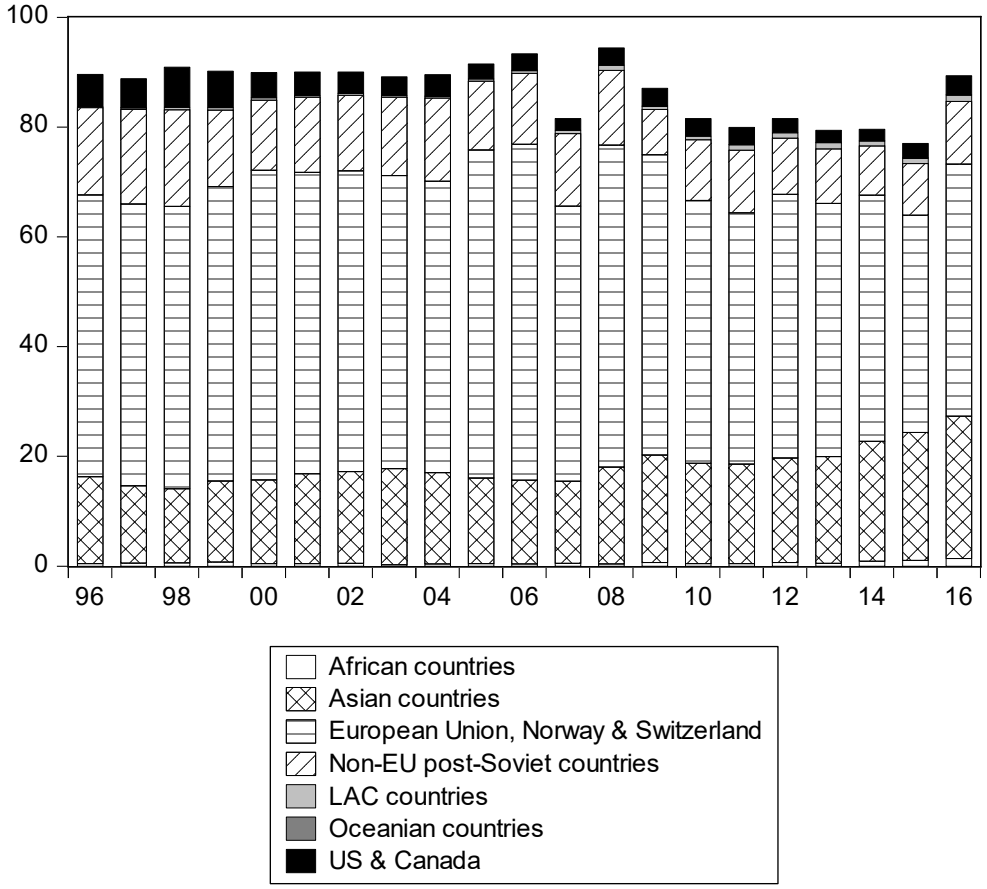

Figure 1. Share of exports by region (% total goods exports)
Source: STAN Bilateral Trade Database-Organisation for Economic Co-operation and Development

Figure 2 shows the trend of key Russian macroeconomic indicators. First, note that after perestroika, specifically since 1994, Russian trade openness has been higher than 46%, yet recently it has observed a decreasing trend (see Figure 2a). Particularly relevant, from 1993 and on, Russian current account has been in a permanent and persistent surplus with a peak of 16.3% in 2000 and a decreasing trend since then (see Figure 2b). In this regard, the balance of goods and services is the major component of the Russian current account. Furthermore, for the case of Russia, the current account and the balance of goods and services have followed a parallel trend (with the only exception in 1992). That is, in the available data sample, the balance of goods and services has also been in a persistent surplus. Therefore, Russia has not been the exception in the wave of persistent imbalances observed in the world in the last 25 years.

