Erasmus University Rotterdam

Master Thesis

MSc International Economics

Russia: currency policy and its bilateral trade

Author:

Joey vd Hoeven

Supervisor:

Professor C. de Vries

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Abstract:

This paper attempts to identify the relationship between the bilateral trade balance of Russia and its biggest trading partners, Germany and the USA, and several independent explanatory variables. The empirical setup allows for non-stationarity and error correction between the variables through the Vector Error Correction Model (VECM) specification. This paper's main conclusions are: (1) the Russian bilateral trade balance and exchange rate do not show a long run relationship; and (2) the results indicate no J-curve effect.

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1. Introduction:

Goldman Sachs published a research paper in 2002 about potential economic superpowers of the 21th century (Purushothaman & Wilson, 2003). These potential economic superpowers were summarized by the acronym BRIC (Brazil, Russia, India, China). Based on this study, Russia was seen by many as an emerging superpower economy and one of the most dominant economies "to be" in the middle of the current century.

During the following years, Russia experienced some impressive economic growth, with real gross domestic product (GDP) increasing 6.9% annually on average, which helped to raise the Russian standard of living and brought economic stability (Cooper, 2009). However, the economic success of Russia was mainly based on high oil prices and when the prices of both oil and other commodities went down in 2008, the Russian economy suffered heavily. Both production and, even more importantly, export of oil and gas went down rapidly (Cooper, 2009). On top of that the Russian economy was also, like many other economies, hit substantially by the global financial crisis. The unavoidable outcome of this all for Russia: Recession! (Cooper, 2009). In dealing with the consequences of this crisis, Russia also had to make some important decisions regarding its exchange rate policy.

The fact that Russia is an emerging economy and recently had to deal with a crisis is one of the main reasons this paper focuses specifically on the Russian currency policy before the financial crisis and the changing policy responses as a result of the crisis. To prognose the amount of bilateral trade between Russia and Germany plus the USA (Russia's biggest trading partners), different models in EViews are used.

My main research question is:

How will the currency policy of Russia impact the international trade position of the country and what do we predict to happen with the future bilateral trade between Russia, Germany and the USA?

The findings of this main research question are underpinned by a few sub questions. These sub-questions discuss what forms of currency policies were used in Russia, how the Russian economy evolved over time and what I predict to happen with the bilateral trade between Russia and its biggest trading partners, Germany and the USA.

After above introduction, in which the purpose of this paper is explained, this paper aims at answering the sub questions while making use of different data sources. The answers of the sub questions will frame the insight of current policy impact, the potential future effects on Russia's international trade position and the possible future bilateral trade between Russia, Germany and the USA. After that, findings, underpinned by forecasting modeling results, are summarized and a clear conclusion is formulated.

2. Literature review:

The importance of the ”exchange rate” as an economic parameter is recognized by many. The macro-economic impact of appreciation and/or depreciation is big in both directly and indirectly impacted economies (Hashim & Zarma, 1996). The economic parameter “exchange rate” is also often used to measure the economic performance of a country and hence it is also seen as a crucial variable for policy decision making. The stability of the exchange rate will allow the economic partners to plan well ahead with stabile costs of production, but also with good oversight of expected prices for goods and services. Very variable exchange rates, on the contrary, are seen by many as a main cause of economic instability.

2.1 Impact exchange rate on trade balance:

The relationship (and mutual influence) of the “exchange rate” and the “trade balance” variables has been studied for a long time. For that reason there is no shortage of theoretical literature, describing and studying the inter-relation of the two parameters. The literature describes a wide range of analyses and not in the last place because of the economic importance of the inter-relation for the economic well being of countries. The Mundell-Fleming model, a very popular model in this space, makes use of a IS-LM model and enables the analysis of the economic impact of the exchange rate parameter on the economy.

Stockman looked for a logical relationship between terms of trades (impacting export/import) and the exchange rate. The model shows that both export/import and exchange rate are simultaneously market driven and changes are triggered by supply and demand step changes. The model does not suggest the two variables influencing each other directly (Stockman, 1978).

The trade balance / exchange rate relationship was also examined by Shirvani and Wilbratte. The specific case studied was between the USA and the 6 other G7 countries being France, Italy, Germany, Japan, Canada and United Kingdom (Shirvani & Wilbratte,

1997). Akbostanci's and Liu, Fan and Shek did case studies for respectively Turkey and Honk Kong (Akbostanci, 2002; Liu, Fan, & Shek, 2007) .

Onafowora found a significant relationship in the bilateral trade of Malaysia, Thailand and Indonesia with the USA and Japan. However, her test results didn't proof a significant relationship of exchange rate and trade balance. Again this conclusion is important as it suggests that currency devaluation will not (positively) increase the long term trade balance (Onafowora, 2003). In a similar study done by Liew, Lim, and Hussain, focusing on ASEAN countries, their conclusion was that not the exchange rate but real money had an impact on the trade balance (Liew, Lim, & Hussain, 2003).

The mentioned relationship real exchange rate / trade balance was studied by Wilson and Kua for Singapore and the USA. Again the study confirmed no significant mutual impact (Wilson & Kua, 2001).

A Thorbecke study showed an effect of an exchange rate change (appreciation) in 3 Asian countries (Malaysia, Indonesia and Thailand) actually would lead to a lower export (Thorbecke, 2006).

On the contrary, Rose confirmed trade balance and exchange rate are not significantly related. Hence, stimulating longer term trade balance numbers could not be kicked off via exchange rate changes (Rose A. K., 1991)

2.2 Trade flows between countries:

The behaviour of trade flows between countries is important in economic modelling and is being used in theoretical studies a lot. One can imagine that one of the key contributing factors is the countries exchange rate. The establishment of the exchange rate based on countries trade flows / pricing levels is deeply studied, amongst others by Rey (Rey, 2001).

2.3 Effect of oil - and gas prices on Russian economy:

Basic trade statistics indicate that the EU imports a large percentage of it energy products from Russia. Quantitative work on the effects of oil and natural gas on the domestic Russian economy have been extensive. Tabata and Kuboniwa have made significant steps in modeling the effects of Russian energy resources on other domestic sectors, like the manufacturing industry, and the Russian economy as a whole (Tabata, 2011; Kuboniwa, 2010).

Furthermore, Rautava and Gaddy and Ickes have shown a lot of support for the theory that the Russian business cycle can almost be fully explained by the fluctuations of the international price of oil (Rautava, 2004; Gaddy & Ickes, 2010). All of this quantitative work, however, is not isolated from the political area. Brugato correlated aggressive Russian political maneuvers to fluctuations in the international price of oil. Brugato's paper quantitatively shows that the economics of oil and natural gas are inherently linked to Russian politics (Brugato, 2008).

2.4 J-curve:

We are talking about a J-curve effect when a curve falls and eventually rises to a point higher than the starting point, suggesting the letter J. An example of the J-curve effect is seen when a country's trade balance initially worsens following a devaluation or depreciation of its currency. The higher exchange rate will at first correspond to more costly imports and less valuable exports, leading to a bigger initial deficit or a smaller surplus. Due to the competitive, relatively low-priced exports, however, a country's exports will start to increase. The trade balance eventually improves to better levels compared to before devaluation.

As for literature on the J-curve effect, the findings do not give a clear support of it. Some contradicting examples; Bahmani-Oskoee and Brooks found the J-curve / Marshall-Lerner condition for the USA and their 6 major trading partners (Bahmani-Oskooee & Brooks, 1991). However, Rose and Yellen could not confirm existence of the J-curve for the USA, while Pesaran and Shin only confirmed the long term element of the J-curve (Rose & Yellen, 1989; Pesaran, Shin, & Smith, 1996). In summary; conflicting conclusions if it comes to confirming the J-curve for US international trade.

For developing countries (e.g. in Middle East and North Africa), the evidence of J-curve existence was even more limited with Bahmani-Oskoee finding little short term J-curve evidence and Upadhyaya and Dhakal showing support for a J-curve for only one out of the 7 countries researched; Mexico (Bahmani - Oskooee, 2001; Upadhyaya & Dhakal, 1997).

A widely used method concerning the J-curve effect is bilateral trade estimation. This method looks at the trading flows of countries and how exchange rates influences those flows The most investigated country in the literature is off course the USA. David Backus investigated US/Canada trade in the 1970's and found a J-curve pattern (Backus, 1986). Rey also looked at the USA-UK trade and found significant impact on trade volumes of both money and financial markets (Rey, 2001).

2.5 Econometric models:

With the development of econometric modelling and econometric methods, VAR and VEC models became popular in the field (Kale, 2001). A VAR model is used to capture the linear interdependencies among multiple time series and a VECM adds error correction features to this model in order to deal with the non-stationarity of some of the series. Moffett studied the relationship between US import/export prices in relation to US import/export quantities. The question was: is there a J-curve relationship? Results show that a depreciation results in simultaneous decrease of exports and a decrease of imports (Moffett, 1989).

3. Sub-question One:

How did the exchange rate policy of Russia develop over the years?

3.1 Period 1990 – 1993:

After the demise of the former Soviet Union, Russia implemented a floating exchange rate system. This system was introduced because of the financial problems the former Soviet union had, which started because of the sudden emergence of new nation states without separate currencies and, thereby, with multiple central banks sharing a common currency, without overall coordination or control (Sachs, 1996).

Like many other countries in the developing world, Russia experienced large inflows and outflows of capital and was therefore increasingly subject to shocks coming from world capital markets. Since the former Soviet Union didn't have a lot of experience with currency convertibility, monetary and exchange-rate policy had to be designed with an eye toward currency stabilization (Sachs, 1996).

Even before reaching the decision over the exchange-rate regime, the successor states to the Soviet Union had to take decisions regarding a national currency. In this, the IMF made a serious mistake in early 1992, pushing hard for the continuation of a common currency for the successor states, despite the existence of 15 separate central banks and little feasibility of monetary coordination among the separate central banks. The Russian government continued to accept the ruble credits issued by the non-Russian central banks in payment for imports from Russia (Sachs, 1996).

In Russia, full monetary independence from the other states effectively began in the fall of 1993, when Soviet currency notes were withdrawn from circulation in Russia, and republics that still lacked their own currency finally moved to establish new national currencies (Sachs, 1996).

3.2 Period 1995 – 2002:

Declining confidence in the domestic currency due to persistent inflation led to the dollarization of the economy. To fight this, Russia introduced an exchange rate corridor system in 1995, strengthening the role of the ruble exchange rate as the nominal policy anchor (Central Bank of the Russian Federation, 2014). This didn't have the effect they were seeking since the nominal deficit averaged 7.4% of GDP during the three years preceding the 1998 debt crisis (Edwards, 2001).

The government debt crisis of 1998 triggered a shift to a managed floating exchange rate. After that crisis, exchange rate dynamics were largely market-driven and allowed official reserves to be rebuilt as oil prices revived. The implementation of a managed floating exchange rate system contributed to the smoothening of the influence of changes in external conditions on the Russian financial markets, preventing excessive movement in the ruble exchange rate, as this threatened macro-economic and financial stability, and the Russian economy as a whole. This exchange rate policy also helped to restore the confidence in the country's financial system (Central Bank of the Russian Federation, 2014). During the next years, Russia experienced an extraordinary economic boost, despite the sharp downturn in the world economy as a whole.

The Bank of Russia intended to gradually decrease its influence on the exchange rate dynamics and to shift to a floating exchange rate regime. However, the exchange rate continued to be tightly managed through 2002–2005, mainly because of the fact that after the East Asian, Russian and Brazilian crises, economists' views on nominal exchange rate regimes continued to evolve (Central Bank of Russia, 2014). Fixed-but-adjustable regimes rapidly lost ground, while the two extreme positions, super-fixed, and freely floating rates gained in popularity (Edwards, 2001).

3.3 Period 2005 – 2008:

In 2005, the Bank of Russia introduced a dual-currency basket as the operational indicator for its exchange rate policy. Again, the aim was to smoothen the volatility of the ruble's exchange rate in relation to other major currencies. The dual-currency basket consisted of the US dollar and the Euro (the value of the dual-currency basket is calculated as the sum of ruble values of 0.55 US dollars and 0.45 Euro's) and was designed to keep the dynamics of the basket's value in line with changes in the ruble's nominal effective exchange rate (Central Bank of Russia, 2014).