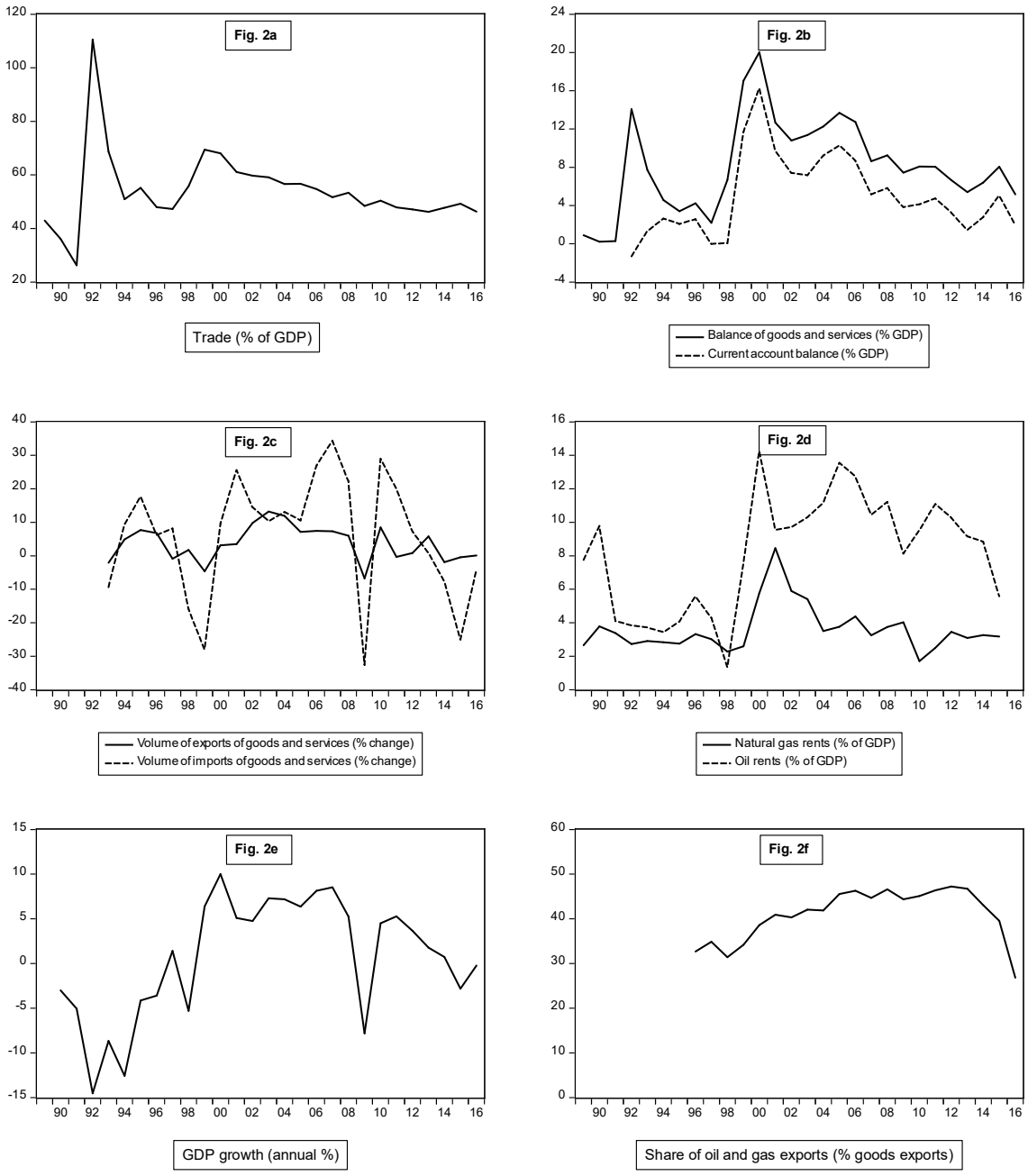

Figure 2. Selected variables of the Russian economy
Source: World Development Indicators, OECD and International Monetary Fund

Within the balance of goods and services, Russian exports are dominated by natural gas and crude petroleum. In the years leading to the global financial crisis, profits of (especially) natural gas and crude petroleum increased significantly, i.e., there was a positive increment in the difference between the value of natural gas/crude oil production at world prices and total costs of production. Consequently, in the years before the global financial crisis, the prices of natural gas and crude petroleum were significantly high such as to increase the share of these

export products in the total goods exports. However, since 2014, the price of crude petroleum and natural gas has been falling which has been reflected in a decrease in the share of these products in total exports.

The empirical literature on the determinants of the bilateral balance has focused on the diverging factors between trade partners, for instance, bilateral real exchange rate, the ratio of external-to-domestic income, the relative development stage, import-weighted distance, foreign direct investment flows, and relative labour costs (Bineau, 2016; Çelik & Kaya, 2010; Gu et al., 2014; Khan & Hossain, 2010, 2012). When including relative factors, the composition of exports could turn relevant, especially when the goods traded are inelastic such is the case of high-tech industries or natural gas and crude petroleum.

Previous studies included export composition to analyse export performance, productivity, and economic growth. The major findings suggest positive effects of export composition and export diversification on economic growth (Aditya & Acharyya, 2013; Ghatak, Milner, & Utkulu, 1997), especially when transiting from primary exports to manufacturing exports (Fosu, 1990; Ghatak et al., 1997; Herzer, Nowak-Lehmann, & Siliverstovs, 2006). Recently, and more relevant for our research, Wierts, Van Kerkhoff, and De Haan (2014) analysed the role of export composition in export performance and found a positive relationship between the share of high-tech exports and export performance. Nevertheless, the role of export composition in determining the bilateral goods balance has not been tested in-depth. In this article, we add to this literature using and focusing on key characteristics of the Russian economy.