The global financial crisis of 2007-2008, as a result of bad housing loans by banks around the world, led to a sharp decline in oil prices. This sharply eroded Russia's current account balance and triggered massive capital outflows, putting the ruble under significant downward pressure. Dealing with the consequences of this crisis, Russia had to make some important decisions regarding its exchange rate policy. Should the policy aim to preserve the competitiveness gains associated with the ruble's devaluation by making sure the exchange rate drops in line with inflation? Or is the calming effect of a stable exchange rate on consumers and investors more important, even when Russian producers begin to find it harder to compete against their foreign rivals? In other words, is it better to have a "soft" ruble, or a "hard" one (Woodruff, 1999)? The legacy of Soviet energy policy creates serious difficulties for either a hard ruble or a soft ruble policy. When the ruble's dollar value is low, Russian energy users cannot afford to pay world prices for oil and gas, or even a reasonable fraction of them. As a result, the government comes under pressure to intervene in the economy and hold down energy prices. When the ruble's dollar value is high, however, Russian firms cannot compete against foreign firms.

The choice that Russia faced was whether to continue to combine a weak exchange rate with export restrictions, or whether to pursue a strong exchange rate that would make domestic energy sales attractive, but damage the competitiveness of the Russian industry. If it wants to create a political base for long-term growth and eventually world market competitiveness, Russia should choose a strong exchange rate. Such a policy has one key advantage. This advantage is that it makes energy producers work all together to generate growth (Woodruff, 1999). A stronger exchange rate would make the domestic market a realistic source of major sales, leading energy producers to invest in their customers in an effort to further expand the market. A weak exchange rate pits energy exporters against the government in a battle over whether the domestic market will be supplied at all; a strong exchange rate could unite the two forces in a battle for growth (Woodruff, 1999). The bank of Russia decided to go for a policy that tried to create a strong exchange rate, a trend that threatened to put a heavy strain on the balance sheets of banks, the competitiveness of the Russian industry and households.

3.4 Period 2009 - 2015:

Between November 2008 and January 2009, the Bank of Russia allowed the ruble to depreciate gradually by widening the dual-currency band. At the same time, the Bank conducted large-scale interventions in the domestic foreign exchange market in order to slow the pace of the ruble's depreciation with the aim of giving the economy time to adjust to these ongoing changes (Central Bank of the Russian Federation, 2014).

In January 2009, the Bank of Russia announced a wide fixed band for the ruble value of the dual-currency basket (allowing fluctuations from 26 to 41 rubles) and it also introduced a floating operational band. The gradual move to a more flexible exchange rate regime was intended to create favorable conditions for market participants to adjust to a fully floating exchange rate environment (Central Bank of the Russian Federation, 2014).

Starting from the first quarter of 2009, the exchange rate policy mechanism permitted foreign exchange interventions both within the floating operational band for the ruble value of the dual-currency basket and at its borders. The operational band included a "neutral" range where no interventions were conducted. When the value of the dual-currency basket moved outside the "neutral" range, the Bank of Russia started buying or selling foreign currency. The closer the value of the dual-currency basket approached the borders of the operational band, the more heavily the Bank of Russia intervened. The Bank of Russia determined the volume of its target interventions according to balance of payment factors, the budget policy and domestic and foreign financial market conditions (Central Bank of the Russian Federation, 2014).

During 2009–2012, the Bank of Russia further increased the flexibility of its exchange rate policy, widening the floating operational band from 2 to 7 rubles. Following these changes, intervention volumes have steadily decreased. Yet the foreign exchange market remained stable. This was caused by the fact that the gradual shift to a more flexible Ruble exchange rate helped economic agents to adjust to the growing level of Ruble volatility, promoting continued de-dollarisation, and making households' foreign exchange deposits and foreign exchange cash purchases less vulnerable to Ruble exchange rate changes. Also, the ruble's volatility and exchange rate trends have stayed in line with the dynamics of other emerging markets currencies (Central Bank of the Russian Federation, 2014).

In 2013–2014, the Bank of Russia further increased the flexibility of the ruble exchange rate regime with a view of creating the conditions for a transition to a fully floating exchange rate regime by 2015. This was seen as an important requirement for the introduction of inflation targeting. After moving to a floating exchange rate regime, the Bank of Russia planned to abandon exchange rate-based operational indicators for its exchange rate policy. Even in this case, however, the Bank retains the right to intervene in the foreign exchange market (Central Bank of the Russian Federation, 2014).

From November 2014, the Bank of Russia finally abolished the exchange rate policy mechanism through cancelling the range of the dual-currency basket ruble values and regular interventions close to and outside the borders of this band. However, the new approach of the Bank of Russia does not completely abandon foreign exchange interventions, which can still be implemented in case of financial stability threats (Central Bank of Russia, 2014).

During the first months of 2015, the Russian economy got into a dangerous position. This was mainly caused by the fact that in one year the ruble's value more than halved against the dollar. A warning was given by the Central Bank of Russia that the country's GDP could decline by more than 4% should oil prices remain low. The decision by the Central Bank of Russia to raise interest rates from 10.5% to 17% should theoretically have helped to stabilize the Russian ruble. Instead, the currency weakened. Since then, the ruble has been recouping its losses. However, the currency is still weak and vulnerable to economic challenges and risks that the Central Bank of Russia is fervently trying to mitigate. Despite Russia's economic worries, the Central Bank of Russia pressed ahead with fully floating the ruble, opening the currency up to the pressures of floating freely in currency markets.

4. Sub-question Two:

How did Russia's economic situation evolve over the years?

4.1 Period 1991 – 1993:

After the collapse of the Soviet Union in 1991 and the collapse of Russia's controlled economy, a new Russian Federation was created under Boris Yeltsin. He vowed to transform Russia's socialist economy into a capitalist market economy and implemented economic shock therapy, price liberalization and nationwide privatization. Due to a sudden total economic shift, a majority of the national property and wealth fell into the hands of a small number of oligarchs. These oligarchs hindered commerce by imposing unauthorized tolls and tariffs. Rather than creating new enterprises, Yeltsin's democratization led to international monopolies hijacking the former Soviet markets, arbitraging the huge difference between old domestic prices for Russian commodities and the prices prevailing on the world market.

4.2 Period 1997 – 1999:

In the period 1997/1998 the Russian currency (Ruble) and the Russian economy came into a vulnerable position. The main reason for that could be found in the so called "oil crisis period" in which commodity prices (e.g. for oil and gas) went down dramatically. As a result Russia was missing big foreign currency earnings. This put downward pressure on Russia's foreign currency reserves and made it more difficult to service the debt and defend the ruble. In the same period, the Asian financial crisis kicked in and investors did not want to take any risks in short term security holdings (Cooper, 2009).

With an economic system and related policies still based on a communistic history, restructuring of policies was not a straightforward thing. Establishing a new tax regime looked impossible. Bankruptcy laws could not be easily introduced. However, Russian leadership was persistent to find the way forward and covert the central driven economy into a more market driven economy. As described earlier, this change also made the Ruble more "market driven" and internationally even opened the Russian economy (Cooper, 2009).

In this period (end of the 90's) quite some Russian banks, with some of them holding government debt, collapsed. Many symptoms of the 1998 crisis developed even before the financial crisis as Russian interest rates soared, prices on the Russian stock market plummeted and the value of the Russian ruble sank (between July 1998 - September 1998, 60% of its (nominal) value in terms of the dollar and an additional 17% of its dollar value in the first nine months of 1999. The exchange rate reached 25 to 1, as compared to 6.29 to 1 before the crisis). As a result of the many changes, the financial reserves of Russia dropped in July/August 1998 with approximately 30% to $12,5 billion. Russia's GDP went down with almost 5% in 1998 (Cooper, 2009).

The core of the Russian crisis specifically was in fact that the government had to finance budget deficits with short term debts. As long as the Russian governments could handle these debts and deficits, the government was able to avoid inflation, and hence keep the Ruble more or less stable.

The government also had to deal with a legacy from the (centrally planned) economy of the past (e.g. period of Boris Yeltsin). Quite some ineffective, low quality, non-competitive industries had to be abandoned or modernized in alignment with global standards. Government expenditure in the Yeltsin period was massive with budget deficits getting close to 10% of the GDP. Extreme high interest rates had to be paid to

finance these government debts. The radical approach in Yeltsin's reform program created inflation as the market economy got introduced a bit too early (Cooper, 2009).

The massive devaluation of the ruble had some positive effects for the economy. With their rubles worth fewer dollars, Russians were no longer able to afford imported goods. They began to look for domestically produced alternatives, and many Russian businesses responded with a lot of enthusiasm. Russian exporters also benefited, because their costs for wages and other domestic inputs fell greatly in dollar terms, making them more competitive on world markets (Woodruff, 1999).

It was widely feared, however, that the positive effects of devaluation would be short-lived. Opportunities to replace imports had largely already been realized. Meanwhile, inflation was starting to outstrip the continuing decline in the exchange rate. As a result, Russian prices were going up in dollar terms, eroding earlier competitiveness gains (Woodruff, 1999).

4.3 Period 1999 – 2015:

During the period 1999 – 2008, the Russian economy experienced a great 6,9% increase of the real GDP (Cooper, 2009). With that excellent average, not only did the Russian standard of living increase, but both economic and financial stability increased and that was something that Russia missed for a long period (Cooper, 2009). The impact of this success on political leaders (like Putin and Dmitrij Medvedev) was very positive and they gained the support of the Russian people even more. This allowed them to re-position Russia again as world power, next to Europe and the USA (Cooper, 2009).

By the end of 2008 also the Russian economy started to suffer, like all other economies, from a recession as a result of the (global) financial crisis. Many industrial countries had a big dependency on the huge amount of natural reserves in Russia (oil, gas, etc.) and these reserves sales did boost Russia's economy in the economic growth period (Cooper, 2009). But now, with recession kicking in, the need for oil, gas and other

raw materials disappeared. The Russian economy showed to have become too dependent on the income from oil and other commodities. This caused great instability from 2008 onwards. The biggest collapse came in the summer of 2014, when these resources lost 50% of their value, hitting the Russian economy hard.

In order to reduce the capital outflows, slow the ruble's depreciation and to prevent instability in domestic financial markets, the Bank of Russia raised interest rates steadily and implemented a range of additional measures. Banks were advised to maintain stable levels of net foreign assets and currency positions, and their observance of these recommendations was taken into account when credit limits were set for individual banks' access to Bank of Russia unsecured loans. Limits were substantially reduced for banks that did not adequately respect the recommendations (Central Bank of the Russian Federation, 2014).

5. Sub-question Three:

What do we predict to happen with the future bilateral trade between Russia, Germany and the USA?

This sub question is answered with the help of a progressive scheme. This scheme goes through the different steps that are necessary to predict the net trade between Russia and Germany plus the USA. These predictions are the input to various forecasting models (to be explained in further detail). Simulation tests are computed and result in a hypothesis. Further analysis of the simulation output leads to a better estimation of the different forecasting models. This analysis allows a comparison of strengths of the different models used. Ultimately the best fit model is used to answer this specific sub question.

5.1 Progressive Scheme:

The statistical program EViews is being used to calculate/ predict the net amount of trade between Russia, Germany and the USA. EViews is a specialized program to do analysis over time series. The (Russian Ruble/US$) exchange rate is one of the variables I use to predict the future Russian bilateral trade, as a change of the exchange rate has a effect on the bilateral trade balance. It is assumed that a depreciation of the real exchange rate leads to an improvement of the bilateral trade balance of a country. The logic behind this is that export goods become less expensive for the outside world, which in turn encourage other countries to buy more goods. The second variable that I use is the Gross Domestic Product (GDP) of Russia. An increase in the Russian income is likely to have a (negative) effect on the bilateral trade balance. It is likely that the Russian imports will increase if income increases and have a effect on the bilateral trade balance. The Gross Domestic Product (GDP) of the USA is the third variable I am using. This country's GDP is chosen as variable as it is the largest importer of Russian goods. An increase in the GDP of the USA will therefore have a positive effect on the bilateral trade balance. The Gross Domestic Product (GDP) of Germany is the fourth variable. This because of the fact that Germany is one of the biggest trading partners of Russia. As stated before: Russia is

one of the biggest/ largest owners of natural reserves. Beside former Soviet States, other big consumers of the reserves (like Germany and the USA) are also dependent on these Russian reserves. Hence I also used both the prices of gas and oil. The associated variable names for my research are:

-- Trade_balance_us	=	net trade between the USA and Russia (exports USA to Russia – imports USA from Russia)
-- Trade_balance_ger	=	net trade between Germany and Russia (exports Germany to Russia– imports Germany from Russia)
-- GDP_Russia	=	the GDP of Russia
-- GDP_Us	=	the GDP of the USA
-- GDP_Ger	=	the GDP of the Germany
-- Exchange_eu	=	the (Russian Ruble/EU€) exchange rate
-- Exchange_us	=	the (Russian Ruble /US$) exchange rate
-- Oil_price	=	the oil price
-- Gas_price	=	the gas price

The dataset that I use for these variables consists of monthly GDP of Russia data, monthly GDP of the USA data and monthly GDP of Germany data from at least the year 2000 until 2014, daily (Russian Ruble /US$ and Russian Ruble/EU€) exchange rate data and converting this into monthly data, and monthly oil price and gas price data.