In Russia, the share of crude petroleum and natural gas in the total exports of goods is significantly high (between 27% and 47% during the period 1996-2016) while the share of high-tech exports is relatively low (between 0.78% and 3.71% during the same period). Consequently, we could expect a higher influence of crude petroleum and natural gas on Russia's bilateral balance. Additionally, there is no clear pattern between the trade in goods balance and the export composition by technological intensity. On the contrary, the share of crude petroleum and the trade in goods balance seems to be positively correlated (see Figure 3). Therefore, in what follows, we examine the determinants of the bilateral trade balance of Russia with special emphasis on the role of export composition.

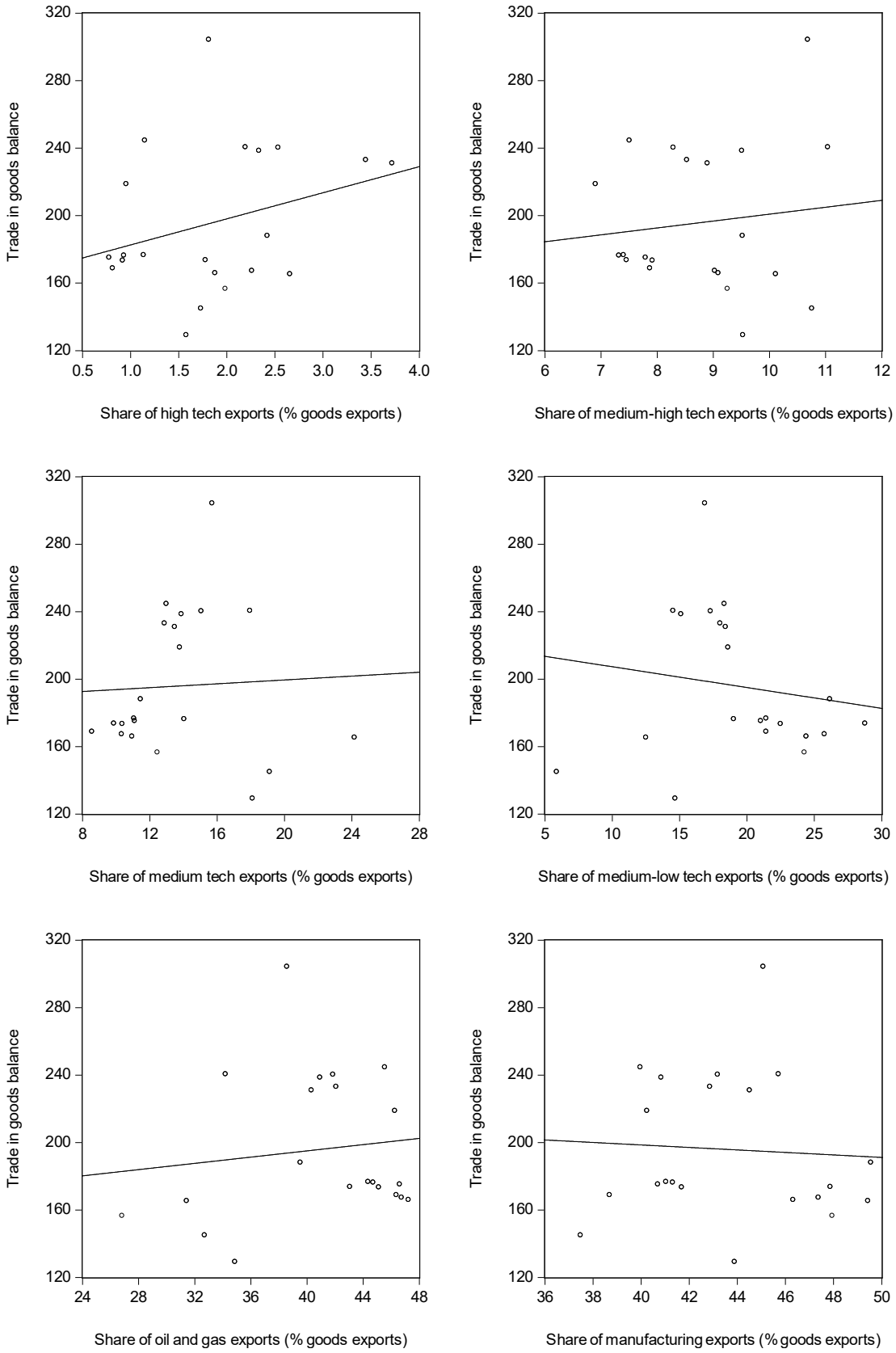

Figure 3. Trade in goods balance and export composition of Russia

Source: STAN Bilateral Trade Database-Organisation for Economic Co-operation and Development

DATA AND EMPIRICAL SPECIFICATION

The core data were taken from the OECD, specifically the STAN Bilateral Trade Database by Industry and End-use category (BTDIxE) and from the World Bank, namely World Development Indicators (WDI). The data set consists of annual observations on bilateral trade between Russia and 54 of its major partners, accounting for around 89% of Russian trade, over the period 1996-2016. However, we lost several observations in the regression analysis, where we included 41 trade partners

The dependent variable is bilateral trade balance (TB), measured as the ratio of total exports to total imports of goods. In this manner, we obtain a unit-free measure and positive numbers allowing a logarithmic transformation of the variable. These variables were drawn from BTDIxE and the size of the sample is mainly limited by the degree of data availability on this variable. On average, TB equals 12.46 (SD = 143.73). Figure 2b shows the trends in the trade balance and the current account of Russia with the world over the period 1989-2016. This provides a general perception on the behaviour of the key dependent variable.

Following the literature, there are two key explanatory variables: relative income and exchange rate (Bineau, 2016; Çelik & Kaya, 2010; Gu et al., 2014; Khan & Hossain, 2012). To estimate income elasticity, we use the ratio of a partner's real GDP per capita to Russian real GDP per capita (Y_P/Y_R). On average, this variable equals 2.69 (SD = 2.49). To estimate price elasticity, we use the real effective exchange rate index (REER), measured as the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs.[3] We estimated a relative appreciation/depreciation (RD) using the ratio of the change in partner's REER ($REER_{Pt}$/ $REER_{Pt-1}$) to the change in Russia's REER ($REER_{Rt}$/ $REER_{Rt-1}$). On average, RD equals 1.008 (SD = 0.14). These variables were drawn from WDI.

Thus, using bilateral data, the baseline trade model[4] previously estimated in Turkey (Çelik & Kaya, 2010), Bangladesh (Khan & Hossain, 2012), China (Gu et al., 2014), and Cambodia (Bineau, 2016) is given by equation (1):

[3] Previous studies used the real exchange rate between the currency of the country of interest and the currency of the partner country. Actually, most of the international transactions have place in dollars, euros, British pounds or yens. Consequently, we think that the measure used here is a better approach of the appreciation or depreciation of the rouble. In addition, we replicated our regressions using bilateral real exchange rates and the results (not reported) are qualitatively the same.

[4] Note that geographical distance has been included in previous studies on the bilateral balance (Khan & Hossain, 2012). However, we did not include these indicators due to data limitations and because distance seems

$$lnTB_{Pt} = \beta_{0P} + \beta_1 lnY_P/Y_{R,t} + \beta_2 lnRD_{P,t} + e_P + v_{Pt} \quad (1)$$

ln indicates a logarithmic transformation of the variables, in this manner the coefficients measure elasticities. Subscripts $_P$, $_R$ and $_t$ indicate partner country, Russia, and time, respectively. The hypotheses claim that TB depends positively upon the level of Y_P/Y_R and RD. That is, countries with higher income, in comparison to Russia, should be able to import more products from Russia improving Russian trade balance in goods. In addition, is the higher the RD, the cheaper is the rouble, in relation to partner country, stimulating the demand of products from Russia and improving Russian trade balance.

We add export composition to this baseline model. Some export products are inelastic, for instance, petroleum and natural gas (Cooper, 2003; Krichene, 2002) in the Russian case. If these inelastic export products are a relevant proportion of total exports, then, there are reasons to think that relative income and exchange rate will not, or will only weakly, affect trade balance. In this regard, high technology goods represent another set of inelastic products. However, these products are only 2.4% of total Russian exports and 12.9% of total Russian imports.[5] Thus, to test the relevance of export composition, in the Russian case, oil and natural gas are the most adequate set of products.

To measure this export composition effect, we use the ratio of exports of petroleum and natural gas to total exports (EC). On average, EC equals 0.33 (SD = 0.25). This variable was drawn from BTDIxE.

Thus, the extended model is given by equation (2), where a positive relationship between TB and EC is expected.

$$lnTB_{Pt} = \beta_{0P} + \beta_1 lnY_P/Y_{R,t} + \beta_2 lnRD_{P,t} + \beta_3 lnEC_{P,t} + \beta_4 X + e_P + v_{Pt} \quad (2)$$

to be irrelevant in the case of Russia, the largest country of the world sharing borders with many of its major partners.

[5] Note that inelastic import products may also have an effect on trade balance.

where *X* represents control variables: yearly oil price, time dummy variables, and dummy variables by group of countries, for Commonwealth of Independent States (CIS), Central Eastern European countries (CEE) and Western European Countries (WEC).

As in previous empirical studies (Bineau, 2016; Çelik & Kaya, 2010; Gu et al., 2014; Khan & Hossain, 2012), we firstly tested stationarity. We used those tests not requiring strongly balanced data, Im-Pesaran-Shin (IPS) and Fisher-type, including combinations of constant and trend. The main results are reported in Table 1. The tests suggest that only the relative income (ln Y_P/Y_R) has unit root. These results differ from previous studies, where most of the variables had unit root, and as a result, panel cointegration analysis was required.