Before starting a regression analysis, one needs to validate that the variables that go into the analysis are stationary. Non-stationary variables have the risk that the computed regression are worthless/random. The results in those cases might suggest a (significant) relationship which is totally non-existing. The Augmented Dickey Fuller test can be used to check if a variable is really stationary. For those cases that variables proof to be non-stationary, one can still look for stationary variables by taking the first difference; so we test the lagged variables for stationarity. If needed we can apply the next level difference to finally get a stationary variable.

Assuming that we now have checked on stationarity and have found our stationary variables, we also need to do some other checks. The independent variables that we want to apply in the model also need to meet the assumptions of "Ordinary Least Squares". Not meeting these assumptions leads to an unbiased regression and hence to incorrect regression results. The "Ordinary Least Squares" assumptions used are:

- "Homoscedasticity"; the variance of the error term has to be constant. Homoscedasticity can be checked by using the residual plot and see if the errors are varying constantly.
- "Normality"; the error term is normally distributed. Normality can be checked by making use of the histogram functionality and then see if the histogram meets a normal distribution.
- "Linearity"; the dependent and independent variables have a linear relationship to each other. To validate linearity one makes use of a so called scatterplot. If the scatterplot form meets a line, there is linearity.
- "no serial correlation"; the error term is uncorrelated to itself. Serial correlation can be checked by creating a so called correlogram. Using a correlogram, probabilities show serial correlation or not

Now that I have checked the variables on stationarity and the OLS assumptions, I am ready to start using the different forecasting models. For the forecasting quality it is crucial that the dependent variable is "lagged". In other words; the dependent variable should reflect a year on year change. Furthermore it is important re-iterate that when running the different forecasting models, none of them should have serial correlation between the errors.

The 3 forecasting models used for this paper are:

- The Autoregressive Model (AR). In this model the dependent variable relates linearly to its own lagged value.
- The Distributed Lag Model (DL). In this model the dependent value relates linearly on the independent variable and its lagged values.
- The Autoregressive Distributed Lag Model (ARDL). In this model the dependent variable depends linearly on its own lagged value plus the independent variable (both value and lagged value).

All three mentioned models are now ready to be executed. Based on a good null hypothesis, the best forecasting model can be selected. So we can now use the test results to see which model can be best used and start to predict trade volumes between Russia, Germany and the USA. The forecasted trade volume(s) are incorporated in a final conclusion.

5.2 Tests & Results:

A significance level of 5% is used in this study as most other (similar) studies use this same percentile to evaluate their results.

First a "stationarity" verification is done of the variables by using the Augmented Dickey Fuller test. However, before interpreting the output of these tests, all variables are also plotted in a graph to validate for specific trends and/or drifts. Only then the "Augmented Dickey Fuller" tests are executed. Figure 1 shows both graph plus test results for the variable "trade_balance_us". The results show not only a drift, but also a clear upward trend. The "Dickey Fuller Test" indicates however, with a probability of 0.1066 being greater than the 0.05 significance level, that the null hypothesis (non-stationary) cannot be rejected. In other words, the variable "trade_balance_us" is potentially non-stationary and hence cannot be used for the forecasting of the bilateral trade volumes between Russia and the USA.

To get this variable "stationary", the first difference is taken, i.e. the difference between the bilateral trade this year and the bilateral trade last year. This variable is shown as "d_ trade_balance_us = trade_balance_us – trade_balance_us (-1)". Figure 2 shows the test results (and graph) for this "first difference" variable (d_ trade_balance_us) and in this case the null hypothesis can clearly be rejected. The probability of 0.0000 is clearly below the 0.05 significance level. So the "non-stationary" null hypothesis is rejected and the variable "d_ trade_balance_us" is deemed to be stationary. The mentioned variable can be used in the forecasting models.

All the other variables are tested in similar fashion and are all stationary when using the first difference. Details on this analysis can be found in Appendix A. Working with a model is easier if all variables are lagged in the same order. In my study I therefore used a lagging of the first order. The first order lagging that I use in all my models will not impact the variables "stationarity". As the graph shows; lagging will not turn a "stationary" in a "non-stationary" variable.

Now it is time to execute the checks on the OLS assumptions. I now regress the "lagged bilateral trade" variable with the lagged variables of the GDP of Russia, the GDP of the USA and Germany plus the ones of the oil price and the gas price. Mentioned regressions are shown below:

$\Delta TBUS = c + \beta(1)\Delta ERUS + \varepsilon$
$\Delta TBUS = c + \beta(1)\Delta GDPUS + \varepsilon$
$\Delta TBUS = c + \beta(1)\Delta GDPR + \varepsilon$
$\Delta TBUS = c + \beta(1)\Delta OIL + \varepsilon$
$\Delta TBUS = c + \beta(1)\Delta GAS + \varepsilon$
$\Delta TBGER = c + \beta(1)\Delta EREU + \varepsilon$
$\Delta TBGER = c + \beta(1)\Delta GDPGER + \varepsilon$
$\Delta TBGER = c + \beta(1)\Delta GDPR + \varepsilon$
$\Delta TBGER = c + \beta(1)\Delta OIL + \varepsilon$
$\Delta TBGER = c + \beta(1)\Delta GAS + \varepsilon$

After computing the tests for "homoscedasticity", "normality", "linearity" and "serial correlation", output results show that all of these assumptions are not violated if I

look at the bilateral trade balance between Russia and Germany, and most of these assumptions are not violated if I look at the bilateral trade balance between Russia and the USA (appendix B). Still there is a small amount of violations in the USA case, which could cause the regression's output to be biased in some (small) way.

As stated in section 5.1 (progressive scheme), three forecasting models are being used in this paper:

- The AR Model
- The DL Model
- The ARDL Model

For reference, mentioned models and their specifics are summarized in 5.1.

So what do we expect as potential outcome of our modeling activities? One would expect Russia's GDP to have a high influence on trading amount with both the USA and Germany. As the increase of Russia's GDP would naturally lead to the willingness of Russia to increase the imports from economic partners like the USA and Germany; off course the change will impact the amounts of trade between mentioned countries.
With the use of more variables (5 in my study) I can strengthen the null hypothesis, which now becomes:

The ARD (Autoregressive Distribution) Lag Model with the 5 variables (1) lagged trade balance; (2) lagged exchange rate; (3) lagged Russian GDP; (4) lagged oil price and (5) the lagged gas price is best to forecast net Russian bilateral trading amounts with Germany and the USA.

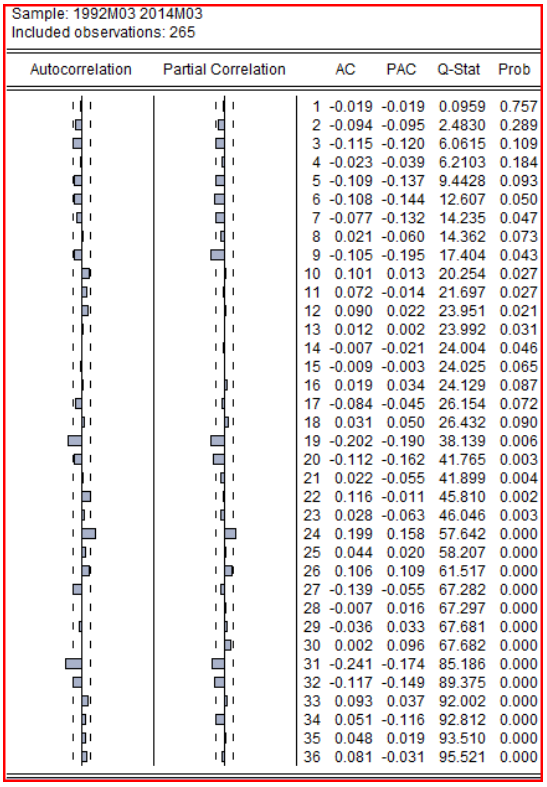
The forecasting models used to predict trade volumes between Russia and Germany plus the USA make use of the following variables:

- "d_exchange_us"
- "d_exchange_eu"
- "d_gdp_russia"
- "d_ trade_balance_us"

- "d_ trade_balance_ger"
- "d_oil_price"
- "d_gas_price"

The regression formulas of the AR, DL and ARDL Models are shown in the following overview:

Test results can only be progressed after the "no serial correlation" assumption has been verified. Figure 3 shows the correlogram of the AR Model. Given the 0.05 significance level that was chosen, it is visible that there are some signs of "serial correlation" of the errors for this model.


Sample: 1992M03 2014M03
Included observations: 265

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.019	-0.019	0.0959	0.757
		2	-0.094	-0.095	2.4830	0.289
		3	-0.115	-0.120	6.0615	0.109
		4	-0.023	-0.039	6.2103	0.184
		5	-0.109	-0.137	9.4428	0.093
		6	-0.108	-0.144	12.607	0.050
		7	-0.077	-0.132	14.235	0.047
		8	0.021	-0.060	14.362	0.073
		9	-0.105	-0.195	17.404	0.043
		10	0.101	0.013	20.254	0.027
		11	0.072	-0.014	21.697	0.027
		12	0.090	0.022	23.951	0.021
		13	0.012	0.002	23.992	0.031
		14	-0.007	-0.021	24.004	0.046
		15	-0.009	-0.003	24.025	0.065
		16	0.019	0.034	24.129	0.087
		17	-0.084	-0.045	26.154	0.072
		18	0.031	0.050	26.432	0.090
		19	-0.202	-0.190	38.139	0.006
		20	-0.112	-0.162	41.765	0.003
		21	0.022	-0.055	41.899	0.004
		22	0.116	-0.011	45.810	0.002
		23	0.028	-0.063	46.046	0.003
		24	0.199	0.158	57.642	0.000
		25	0.044	0.020	58.207	0.000
		26	0.106	0.109	61.517	0.000
		27	-0.139	-0.055	67.282	0.000
		28	-0.007	0.016	67.297	0.000
		29	-0.036	0.033	67.681	0.000
		30	0.002	0.096	67.682	0.000
		31	-0.241	-0.174	85.186	0.000
		32	-0.117	-0.149	89.375	0.000
		33	0.093	0.037	92.002	0.000
		34	0.051	-0.116	92.812	0.000
		35	0.048	0.019	93.510	0.000
		36	0.081	-0.031	95.521	0.000

Figure 3. AR model error Correlogram

Appendix C, figures 4a-r, show, with the help of various correlograms, that all the AR, DL and ARDL forecasting models all show "correlated errors". Appendix C, figures 5a-r, do reflect the outcome of the significance test of the coefficients of the independent variables. Table 1 (USA) and Table 2 (Germany) show that there is low influence of the independent variables on the dependent ones.

Data from table 1 indicates that the AR-model is the best model that can be used to predict the future value of the bilateral trade between Russia and the USA, since it is the only model in which all the parameters are significant. The conclusion for these tables is clear: Russian bilateral trade volumes can be best forecasted based on last year trade numbers complemented with a constant value (the AR model). Looking at the data in table 1, it is interesting to see that the first difference of the previous oil price (variable "d_oil_price(-1)") is significant in most of the models, but isn't included in the model that predicts the best. I therefore wanted to take a look at a model that contained both the variable "d_trade_balance_us(-1)" and the variable "d_oil_price(-1)". The output of this model can be seen in appendix E. The output shows that the bilateral trade between Russia and the USA can also be predicted really well with a model that consists of the previous bilateral trade balance and the previous oil price. Since this was the case for the bilateral trade between Russia and the USA, I also wanted to take a look at the Germany case. The output of this model is also shown in appendix E. This output shows a different situation, since the previous oil price isn't significant here and therefore the AR model, as shown in table 2, is still the best model to predict the future bilateral trade balance between Russia and Germany.