Table 1. Panel unit root tests

Variable	IPS	Fisher Dickey-Fuller	Fisher Phillips-Perron
ln TB constant	-4.75*	Inverse chi-squared 186.15*	Inverse chi-squared 184.68*
		Inverse normal -3.66*	Inverse normal -4.22*
		Inverse logit -4.28*	Inverse logit -4.57*
		Modified inv. chi-squared 5.31*	Modified inv. chi-squared 5.21*
ln TB constant and trend	-5.48*	Inverse chi-squared 230.66*	Inverse chi-squared 164.48*
		Inverse normal -5.50*	Inverse normal -3.64*
		Inverse logit -6.31*	Inverse logit -3.69*
		Modified inv. chi-squared 8.34*	Modified inv. chi-squared 3.84*
ln Y_P/Y_R constant	0.75	Inverse chi-squared 81.96	Inverse chi-squared 57.18
		Inverse normal 0.86	Inverse normal 3.47
		Inverse logit 0.94	Inverse logit 3.36
		Modified inv. chi-squared -1.77	Modified inv. chi-squared -3.45
ln Y_P/Y_R constant and trend	7.06	Inverse chi-squared 43.55	Inverse chi-squared 25.75
		Inverse normal 7.45	Inverse normal 10.44
		Inverse logit 7.50	Inverse logit 10.85
		Modified inv. chi-squared -4.38	Modified inv. chi-squared -5.59
ln RD constant	-14.41*	Inverse chi-squared 435.63*	Inverse chi-squared 401.98*
		Inverse normal -15.82*	Inverse normal -15.14*
		Inverse logit -18.68*	Inverse logit -17.24*
		Modified inv. chi-squared 27.6*	Modified inv. chi-squared 24.9*
ln RD constant and trend	-9.74*	Inverse chi-squared 276.74*	Inverse chi-squared 256.56*
		Inverse normal -10.71*	Inverse normal -10.34*
		Inverse logit -11.46*	Inverse logit -10.68*
		Modified inv. chi-squared 15.2*	Modified inv. chi-squared 13.6*
ln EC constant	-5.42*	Inverse chi-squared 163.43*	Inverse chi-squared 327.17*
		Inverse normal -3.18*	Inverse normal -7.24*
		Inverse logit -4.34*	Inverse logit -11.03*
		Modified inv. chi-squared 5.9*	Modified inv. chi-squared 17.6*
ln EC constant and trend	-0.80	Inverse chi-squared 90.77	Inverse chi-squared 192.6*
		Inverse normal 0.28	Inverse normal -3.27*
		Inverse logit -0.09	Inverse logit -5.45*
		Modified inv. chi-squared 0.36	Modified inv. chi-squared 7.6*

Ho: All panels contain unit roots
* Indicates significance at 1% levels

Therefore, in the Russian case, we can proceed with typical regression analysis using panel data. However, it is important to recognize that trade balance is a variable of autoregressive

nature. That is, TB_{t-1} is a good predictor of TB_t. Given this, the econometric literature suggests the use of dynamic panel data models, namely the DIF GMM estimator (Arellano & Bond, 1991) and the SYS GMM estimator (Blundell & Bond, 1998). This has been already noted in the literature on the determinants of external imbalances, but the relevance of these methods is neglected because of specific concerns on the assumptions required by them. For example, there are no tests on autocorrelation in the case of Bangladesh (Khan & Hossain, 2012) and the validity of the internal instruments is rejected in the case of current accounts in emerging countries (Duarte & Schnabl, 2015).

Moreover, the dependent and independent variables may present highly autoregressive characteristics, biasing the DIF GMM estimator (Blundell, Bond, & Windmeijer, 2001; Bun & Windmeijer, 2010). Consequently, the SYS GMM in two steps is the main method used in this research. This method ensures efficiency and consistency once the internal instruments are validated and in the absence of autocorrelation of second order (Baltagi, 2005).

RESULTS

Table 2 presents the main results of the regression analysis. The used method is SYS GMM in two steps, including a maximum of 2 lags of dependent and independent variables as instruments.[6] Note that the SYS GMM estimator provides short-run coefficients. To obtain long-run coefficients it is necessary to divide the short-run coefficient by 1 minus the coefficient of the lagged dependent variable.

Column (1) presents the estimated coefficients of the baseline model given by equation (1). Serial correlation of second order is rejected and the internal instruments are validated according to the Sargan test. It is worth noticing that the dynamic model is well justified because the lagged dependent variable as regressor is statistically significant at the 1% level. In general, all estimated regressions support the autoregressive nature of TB.

In column (1), the coefficient of relative income ($\ln Y_P/Y_R$) is positive and statistically significant at the 1% level. That is, an increase in real income of partner countries improves Russia's trade balance in goods, as previous studies found in the case of Turkey (Çelik & Kaya, 2010), China (Gu et al., 2014) and Cambodia (Bineau, 2016). Yet, the evidence in China and Cambodia is somewhat mixed depending on partner country. On the contrary, in

[6] In this manner, we keep the number of instruments low, accounting for the potential problem of too many instruments (Roodman, 2009).

Bangladesh, using an Unrestricted Error Correction Model, relative per capita GDP did not show significant impacts on trade balance in the short-term. However, the estimation using DIF GMM presented a positive and statically significant coefficient of relative per capita GDP (Khan & Hossain, 2012). Note that the cited study does not present tests on autocorrelation, so we should take the mentioned result with caution.

In column (1), the coefficient of relative appreciation/depreciation (ln RD) is positive and statistically significant at the 1% level. That is, a depreciation of the rouble improves Russia's trade balance in goods. In general, this result agrees with previous studies (Bineau, 2016; Çelik & Kaya, 2010; Gu et al., 2014; Khan & Hossain, 2012), which also showed some evidence for J-curves. That is, depreciation initially (short-term) leads to deterioration in the trade balance, and after some time (long-term), it improves the balance. Here, our focus is not on tests for J-curves, and we are not studying the determinants of bilateral trade balance for each partner country. Nevertheless, note that the coefficient of ln RD is positive in the short-run and in long-run, subsequently, on average, there are no reasons to support J-curves in the Russian case. However, about the impact of the depreciation of rouble, it is important to note that in other specifications ln RD lost statistical significance (see columns 2, 4 and 5).

In column (2) we replicated the baseline model adding time dummies; as a result ln RD is not statistically significant. Column (3) presents a first estimation of the extended model (given by equation 2) without time dummies nor oil price. Previous reported results are supported, and export composition (ln EC) is positive and statistically significant at the 1% level. Once we include time dummies (column 4) ln Y_P/Y_R and ln EC preserves statistical significance, but not ln RD. Including oil price as control variable (columns 5 and 6) does not change the statistical significance of ln Y_P/Y_R and ln EC. On the contrary, ln RD is not statistically significant in the model without time dummies (column 4), and it presents a negative significant coefficient in the model with time dummies (column 5).

The most important result for this research is the positive and statistically significant coefficient of ln EC in all specifications. That is, the ratio of exports of crude petroleum and natural gas to total exports is significantly and positively associated with the Russian trade balance in goods. This, in part, explains the persistent surplus (since 1994) in Russian trade balance and current account. Therefore, our findings suggest that the composition of exports matters for trade balance. Specifically, when exports consist of a large proportion of inelastic goods we can expect positive effects on trade balance, even if the price of these products is falling, as in the case of oil and natural gas during the years 2014-2016.

As additional robustness checks we replicated the regression analysis using the DIF GMM estimator and the fixed effects corrected model as proposed by Bruno (2005). The results (not reported) are similar to those reported in Table 2.

Table 2. Regression results
Dependent variable: ln TB (trade balance in goods)

		(1)	(2)	(3)	(4)	(5)	(6)
Lagged Dependent (ln TB_{t-1})		0.86***	0.66***	0.56***	0.35***	0.50***	0.42***
Relative income (ln Y_P/Y_R)	+	0.62***	0.70**	0.52***	1.10***	0.65***	0.92*
Relative appreciation/depreciation (ln RD)	+	0.43***	0.05	0.15***	-0.92	0.07	-1.40*
Export composition (ln EC)	+			0.02***	0.03***	0.02***	0.04***
CIS		2.40***	3.28***	1.14***	2.17	1.63***	1.21
CEE		-0.28	0.94	1.14***	0.11	1.53***	2.02
WEC		0.76***	0.10	-0.21	0.95	-0.82***	-0.51
Oil price						-0.001***	0.002
Constant		-0.85***	-0.87**	-0.37***	-0.30**	-0.23*	-1.09
Time dummies		Non- included	Included	Non- include	Included	Non- include	Included
Observations		813	813	557	557	557	557
N x T		41 x 20	41 x 20	37 x 20	37 x 20	37 x 20	37 x 20
Sargan test		35.15	10.27	32.94	12.78	30.33	12.93
(p-value)		(0.96)	(1.00)	(0.98)	(1.00)	(0.99)	(1.00)
First order serial correlation test (p-value)		-3.66 (0.00)	-2.89 (0.00)	-3.95 (0.00)	-2.29 (0.02)	-3.71 (0.00)	-3.28 (0.00)
Second order serial correlation test (p-value)		-0.18 (0.85)	-0.06 (0.94)	-0.08 (0.93)	0.63 (0.52)	-0.23 (0.81)	0.54 (0.58)
Long run coefficients							
Relative income (ln Y_P/Y_R)		4.43	2.06	1.18	1.69	1.30	1.59
Relative appreciation/depreciation (ln RD)		3.07	0.15	0.34	-1.42	0.14	-2.41
Export composition (ln EC)				0.05	0.05	0.04	0.07

(*) [**] and {***} indicate statistical significance at the (10%) [5%] and {1%} levels.