Out of sample forecasts have been done for the various models. As can be seen in appendix F, most of these out of sample forecasts are not good, since the important parameters "bias proportion", indicating how far the mean is from the mean of the actual series, and "variance proportion", indicating how far the variance of the forecasts is from the variance of the actual series, are both not small. In order to have a good out of sample forecast, both of these parameters should be small. The results indicate that in all the forecasts the "bias proportion" is always really small, but they also indicate that the "variance proportions" of all the out of sample forecasts are really high. The only cases for which could be stated that the "variance proportions" are relatively low is when we look at the out of sample forecasts of the ARDL3 and ARDL4 models, but even then the "variance proportion" has a pretty high value. Taking this all into account, we can conclude that the out of sample forecasts are not good.

I also want to look if the bilateral trade balance between Russia and Germany is correlated with the bilateral trade balance between Russia and the USA. I did this with the use of a Seemingly Unrelated regression (SUR). A SUR is used to gain efficiency in estimation by combining information on different equations and it is used to impose and/or test restrictions that involve parameters in different equations. I use both the equation of the dependent variable "d_trade_balace_us" as the equation of the dependent variable "d_trade_balance_ger". The output of this SUR is shown in appendix G. The output shows that the equations of "d_trade_balance_ger" and of "d_trade_balance_us" are not correlated, since the correlation value is really small. Because of this, the VEC models are predicted separately.

5.2.1 Explanatory variables::

I also examine the relationship between the different components of the Russian bilateral trade balance with the US and Germany. As mentioned before, the variables that I consider are the Russian GDP, the US GDP, the German GDP, the oil price, the gas price, the real exchange rate between the Russian Ruble and the American Dollar and the real exchange rate between the Russian Ruble and the Euro. I follow the structure and methodology of Yeun-Ling, Wai-Mun, & Geoi-Mei closely (Yuen-Ling, Wai-Mun, & Geoi-Mei, 2008).

First the relationship between the different components is estimated with a ordinary least squares regression (OLS). The main objective is to explain the dependent variables "lgtrade_balance_us" and "lgtrade_balance_ger" with the variables "Russian

GDP", "US GDP", "German GDP", "oil price", "gas price" and the "real exchange rate" (Russian Ruble /US$ and Russian Ruble/EU€), with particular interest for the effect of the real exchange rate on the Russian bilateral trade balance with the US and Germany.

The natural logarithms (ln) of all variables are taken. Due to this transformation the variables could be interpreted as elasticity's.

5.2.2 Specifications:

The following two regressions are being used:

(1) $lgtrade\_balance\_us = \beta_0 + \beta_1 lggdp_{Russia} + \beta_2 lggdp_{US} + \beta_3 lgexchange\_us + \beta_4 lgoil\_price + \beta_5 lggas\_price + \mu$

(2) $lgtrade\_balance\_ger = \beta_0 + \beta_1 lggdp_{Russia} + \beta_2 lggdp_{germany} + \beta_3 lgexchange\_eu + \beta_4 lgoil\_price + \beta_5 lggas\_price + \mu$

These regressions tell that the relative exports to imports between Russia and its biggest trading partners, the USA and Germany, are explained by the GDP of the countries, the real exchange rate and the oil and gas prices.

All variables in equation (1) and (2) are tested for stationarity. In addition to the paper of Yeun-Ling, Wai-Mun, & Geoi-Mei, the Augmented Dickey-Fuller (ADF) test and the Philips-Perron (PP) tests are used for unit root testing (Yuen-Ling, Wai-Mun, & Geoi-Mei, 2008). If both tests give opposing results for a variable, the KPSS test is used to decide if there is a unit root. Testing for unit root is important because non-stationary variables can cause some problems to standard OLS regression. As can be seen in Appendix P, I find a unit root in almost all variables using the ADF test and the PP test. Since this is undesirable for regression analysis, the first difference is taken from all variables. The US regression now has the following form:

(3) $D(lgtrade\_balance\_us) = \beta_0 + \beta_1 D(lggdp\_Russia) + \beta_2 D(lggdp\_US) + \beta_3 D(lgexchange\_us) + \beta_4 D(lgoil\_price) + \beta_5 D(lggas\_price) + \mu$

D stands for the first difference of the variable. Taking the first difference is a standard routine to get rid of unit root in variables in order to use the variables in a regression analysis.

Another way to cope with non-stationary variables which are integrated of order one (that is after taking the first difference the variables are stationary), is to look at the cointegration of the variables. I examine the cointegration relationship between the variables by using the Engle-Granger approach and the Johansen cointegration test.

The Engle-Granger approach requires two steps to be taken. The first step is again to estimate the regression (1 and 2) and obtain the residual term μ from the equation. The second step is to perform a standard ADF unit root test on the residual term μ to see if this term is stationary. In order to say that the variables are cointegrated, the residual term μ should form a stationary serie. However, it could be argued that there are some problems with the Engle-Granger approach. One of these problems is that the residual series is estimated rather than observed, so the standard asymptotic distributions of conventional unit root statistics do not apply. Therefore I apply another cointegration test to see if the variables are cointegrated.

The Johansen cointegration test was used in order to determine the number of cointegration relationships between the variables. Determining this number of cointegration relationships is important, especially for the next step taken in this analysis. This next step is the Vector error correction model (VECM).

The VECM model shows if a lagged value (Lag one and Lag two) of the variables are significantly explaining the dependent variables in the VECM model. This is interesting since the long run relationship between the variables could be revealed. The

VECM is also important for our analyses because it serves as the basis for the impulse response function.

Following Yeun-Ling, Wai-Mun, & Geoi-Mei, statistical tests are applied on the VECM model to verify the correctness of the model (Yuen-Ling, Wai-Mun, & Geoi-Mei, 2008). The model is tested for serial correlation, hetroskedasticity and the pairwise Granger causality test is applied on the model. With this causality test I can elicit the direction in which the variables influence each other.

To analyze the short run and long run effects of one variable on another, an impulse response function is conducted. The impulse response function shows the effect of a change in one variable on another variable and also show how that effect behaves over time. This is interesting to see, because it is usually assumed that a depreciation of the real exchange rate ("exchange_us" or "exchange_eu") first decreases the value of the trade balance, that is imports increase relatively to exports, and later on improve the trade balance; the so called J-Curve. With the impulse response function I can extend our analysis and I could investigate the existence of the J-Curve for the Russian trade balance.

The estimates of regression equation (3) are summarized in table 3 of appendix Q. The estimated parameter values are:

$$D(lgtrade\_balance\_us) = 43.36815 - 0.403572D(lggdp_{Russia}) - 0.271563D(lggdp_{US}) - 0.929540D(lgexchange\_us) + 0.017614D(lgoil\_price) + 0.035239D(lggas\_price) + \mu$$

5.2.3 Unit root testing:

Both the "Augmented Dickey Fuller" test and "Philips Perron"unit root tests are being used to check for the existence of a unit root. Most variables don't have a unit root according to the ADF test and the PP test, except for the variables "lgexchange_eu", "lggdp_US", which has a unit root according to all the tests, except the PP test with trend, the variable "lgexchange_us", the variable "lgoil_price" and the variable "lggas_price" (for all tests except the ADF test with trend). After taking the first difference all variables

are stationary. This is, as said before, important since variables with a unit root can give rise to serious problems with the OLS estimator. After these tests I can conclude that this is not the case with this regression, because all variables are at most integrated of order one (1). This means that the variables are stationary after taking the first difference. In table 3 and 4 (4 & 5 in appendix Q) the results of the ADF and PP tests are summarized.

Variable	ADF test		PP test		KPSS test
	No trend	Trend	No trend	Trend	
Lggdp_russia	0.0035 [3]	0.0009 [3]	0.0035 [3]	0.0009 [3]	
D(Lggdp_russia)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0001 [3]	
Lggdp_US	0.8091	0.2882	0.7978	0.0004 [3]	Unit root
D(lggdp_US)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgexchange_us	0.9805	0.9849	0.9988	0.9990	
D(lgexchange_us)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgtrade_balance_us	0.0031 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
D(lgtrade_balance_us)	0.0000 [3]	0.0000 [3]	0.0001 [3]	0.0001 [3]	
Lgoil_price	0.3380	0.3233	0.4380	0.4881	
D(Lgoil_price)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lggas_price	0.6528	0.0311 [2]	0.7477	0.1392	
D(Lggas_price)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
[1] = 10% ; [2] = 5% ; [3] = 1% significance level					

Table 3. ADF & PP (USA)

Variable	ADF test		PP test		KPSS test
	No trend	Trend	No trend	Trend	
Lggdp_russia	0.0035 [3]	0.0009 [3]	0.0035 [3]	0.0009 [3]	
D(Lggdp_russia)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0001 [3]	
Lggdp_ger	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
D(lggdp_ger)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgexchange_eu	0.9516	0.5674	0.9935	0.9488	
D(lgexchange_eu)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgtrade_balance_ger	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
D(lgtrade_balance_ger)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgoil_price	0.3380	0.3233	0.4380	0.4881	
D(Lgoil_price)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lggas_price	0.6528	0.0311 [2]	0.7477	0.1392	
D(Lggas_price)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
[1] = 10% ; [2] = 5% ; [3] = 1% significance level					

Table 4. ADF & PP (Germany)

5.2.4 Engle-Granger cointegration approach:

I now continue with the Engle-Granger cointegration approach. The residual term μ (called RESIDUAL1) is tested for unit root with an ADF test with trend and intercept. The t-statistic for this ADF test for the USA case on the residual is -9.565347 and the corresponding p-value is 0.0000. The t-statistic for this ADF test for the Germany case on the residual is -1.161536 and the corresponding p-value is 0.6764. However, since the ADF test is now used to test for co-integration in the residual term, the standard p-value provided in Eviews is incorrect. Therefore the t-values (-9.565347 (USA) / -1.161536 (Germany)) of the ADF tests are compared with critical values obtained from "Critical values for cointegration tests" (MacKinnon, 2010). The critical value for the 5% significance level is -4.43 and therefore we do reject the null hypothesis in the USA case. This means that there is no unit root, that the residual term is stationary and that the variables are cointegrated. In the case of Germany I do not reject the null hypothesis. This means that there is a unit root, that the residual term is not stationary and that the variables are not cointegrated. These results can also been seen in tables 6 and 7 in appendix Q.

5.2.5 Johansen cointegration test:

The Johansen cointegration test is used to determine the number of cointegration relationships between the variables. The Johansen test actually performs two different methods in explaining the number of cointegration relationships. Namely the trace value and the maximum eigenvalue. The trace value test indicates that there are 2 cointegration relationships between the four variables in the case of the USA and 0 cointegration relationships between the four variables in the case of Germany. However, the eigenvalue tests indicates that there is no cointegration relationship at all for the USA case and 1 cointegration relationship for the Germany case. These results can be seen in tables 5 and 6 below (table 8 and 9 in appendix Q).