CONCLUSION

As previous studies (Bineau, 2016; Çelik & Kaya, 2010; Gu et al., 2014; Khan & Hossain, 2012), we found that relative income of partner countries and exchange rates are positively associated with bilateral trade balance. However, in the Russian case, the results are not robust regarding the role of exchange rates. In this regard, the relevance of exchanges rates has been already questioned in other studies, particularly in relation to balance in current accounts of emerging countries (Duarte & Schnabl, 2015).

In this research, the most important finding is the significant positive effect of export composition on trade balance. In the particular case of Russia, petroleum and gas are highly relevant export products, and their demand is inelastic (Cooper, 2003; Krichene, 2002). Accordingly, our results indicated that this kind of export composition is positively related to trade balance. This finding complements previous studies, where relative income of partner

countries and exchange rates are the standard explanatory variables of trade balance, and subsequently of external imbalances.

Hence, the role of export composition in trade balance has several policy implications. Note that Russia has been showing a persistent surplus in both the trade account and the current account; it seems that this surplus is desirable, until now. Russian surplus could reflect precautionary savings (Bems & de Carvalho Filho, 2011; Kilian et al., 2009; Le & Chang, 2013) hedging against fluctuations in crude petroleum and natural gas prices. Therefore, the management of the external surplus is strategic for the future development of the Russian economy. However, if policy makers decide to adjust this situation they should take into account the composition of exports and subsequently the export and productive structure. This implies many challenges, because the supply of petroleum and gas is also highly inelastic. On the other side of the coin, a persistent deficit may lead to an excessive indebtedness and a balance of payment crisis. Thus, countries with persistent deficits should be aware that export composition plays a relevant role in determining their external imbalances. Consequently, policies impacting income or price elasticities (particularly, exchange rates) could not suffice to observe the needed outcomes.

Note that our results are in line with previous studies suggesting that export composition can also favour export performance. Particularly, the evidence suggests that exports consisting of high technology products are positively associated to bilateral total exports in the case of Eurozone countries (Wierts et al., 2014). Therefore, future research should also analyse the impact of other kinds of export composition on export performance.

References

Aditya, A., & Acharyya, R. (2013). Export diversification, composition, and economic growth: Evidence from cross-country analysis. *The Journal of International Trade & Economic Development*, *22*(7), 959–992. https://doi.org/10.1080/09638199.2011.619009

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277–297. Retrieved from http://restud.oxfordjournals.org/content/58/2/277.short

Aristovnik, A. (2007). Are Current Account Deficits in Eastern Europe and Former Soviet Union Too High? *Transformations in Business & Economics*, *6*(1), 32–53.

Aristovnik, A. (2008). Short-Term Determinants of Current Account Deficits: Evidence from Eastern Europe and the Former Soviet Union. *Eastern European Economics*, *46*(1), 24–42. https://doi.org/10.2753/EEE0012-8775460102

Baltagi, B. (2005). *Econometric analysis of panel data* (Third edit). Chichester, West Sussex, England: JohnWiley & Sons.

Belke, A., & Schnabl, G. (2013). Four Generations of Global Imbalances. *Review of International Economics*, *21*(1), 1–5. https://doi.org/10.1111/roie.12015

Bems, R., & de Carvalho Filho, I. (2011). The current account and precautionary savings for exporters of exhaustible resources. *Journal of International Economics*, *84*(1), 48–64. https://doi.org/10.1016/j.jinteco.2011.02.004

Bineau, Y. (2016). Real exchange rate and bilateral trade balance of Cambodia: A panel investigation. *Economics Bulletin*, *36*(2), 895–900.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115–143. https://doi.org/10.1016/S0304-4076(98)00009-8

Blundell, R., Bond, S., & Windmeijer, F. (2001). Estimation in dynamic panel data models: Improving on the performance of the standard GMM estimator. In *Advances in Econometrics* (Vol. 15, pp. 53–91). https://doi.org/10.1016/S0731-9053(00)15003-0

Brissimis, S. N., Hondroyiannis, G., Papazoglou, C., Tsaveas, N. T., & Vasardani, M. A. (2013). The determinants of current account imbalances in the euro area: A panel estimation approach. *Economic Change and Restructuring*, *46*(3), 299–319. https://doi.org/10.1007/s10644-012-9129-0

Bruno, G. S. F. (2005). Estimation and inference in dynamic unbalanced panel-data models with a small number of individuals. *Stata Journal*, *5*(4), 473–500. Retrieved from http://www.stata-journal.com/sjpdf.html?articlenum=st0091

Bun, M. J. G., & Windmeijer, F. (2010). The weak instrument problem of the system GMM estimator in dynamic panel data models. *The Econometrics Journal*, *13*(1), 95–126. https://doi.org/10.1111/j.1368-423X.2009.00299.x