	Trace statistic	Max-eigen statistic
	P-value	p-value
None	0.0092 [3]	0.1021

At most 1	0.0688 [2]	0.2702
At most 2	0.1785	0.1224
At most 3	0.6430	0.6839
At most 4	0.6568	0.5742
At most 5	0.8850	0.8850
[1] = 10% ; [2] = 5% ; [3] = 1% significance level		

Table 5. Johansen cointegration (USA)

	Trace statistic	Max-eigen statistic
	P-value	p-value
None	0.1141	0.0299 [2]
At most 1	0.7159	0.4545
At most 2	0.9397	0.7440
At most 3	0.9908	0.9773
At most 4	0.9743	0.9897
At most 5	0.3775	0.3775
[1] = 10% ; [2] = 5% ; [3] = 1% significance level		

Table 6. Johansen cointegration (Germany)

5.2.6 VECM:

The VECM model represents the relationship between lagged variables and the dependent variables in the VECM model. In addition to Yeun-Ling, Wai-Mun, & Geoi-Mei I constructed the long run relationship between the variables by using the values given by the VECM model (Yuen-Ling, Wai-Mun, & Geoi-Mei, 2008). The cointegration relations can be found in appendix I. The long run relationship in the case of the USA is summarized in table 7 (table 10 in appendix Q):

	D(LGTRADE_BALANCE)	p-value
COINTEq1	-0.549950	
COINTEq2	-1.104187	
D(LGTRADE_BALANCE_US(-1))	-0.314543	0.0000 [3]
D(LGTRADE_BALANCE_US(-2))	-0.043125	0.0000 [3]
D(LGEXCHANGE_US(-1))	-0.550748	0.0035 [3]
D(LGEXCHANGE_US (-2))	1.1811917	0.6026

D(LGGAS_PRICE(-1))	0.856399	0.7249
D(LGGAS_PRICE(-2))	-0.999308	0.2201
D(LGGDP_RUSSIA(-1))	0.124807	0.3026
D(LGGDP_RUSSIA(-2))	0.080271	0.2599
D(LGGDP_US(-1))	-6.054411	0.0401 [2]
D(LGGDP_US(-2))	-36.58325	0.1773
D(LGOIL_PRICE(-1))	1.431574	0.8431
D(LGOIL_PRICE(-2))	1.508229	0.2145
C	0.113650	0.0305 [2]
[1] = 10% ; [2] = 5% ; [3] = 1% significance level		

Table 7. VECM (USA)

The coefficients in the cointegration equation in appendix I give the estimated long-run relationship among the variables; the coefficients on that term in the VECM show how deviations from that long-run relationship affect the changes in the variable in the next period. As can be seen from table 7 above, there are only a couple of variables that are significant in the VECM and therefore significantly explain how deviations from that long-run relationship affect the changes in the variable in the next period ; the first and second lag of the variable "lgtrade_balance_us", the first lagged real exchange rate and the first lag of the variable "lggdp_us". Since only a few variables in the above equation are significant at a 5% significance level, the above VECM result should be interpreted with care.

Same can be said when I look at the VECM of the Germany case. As can be seen from table 8 below, there are only a couple of variables that are significant in the VECM and therefore significantly explain how deviations from that long-run relationship affect the changes in the variable in the next period; The first and second lagged variable "lgtrade_balance_ger", the second lagged GDP of Russia and the second lag of the variable "lggas_price" . The VECM below should also be interpreted with care, since also here only some variables in the above equation are significant at a 5% significance level. The long run relationship for the Germany case is given by the following VECM model, summarized in table 8 (table 11 in appendix Q):

	D(LGTRADE_BALANCE)	p-value
COINTEq1	-0.630306	
COINTEq2	-3.846402	
D(LGTRADE_BALANCE_GER(-1))	-0.290451	0.0195 [2]

D(LGTRADE_BALANCE_GER(-2))	0.023796	0.0190 [2]
D(LGEXCHANGE_EU(-1))	-1.577548	0.1927
D(LGEXCHANGE_EU (-2))	5.837226	0.6362
D(LGOIL_PRICE(-1))	0.720245	0.8899
D(LGOIL_PRICE(-2))	3.021480	0.2719
D(LGGDP_RUSSIA(-1))	-0.200157	0.6905
D(LGGDP_RUSSIA(-2))	0.160047	0.0887 [1]
D(LGGDP_GER(-1))	0.281699	0.3238
D(LGGDP_GER(-2))	0.773686	0.3115
D(LGGAS_PRICE(-1))	-1.653874	0.1944
D(LGGAS_PRICE(-2))	-3.375262	0.0019 [3]
C	-0.064763	0.4514
[1] = 10% ; [2] = 5% ; [3] = 1% significance level		

Table 8. VECM (Germany)

5.2.7 VEC Residual Serial Correlation LM test:

The various tests that are performed in order to make sure that the models are statistically correct are the VEC Residual Serial Correlation LM test, the VEC Residual Hetroskedasticity test and the pairwise Granger Causality test. At first, a null hypothesis reflecting that no serial correlation is present in the model, is being tested. The corresponding p-value for the USA case for lag 1 is 0.0220, 0.0440 for lag 2 and 0.0077 for lag 3. Since the p – value of all lags are smaller than the 5% significance level the null hypothesis of no serial correlation is rejected. This means that there are indications that there is serial correlation in the VECM model for the USA case. This result can also be seen in appendix K.

The VEC Residual Serial Correlation LM test (appendix K) in the case of Germany shows the following corresponding p-values; 0.1528 for lag 1, 0.4841 for lag 2 and 0.6446 for lag 3. Since the p – value of all lags are larger than the 5% significance level the null hypothesis of no serial correlation cannot be rejected. This means that there are no indications that there is serial correlation in the VECM model for the Germany case.

5.2.8 Heteroskedasticity test VECM:

The null hypothesis of the hetroskedasticity test is that there is homoskedasticity or no hetroskedasticity. The p-value of the test is 0.0000 (appendix L) and hence the null hypothesis is rejected. This is an indication that there is hetroskedasticity in the VECM model for the USA case.

The p-value of the heteroskedasticity test for the Germany case is 0.3321 (appendix L) and hence we do not reject the null hypothesis. This is an indication that there is no hetroskedasticity in the VECM model for the Germany case.

5.2.9 Pairwise Granger Causality test:

Results of the Pairwise Granger Causality test are shown in appendix N. The GDP of the United States does Granger cause the GDP of Russia but not vice versa. The real exchange rate (Russian Ruble /US$) does not Granger cause the US GDP and the same is true for the causality between the American GDP and the real exchange rate (Russian Ruble /US$). The causality between the trade balance of Russia and the US GDP runs from the US GDP to the trade balance. In other words, the US GDP does Granger cause the trade balance. This is easy to understand, since the US GDP will always have a effect on the amount of trade and therefore on the trade balance between the two countries. The oil price does Granger cause the Russian GDP, but the Russian GDP does not Granger cause the oil price. The same is true for the gas price; the gas price does Granger cause the Russian GDP, but the Russian GDP does not Granger cause the gas price. This is really logical, looking at the fact that the Russian GDP depends a lot on the sale of natural resources as gas and oil. A change in the prices of these resources has a big effect on the GDP of Russia. It is therefore not strange that the oil – and gas prices Granger cause the Russian GDP.

The real exchange rate (Russian Ruble /US$) does not Granger cause the Russian GDP and the GDP of Russia does not Granger cause the real exchange rate between the Russian Ruble and the US Dollar. This could be seen as something strange, since Russia has large oil sales and most of the oil businesses use the US Dollar as currency to price and buy/sell their oil. You would therefore expect a lot of currency trading between the

Russian Ruble and the US Dollar and would therefore expect a causal relationship between these two variables.

The oil price does not Granger cause the US GDP and same is true vice versa. The gas price does not Granger cause the US GDP, but the US GDP does Granger cause the gas price. The most important one for this research, shows no causal relationship between the real exchange rate (Russian Ruble /US$) and the trade balance between Russia and the USA.

As can be seen in appendix N, the pairwise Granger Causality tests tell us that the GDP of Germany does not Granger cause the GDP of Russia, but the GDP of Russia does Granger cause the GDP of Germany. The real exchange rate (Russian Ruble/EU€) does Granger cause the Russian GDP, something that can be explained by the huge gas sales of Russia to European countries. The GDP of Russia does not Granger cause the real exchange rate between the Russian Ruble and the Euro. The real exchange rate (Russian Ruble/EU€) does Granger cause the German GDP, but as was the case with the GDP of Russia, the GDP of Germany does not Granger cause the real exchange rate between the Russian Ruble and the Euro. There is no causality between the trade balance of Russia and the German GDP. The oil price does Granger cause the Russian GDP, but the Russian GDP does not Granger cause the oil price. The same is true for the gas price; the gas price does Granger cause the Russian GDP, but the Russian GDP does not Granger cause the gas price. The oil price does not Granger cause the German GDP as is the case vice versa. The gas price does not Granger cause the German GDP, but the German GDP does Granger cause the gas price. The most important one for this research, shows no causal relationship between the real exchange rate (Russian Ruble/EU€) and the trade balance between Russia and Germany.

5.2.10 Impulse response function:

The response impulse function provides some interesting insights in the effect of one variable on a other in the short run (instant effect) and the long run (10 months

horizon). The response impulse function shows how an increase in one variable behaves over 10 months in terms of another variable. The influence of the real exchange rate on the trade balance has our biggest interest (See appendix M for all the impulse response function graphs). Especially the graphs with the titles "lgtrade_balance_us to lgexchange_us" and "lgtrade_balance_ger to lgexchange_eu" are interesting. These graphs can be seen below in figures 4 and 5.

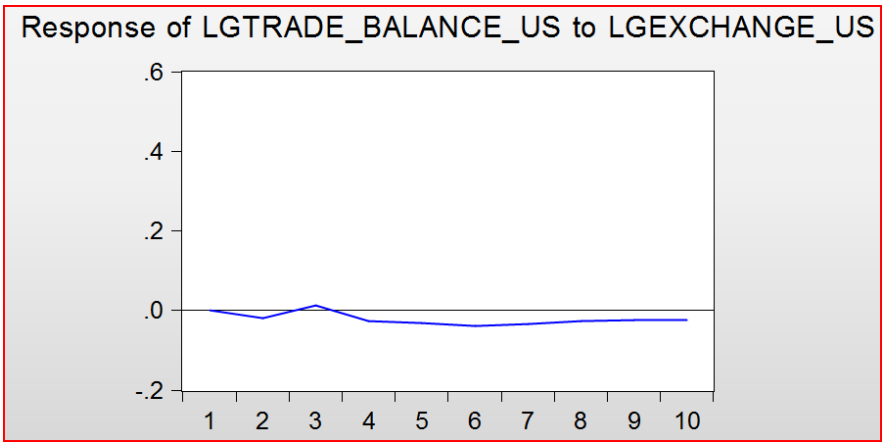


Figure 4. Impulse response graph lgtrade_balance_us to lgexchange_us

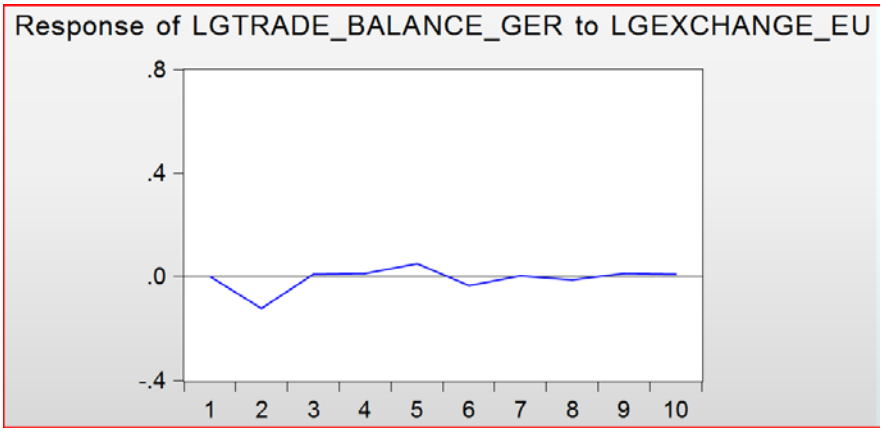


Figure 5. Impulse response graph lgtrade_balance_ger to lgexchange_eu

With the use of these graphs I can see if a J-curve exists in our research for Russia. The graphs do slightly behave in a way that can be expected if there would be a J-curve. If the real exchange rate increases by one standard deviation, the more costly imports and less valuable exports lead to a decrease of the trade balance. However, due to the competitive, relatively low-priced exports, a country's exports start to increase and the trade balance eventually improves to better levels compared to before the devaluation. However, after this increase, it decreases again. In the case of a J-curve, I would have expected an instant decrease of the trade balance the moment the real exchange rate

increased and a improvement of the trade balance till a level higher than the level of the trade balance before the depreciation rate after that, but there wouldn't be a decrease after this. Since this is the case in both figures, I have to conclude that the impulse response functions do not really support the J-curve in my research.

The previous research showed some interesting results. With the use of unit root tests I showed that all the variables that are used in this thesis are stationary when taking the first differences. The Engle Granger cointegration approach showed that for Germany there is a unit root, the residual term isn't stationary and the variables are not cointegrated. This is different for the USA, for which there is no unit root, the residual term is stationary and all variables are cointegrated. The different types of Johansen cointegration tests showed some different results to. The trace tests indicate that there are 2 cointegration relationships for the USA and 0 cointegration relationships when we look at Germany. The eigenvalue tests show something different, indicating that there are no cointegration relationships for the USA and 1 cointegration relationship for Germany. The VEC residual serial correlation LM test showed that there are indications of serial correlation in the USA VEC model. The Germany VEC model had no indications of serial correlation. The heteroskedasticity tests also showed some opposing results, indicating that there is heterskedasticity in the USA VEC model, but no heterskedasicity in the Germany VEC model. The most important result of this research is that the impulse response functions do not really support the J-curve in my research.

6. Conclusion:

Goldman Sachs published a research paper in 2002 about potential economic superpowers of the 21th century (Cooper, 2009). Based on this study, Russia was seen by many as an emerging superpower economy and one of the most dominant economies to be in the middle of the current century.

Russia experienced some impressive economic growth, with real gross domestic product increasing 6.9% annually on average, which helped to raise the Russian standard of living and brought economic stability (Cooper, 2009). The crisis in the last quarter of 2008 brought an abrupt end to this period of growth. The Russian economy was, like many other economies, hit substantially by the global financial crisis. The unavoidable outcome of this all for Russia: Recession! (Cooper, 2009). In dealing with the consequences of this crisis, Russia also had to make some important decisions regarding its exchange rate policy.

Russia caught my attention as this big economic power had to deal with many political and economic changes in the past. The change came in many (positive/negative) flavors and had various impacts on the Russian economy and the well-being of the Russian population. By learning from the past, I hoped to be able to predict the future better. I formulated the main question:

How will the currency policy of Russia impact the international trade position of the country and what do we predict to happen with the future bilateral trade between Russia, Germany and the USA?

The conducted literature review already visualized the difficulty to find relevant relationships between economic variables that would allow good forecasting. A rare exception to above was the linkage of "exchange rate" variable and the "net-trade" variable for a few cases.

Additional sub-questions were formulated and started the focus on Russia:

1 = How did the exchange rate policy of Russia develop over the years?

2= How did Russia's economic situation evolve over the years?

3 = What do we predict to happen with the future bilateral trade between Russia, Germany and the USA?

The first sub question showed that Russia has had quite some changes in its exchange rate system during the years. In 1995, Russia had an exchange rate corridor system, strengthening the role of the ruble exchange rate as the nominal policy anchor. Since 1999, the Bank of Russia implemented a policy of a managed floating exchange rate, which contributed to the smoothening of the influence of changes in external conditions on the Russian financial markets and the Russian economy as a whole. In 2005, the Bank of Russia introduced a dual-currency basket as the operational indicator for its exchange rate policy. Again, the aim was to smoothen the volatility of the ruble's exchange rate in relation to other major currencies. During the period of November 2008 to January 2009, the Bank of Russia allowed the ruble to depreciate gradually by widening the dual-currency band and in January 2009, the Bank of Russia announced a wide fixed band for the ruble value of the dual-currency basket (allowing fluctuations from 26 to 41 rubles) and it also introduced a floating operational band. During 2009–2012, the Bank of Russia further increased the flexibility of its exchange rate policy; the floating operational band was widened from 2 to 7 rubles and from November 2014 on, the Bank of Russia finally abolished the exchange rate policy mechanism through cancelling the range of the dual-currency basket ruble values and regular interventions on and outside the borders of this band.

The second sub question showed that the Russian economy and the Russian economic situation changed significantly over the years. Russia started with economic problems around the time of the financial crisis (August 1998). The world-wide financial crisis was a clear trigger point in Russia to start with the implementation of economic reforms as shortcomings in the existing economic policies had to be addressed. Off course many of these policies had their roots in the communist history of the country in which industrial production was seen as the crucial corner stone of economic success. This specific focus made other sectors (services, consumer industry, food/agriculture) suffer. This shortcoming could well be compensated during economic growth as import of "goods needed" was relatively easy. Standards of living did rise constantly and resulted in great political and economic stability in the country.

The 2008 crisis brought an abrupt end to this period. The Russian economy was, like other economies, hit substantially by the global financial crisis. The economic success of Russia was mainly based on high oil prices, but when the prices of both oil and other commodities went down in 2008, the Russian economy suffered heavily. Both production and, even more importantly, export of oil and gas went down rapidly (Cooper, 2009). The unavoidable outcome of this all for Russia: Recession (Cooper, 2009)!

Sub question three showed a low significance of the relations in the three forecasting models. The models were not progressed any further as results would not be valuable.

The standard OLS regression shows that an appreciation of the exchange rate (Russian Ruble /US$) is followed by an decrease in the trade balance between Russia and the USA. An decrease in the trade balance means that the exports decrease relative to the imports. This also means that if the real exchange rate appreciates, the trade balance increases as well, meaning that the amount of imports decreases relatively to the amount of exports. This is in contrast with standard economic intuition but can be seen as (weak)

support for the J-curve, which says that the trade balance is worse off in the short run after a depreciation of the real exchange rate and improves in later periods.

From the Engle Granger cointegration approach we can conclude that for the USA case, the variables are cointegrated and that a long run relationship between the variables therefore exists. For the Germany case we can conclude that there is a unit root, that the residual term is not stationary and that the variables are not cointegrated and that there therefore doesn't exist a long run relationship between the variables.

The VEC model, which also captures the long run relationship between the variables, does not provide evidence that the real exchange rate has a significant effect on the trade balance. Also the pairwise Granger causality test does not support the causal relationship between the real exchange rate or the trade balance.

The main figure for our analysis about the relationship between the real exchange rate (Russian Ruble /US$ and Russian Ruble/EU€) and the trade balance (with Germany/the USA) is the impulse response function. This function shows the moment the real exchange rate moves and the effect it has on the trade balance of Russia. The graphs do slightly behave in a way that can be expected if there would be a j-curve. If the real exchange rate increases by one standard deviation, the trade balance first decreases and then increases to a point that is slightly higher than the starting point. But finally it decreases again. In the case of a J-curve, I would have expected an instant decrease of the trade balance if the real exchange rate increased and later on an improvement of the trade balance to a level higher than the level of the trade balance before the depreciation of the real exchange rate. There shouldn't be a decrease after this. Therefore I have to conclude that the impulse response function does not really support the J-curve in our research.

Final conclusion: There is no doubt of the fact that Russia is one of the current and "to be" economic powers. It is the obligation of the Russian government to use all macro-economic possibilities to stimulate the growth of their economy. Of course cannot all factors, of which some external, be handled easily and quite a few of those factors are unpredictable. In this environment using forecasting modeling to predict bilateral trade volumes between Russia and Germany and the USA, proofed to be impossible. Detailed analysis in this master Thesis re-confirmed this with supporting data.

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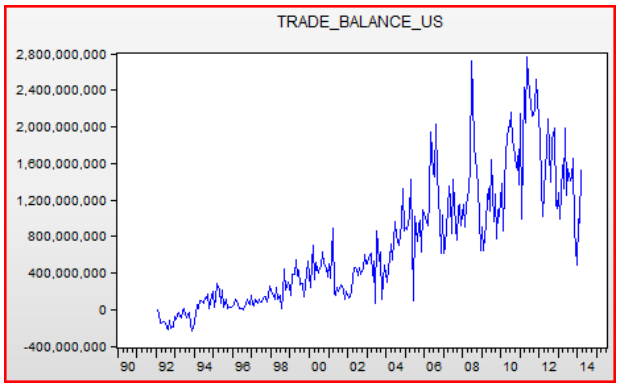
8. Appendices:

Appendix A: Unit Root Tests

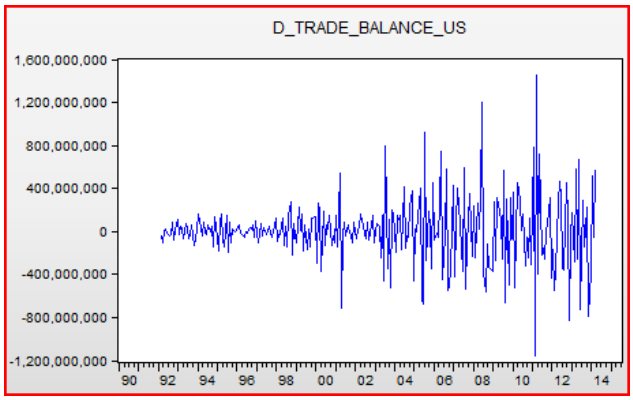


Null Hypothesis: TRADE_BALANCE_US has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.542860	0.1066
Test critical values:	1% level	-3.454906	
	5% level	-2.872244	
	10% level	-2.572547	

*MacKinnon (1996) one-sided p-values.

Figure 1. trend graph "trade_balance_us" (left) ; computed Augmented Dickey Fuller Test (right)

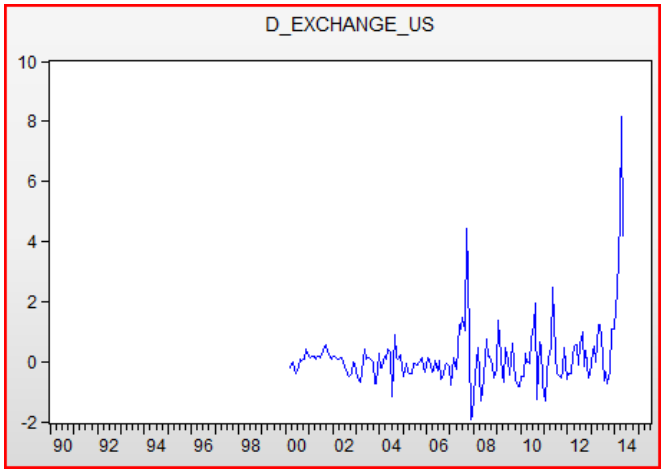


Null Hypothesis: D_TRADE_BALANCE_US has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-24.32212	0.0000
Test critical values:	1% level	-3.454906	
	5% level	-2.872244	
	10% level	-2.572547	

*MacKinnon (1996) one-sided p-values.

Figure 2a. trend graph "d_trade_balance_us" (left) ; computed Augmented Dickey Fuller Test (right)

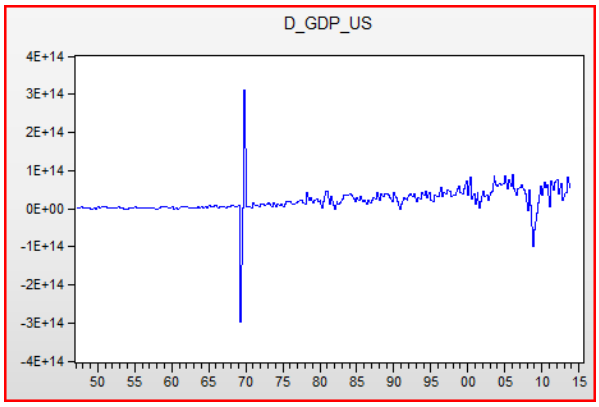


Null Hypothesis: D_EXCHANGE_US has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.595498	0.0000
Test critical values:	1% level	-3.468980	
	5% level	-2.878413	
	10% level	-2.575844	

*MacKinnon (1996) one-sided p-values.

Figure 2b. trend graph "d_exchange_us" (left) ; computed Augmented Dickey Fuller Test (right)

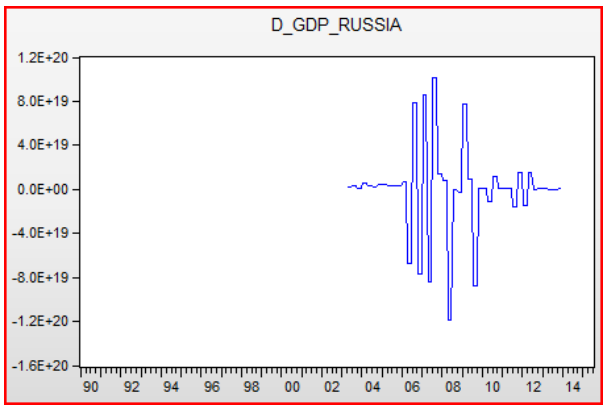


Null Hypothesis: D_GDP_US has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.123749	0.0009
Test critical values:	1% level	-3.438423	
	5% level	-2.864993	
	10% level	-2.568664	

*MacKinnon (1996) one-sided p-values.