Carrasco, C. A., & Hernandez-del-Valle, A. (2017). Revisiting the Factors behind European External Imbalances. *Journal of Economic Integration*, *32*(2), 324–357. https://doi.org/10.11130/jei.2017.32.2.324

Carrasco, C. A., & Serrano, F. (2015). Global and European imbalances and the crisis: a critical review. In *The Demise of Finance-dominated Capitalism* (pp. 265–288). Edward Elgar Publishing. https://doi.org/10.4337/9781784715076.00013

Çelik, S., & Kaya, H. (2010). Real exchange rates and bilateral trade dynamics of Turkey: panel cointegration approach. *Applied Economics Letters*, *17*(8), 791–795. https://doi.org/10.1080/13504850802388993

Cooper, J. C. B. (2003). Price elasticity of demand for crude oil: estimates for 23 countries. *OPEC Review*, *27*(1), 1–8. https://doi.org/10.1111/1468-0076.00121

Djankov, S., & Freund, C. (2002). Trade Flows in the Former Soviet Union, 1987 to 1996. *Journal of Comparative Economics*, *30*(1), 76–90. https://doi.org/10.1006/jcec.2001.1752

Duarte, P., & Schnabl, G. (2015). Macroeconomic Policy Making, Exchange Rate Adjustment and Current Account Imbalances in Emerging Markets. *Review of Development Economics*, *19*(3), 531–544. https://doi.org/10.1111/rode.12168

Federal'naya tamozhennaya sluzhba. (2017). *Vneshnyaya torgovlya Rossii v 2016 godu (Russian international trade in the year 2016)*. Retrieved from http://www.customs.ru

Fosu, A. K. (1990). Export composition and the impact of exports on economic growth of developing economies. *Economics Letters*, *34*(1), 67–71. https://doi.org/10.1016/0165-1765(90)90183-2

Ghatak, S., Milner, C., & Utkulu, U. (1997). Exports, export composition and growth : cointegration and causality evidence for Malaysia. *Applied Economics*, *29*(2), 213–223. https://doi.org/10.1080/000368497327272

Gu, X., Zhou, Z.-Y., & Beg, A. B. M. R. A. (2014). What Determines China's Trade Balance Dynamics: A Disaggregate Analysis of Panel Data. *Journal of the Asia Pacific Economy*, *19*(2), 353–368. https://doi.org/10.1080/13547860.2014.880284

Herzer, D., Nowak-Lehmann, F., & Siliverstovs, B. (2006). Export-led growth in Chile: Assessing the role of export composition in productivity growth. *The Developing Economies*, *44*(3), 306–328. https://doi.org/10.1111/j.1746-1049.2006.00019.x

Khan, M. Z. S., & Hossain, M. I. (2010). A Model of Bilateral Trade Balance: Extensions and Empirical Tests. *Economic Analysis and Policy*, *40*(3), 377–391. https://doi.org/10.1016/S0313-5926(10)50037-7

Khan, M. Z. S., & Hossain, M. I. (2012). Determinants of Trade Balance of Bangladesh: A Dynamic Panel Data Analysis. *Bangladesh Development Studies*, *35*(2), 45–65. Retrieved from http://bids.org.bd/uploads/publication/BDS/35/35-2/02_Determinants of Trade.pdf

Kilian, L., Rebucci, A., & Spatafora, N. (2009). Oil shocks and external balances. *Journal of International Economics*, *77*(2), 181–194. https://doi.org/10.1016/j.jinteco.2009.01.001

Krichene, N. (2002). World crude oil and natural gas: a demand and supply model. *Energy Economics*, *24*(6), 557–576. https://doi.org/10.1016/S0140-9883(02)00061-0

Langhammer, R. J. (1991). *Salient features of trade among former Soviet Union republics: facts, flaws and findings* (No. Kiel Working Paper, No. 496). Kiel. Retrieved from http://hdl.handle.net/10419/582

Le, T.-H., & Chang, Y. (2013). Oil price shocks and trade imbalances. *Energy Economics*, *36*(March), 78–96. https://doi.org/10.1016/j.eneco.2012.12.002

Navoi, A. V. (2017). Ustoichivost' balansov mezhdunarodnykh raschetov kak vazhneishaya predposylka finansovoi stabil'nosti (Sustainability of external balances as an important precondition for financial stability). *Den'gi I Kredit*, (6), 66–72. Retrieved from https://www.cbr.ru/publ/MoneyAndCredit/navoy_06_17.pdf

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, *71*(1), 135–158. https://doi.org/10.1111/j.1468-0084.2008.00542.x

Wierts, P., Van Kerkhoff, H., & De Haan, J. (2014). Composition of exports and export performance of Eurozone countries. *Journal of Common Market Studies*, *52*(4), 928–941. https://doi.org/10.1111/jcms.12114