Figure 2c. trend graph "d_gdp_us" (left) ; computed Augmented Dickey Fuller Test (right)

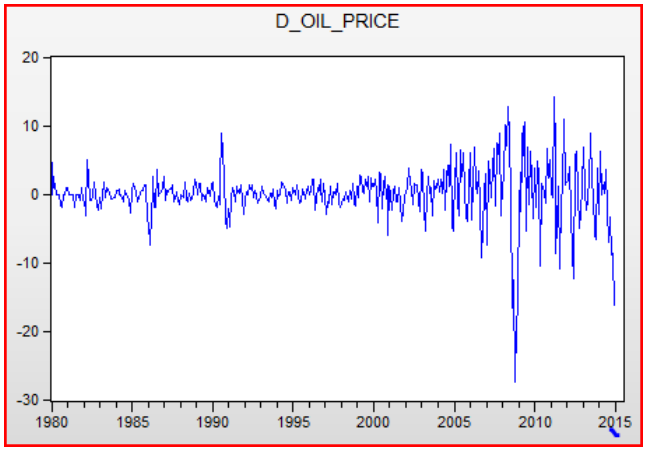


Null Hypothesis: D_GDP_RUSSIA has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.687222	0.0055
Test critical values:	1% level	-3.487550	
	5% level	-2.886509	
	10% level	-2.580163	

*MacKinnon (1996) one-sided p-values.

Figure 2d. trend graph "d_gdp_russia" (left) ; computed Augmented Dickey Fuller Test (right)

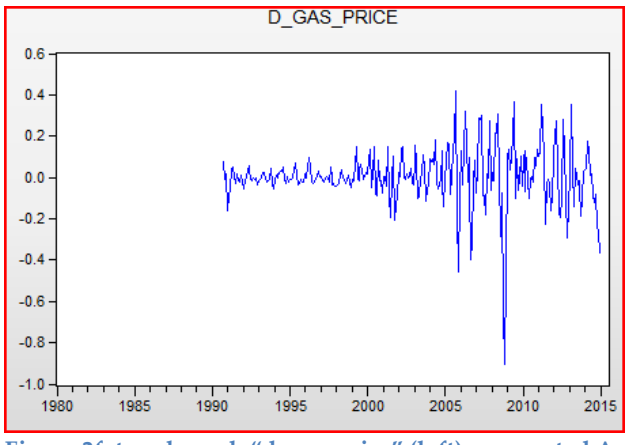


Null Hypothesis: D_OIL_PRICE has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=17)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.07468	0.0000
Test critical values:	1% level	-3.445481	
	5% level	-2.868105	
	10% level	-2.570332	

*MacKinnon (1996) one-sided p-values.

Figure 2e. trend graph "d_oil_price" (left) ; computed Augmented Dickey Fuller Test (right)

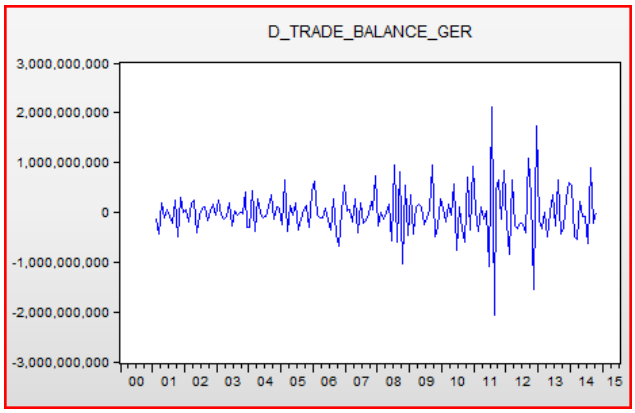


Null Hypothesis: D_GAS_PRICE has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.90824	0.0000
Test critical values:	1% level	-3.452831	
	5% level	-2.871332	
	10% level	-2.572060	

*MacKinnon (1996) one-sided p-values.

Figure 2f. trend graph "d_gas_price" (left) ; computed Augmented Dickey Fuller Test (right)

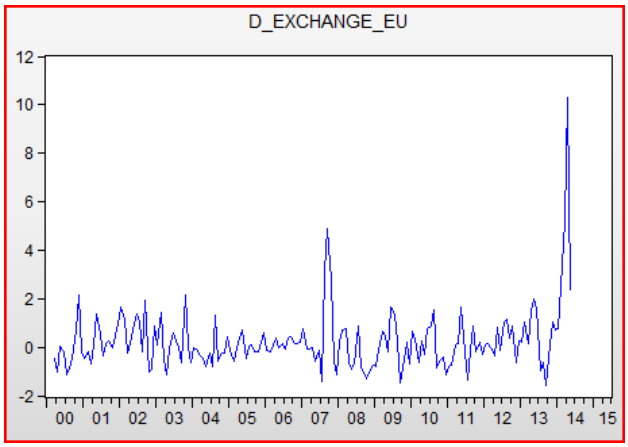


Null Hypothesis: D_TRADE_BALANCE_GER has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.48992	0.0000
Test critical values:	1% level	-3.470679	
	5% level	-2.879155	
	10% level	-2.576241	

*MacKinnon (1996) one-sided p-values.

Figure 2g. trend graph "d_trade_balance_ger" (left) ; computed Augmented Dickey Fuller Test (right)

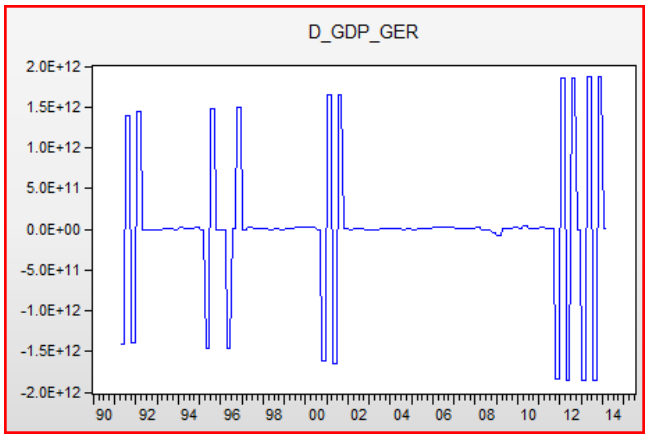


Null Hypothesis: D_EXCHANGE_EU has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.579128	0.0000
Test critical values:	1% level	-3.468980	
	5% level	-2.878413	
	10% level	-2.575844	

*MacKinnon (1996) one-sided p-values.

Figure 2h. trend graph "d_exchange_eu" (left) ; computed Augmented Dickey Fuller Test (right)



Null Hypothesis: D_GDP_GER has a unit root
Exogenous: Constant
Lag Length: 15 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.595324	0.0002
Test critical values:	1% level	-3.455387	
	5% level	-2.872455	
	10% level	-2.572660	

*MacKinnon (1996) one-sided p-values.

Figure 2i. trend graph "d_gdp_ger" (left) ; computed Augmented Dickey Fuller Test (right)

Appendix B: Serial Correlation Tests

Correlation test, Normality test, Homoskedasticity test and Linearity test between variables:

Sample: 2000M03 2014M03
Included observations: 169

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.388	-0.388	25.837	0.000
		2	0.116	-0.040	28.170	0.000
		3	-0.148	-0.138	32.006	0.000
		4	0.073	-0.036	32.941	0.000
		5	-0.105	-0.103	34.872	0.000
		6	-0.006	-0.117	34.878	0.000
		7	-0.096	-0.171	36.506	0.000
		8	0.100	-0.032	38.306	0.000
		9	-0.162	-0.194	43.021	0.000
		10	0.133	-0.057	46.244	0.000
		11	-0.018	-0.007	46.305	0.000
		12	0.085	0.020	47.646	0.000
		13	-0.025	0.019	47.766	0.000
		14	0.026	0.004	47.889	0.000
		15	-0.044	-0.030	48.255	0.000
		16	0.080	0.062	49.465	0.000
		17	-0.137	-0.056	53.029	0.000
		18	0.134	0.074	56.484	0.000
		19	-0.193	-0.095	63.637	0.000
		20	-0.001	-0.167	63.637	0.000
		21	-0.035	-0.109	63.882	0.000
		22	0.133	0.029	67.359	0.000
		23	-0.103	-0.098	69.450	0.000
		24	0.234	0.154	80.379	0.000
		25	-0.104	0.066	82.570	0.000
		26	0.178	0.137	88.955	0.000
		27	-0.204	-0.015	97.401	0.000
		28	0.096	-0.003	99.279	0.000
		29	-0.080	0.009	100.61	0.000
		30	0.082	0.116	102.00	0.000
		31	-0.187	-0.043	109.31	0.000
		32	-0.050	-0.213	109.83	0.000
		33	0.076	0.025	111.07	0.000
		34	0.005	-0.086	111.07	0.000
		35	0.003	-0.025	111.08	0.000
		36	0.071	-0.005	112.19	0.000

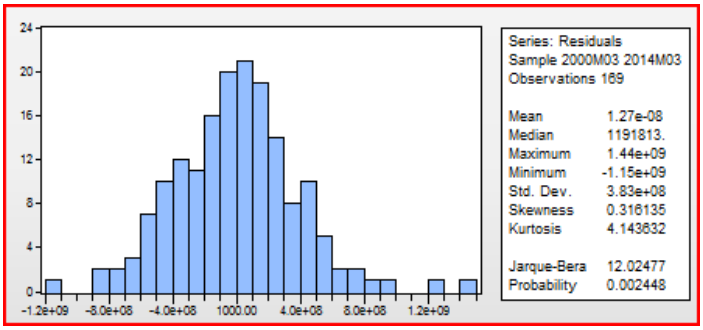


Figure 3a. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_us" and "d_exchange_us".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.008317	Prob. F(1,167)	0.9274
Obs*R-squared	0.008416	Prob. Chi-Square(1)	0.9269
Scaled explained SS	0.012917	Prob. Chi-Square(1)	0.9095

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 12:09
Sample: 2000M03 2014M03
Included observations: 169

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.45E+17	2.01E+16	7.229302	0.0000
D_EXCHANGE_US	2.17E+15	2.38E+16	0.091197	0.9274

R-squared	0.000050	Mean dependent var	1.46E+17
Adjusted R-squared	-0.005938	S.D. dependent var	2.59E+17
S.E. of regression	2.60E+17	Akaike info criterion	83.04708
Sum squared resid	1.13E+37	Schwarz criterion	83.08412
Log likelihood	-7015.478	Hannan-Quinn criter.	83.06211
F-statistic	0.008317	Durbin-Watson stat	1.265333
Prob(F-statistic)	0.927446		

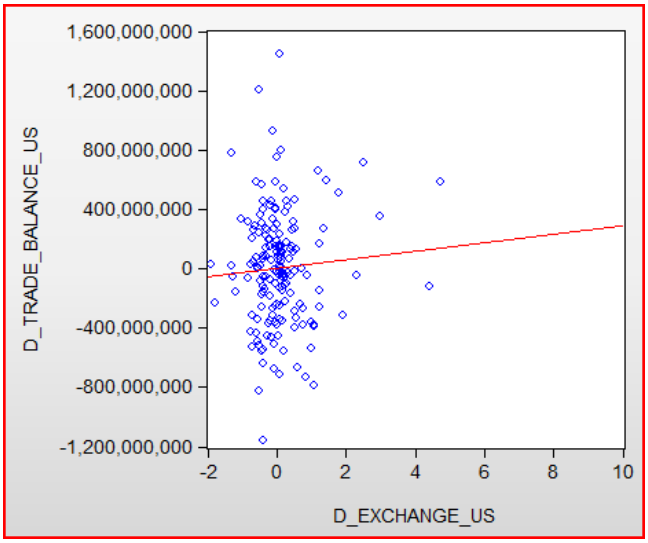


Figure 3b. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_us" and "d_exchange_us".

Sample: 1992M02 2013M12
Included observations: 263

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.389	-0.389	40.194	0.000
		2	0.117	-0.040	43.836	0.000
		3	-0.141	-0.130	49.195	0.000
		4	0.080	-0.021	50.927	0.000
		5	-0.105	-0.093	53.915	0.000
		6	-0.021	-0.128	54.036	0.000
		7	-0.068	-0.146	55.289	0.000
		8	0.080	-0.028	57.021	0.000
		9	-0.131	-0.159	61.760	0.000
		10	0.103	-0.049	64.656	0.000
		11	0.001	0.010	64.657	0.000
		12	0.061	0.020	65.694	0.000
		13	-0.008	0.031	65.712	0.000
		14	0.024	0.025	65.871	0.000
		15	-0.034	-0.016	66.204	0.000
		16	0.081	0.087	68.042	0.000
		17	-0.134	-0.045	73.164	0.000
		18	0.136	0.091	78.400	0.000
		19	-0.189	-0.083	88.625	0.000
		20	-0.013	-0.164	88.670	0.000
		21	-0.035	-0.102	89.019	0.000
		22	0.131	0.047	93.946	0.000
		23	-0.089	-0.059	96.229	0.000
		24	0.228	0.186	111.39	0.000
		25	-0.086	0.097	113.57	0.000
		26	0.175	0.166	122.60	0.000
		27	-0.189	0.017	133.17	0.000
		28	0.081	0.010	135.10	0.000
		29	-0.083	-0.003	137.17	0.000
		30	0.102	0.152	140.28	0.000
		31	-0.186	-0.019	150.68	0.000
		32	-0.064	-0.205	151.92	0.000
		33	0.097	0.050	154.75	0.000
		34	-0.039	-0.104	155.22	0.000
		35	0.045	0.004	155.85	0.000
		36	0.032	0.015	156.18	0.000

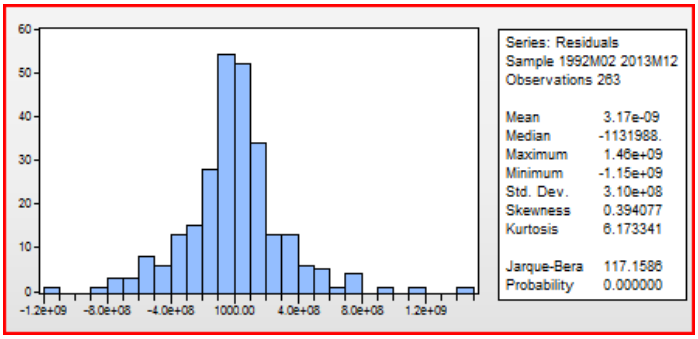


Figure 3c. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_us" and "d_gdp_us".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.191921	Prob. F(1,261)	0.6617
Obs*R-squared	0.193249	Prob. Chi-Square(1)	0.6602
Scaled explained SS	0.492299	Prob. Chi-Square(1)	0.4829

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 12:20
Sample: 1992M02 2013M12
Included observations: 263

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.04E+17	2.41E+16	4.323954	0.0000
D_GDP_US	-214.2090	488.9637	-0.438088	0.6617

R-squared	0.000735	Mean dependent var	9.55E+16
Adjusted R-squared	-0.003094	S.D. dependent var	2.18E+17
S.E. of regression	2.18E+17	Akaike info criterion	82.69135
Sum squared resid	1.24E+37	Schwarz criterion	82.71851
Log likelihood	-10871.91	Hannan-Quinn criter.	82.70227
F-statistic	0.191921	Durbin-Watson stat	1.162414
Prob(F-statistic)	0.661685		

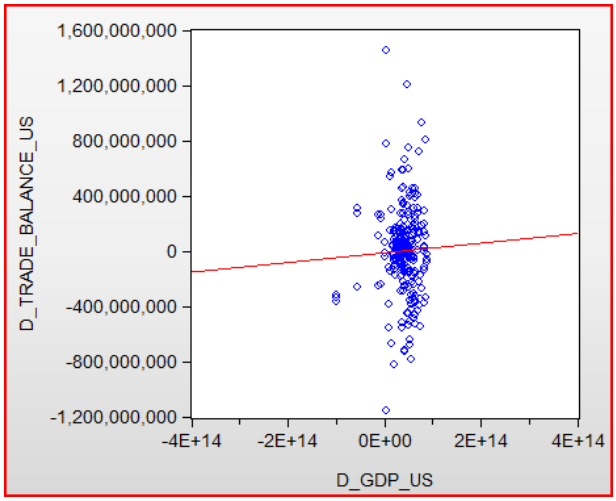


Figure 3d. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_us" and "d_gdp_us".

Sample: 2003M04 2013M12
Included observations: 129

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.379	-0.379	18.994	0.000
		2	0.122	-0.026	20.976	0.000
		3	-0.156	-0.138	24.250	0.000
		4	0.084	-0.024	25.201	0.000
		5	-0.108	-0.094	26.788	0.000
		6	-0.032	-0.144	26.929	0.000
		7	-0.065	-0.150	27.513	0.000
		8	0.094	-0.010	28.752	0.000
		9	-0.148	-0.170	31.820	0.000
		10	0.111	-0.051	33.578	0.000
		11	0.008	0.025	33.587	0.000
		12	0.067	0.025	34.243	0.001
		13	-0.027	0.016	34.346	0.001
		14	0.043	0.040	34.623	0.002
		15	-0.068	-0.045	35.310	0.002
		16	0.108	0.092	37.043	0.002
		17	-0.144	-0.029	40.157	0.001
		18	0.156	0.108	43.854	0.001
		19	-0.219	-0.099	51.204	0.000
		20	-0.015	-0.188	51.237	0.000
		21	-0.055	-0.135	51.711	0.000
		22	0.164	0.056	55.968	0.000
		23	-0.118	-0.084	58.179	0.000
		24	0.246	0.172	67.956	0.000
		25	-0.097	0.081	69.480	0.000
		26	0.186	0.140	75.142	0.000
		27	-0.176	0.033	80.264	0.000
		28	0.069	0.011	81.066	0.000
		29	-0.073	-0.002	81.976	0.000
		30	0.059	0.107	82.577	0.000
		31	-0.157	-0.009	86.805	0.000
		32	-0.068	-0.208	87.619	0.000
		33	0.100	0.065	89.396	0.000
		34	-0.030	-0.101	89.552	0.000
		35	0.030	-0.017	89.713	0.000
		36	0.035	0.003	89.941	0.000

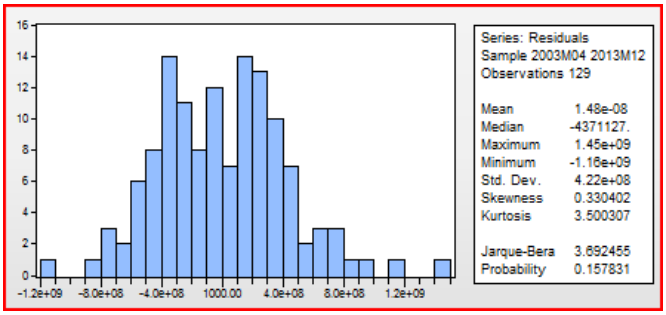


Figure 3e. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_us" and "d_gdp_russia".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.369269	Prob. F(1,127)	0.2441
Obs*R-squared	1.375997	Prob. Chi-Square(1)	0.2408
Scaled explained SS	1.667281	Prob. Chi-Square(1)	0.1966

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 12:53
Sample: 2003M04 2013M12
Included observations: 129

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.76E+17	2.46E+16	7.154915	0.0000
D_GDP_RUSSIA	-0.000710	0.000607	-1.170158	0.2441

R-squared	0.010667	Mean dependent var	1.76E+17
Adjusted R-squared	0.002877	S.D. dependent var	2.80E+17
S.E. of regression	2.80E+17	Akaike info criterion	83.19797
Sum squared resid	9.93E+36	Schwarz criterion	83.24231
Log likelihood	-5364.269	Hannan-Quinn criter.	83.21599
F-statistic	1.369269	Durbin-Watson stat	1.363678
Prob(F-statistic)	0.244129		

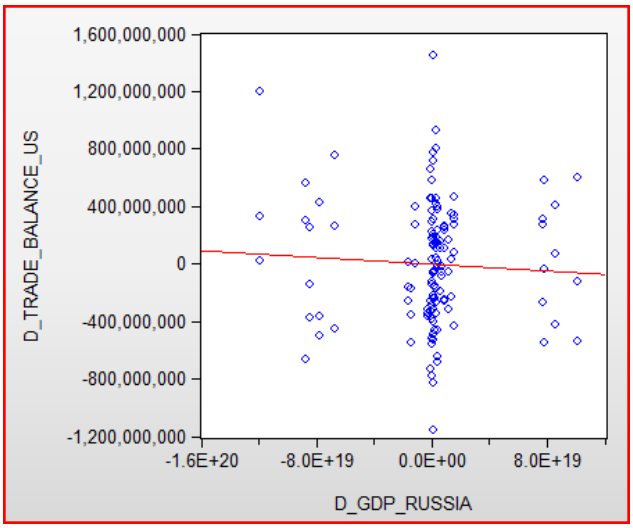


Figure 3f. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_us" and "d_gdp_russia".

Sample: 1992M02 2014M03
Included observations: 266

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.433	-0.433	50.474	0.000
		2	0.114	-0.091	53.975	0.000
		3	-0.146	-0.164	59.770	0.000
		4	0.065	-0.074	60.922	0.000
		5	-0.050	-0.069	61.616	0.000
		6	-0.012	-0.094	61.652	0.000
		7	-0.092	-0.181	63.989	0.000
		8	0.101	-0.043	66.797	0.000
		9	-0.167	-0.215	74.515	0.000
		10	0.136	-0.089	79.700	0.000
		11	-0.028	-0.030	79.919	0.000
		12	0.058	-0.021	80.857	0.000
		13	0.025	0.050	81.026	0.000
		14	-0.035	-0.014	81.377	0.000
		15	-0.026	-0.065	81.568	0.000
		16	0.083	0.052	83.532	0.000
		17	-0.097	-0.023	86.200	0.000
		18	0.131	0.101	91.135	0.000
		19	-0.183	-0.050	100.80	0.000
		20	0.009	-0.131	100.82	0.000
		21	-0.028	-0.110	101.04	0.000
		22	0.093	0.008	103.57	0.000
		23	-0.096	-0.123	106.29	0.000
		24	0.189	0.105	116.78	0.000
		25	-0.112	0.039	120.47	0.000
		26	0.143	0.078	126.51	0.000
		27	-0.176	-0.041	135.71	0.000
		28	0.096	-0.048	138.48	0.000
		29	-0.050	-0.031	139.23	0.000
		30	0.094	0.118	141.91	0.000
		31	-0.158	-0.024	149.49	0.000
		32	-0.037	-0.168	149.90	0.000
		33	0.069	0.032	151.37	0.000
		34	-0.004	-0.087	151.38	0.000
		35	0.013	-0.020	151.43	0.000
		36	0.062	0.068	152.61	0.000

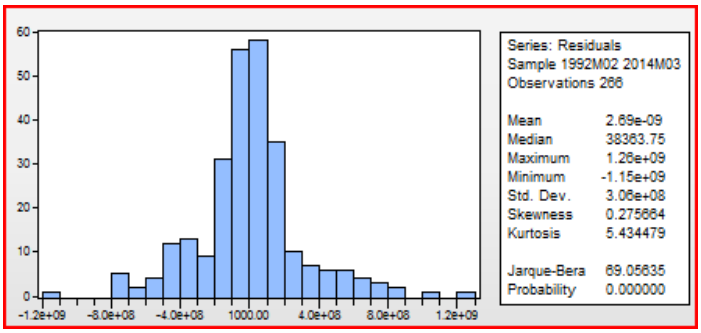


Figure 3g. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_us" and "d_oil_price".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.512499	Prob. F(1,264)	0.1141
Obs*R-squared	2.507667	Prob. Chi-Square(1)	0.1133
Scaled explained SS	5.476802	Prob. Chi-Square(1)	0.0193

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 13:04
Sample: 1992M02 2014M03
Included observations: 266

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.18E+16	1.20E+16	7.626046	0.0000
D_OIL_PRICE	4.23E+15	2.67E+15	1.585086	0.1141

R-squared	0.009427	Mean dependent var	9.31E+16
Adjusted R-squared	0.005675	S.D. dependent var	1.96E+17
S.E. of regression	1.96E+17	Akaike info criterion	82.47817
Sum squared resid	1.01E+37	Schwarz criterion	82.50511
Log likelihood	-10967.60	Hannan-Quinn criter.	82.48900
F-statistic	2.512499	Durbin-Watson stat	1.103245
Prob(F-statistic)	0.114144		

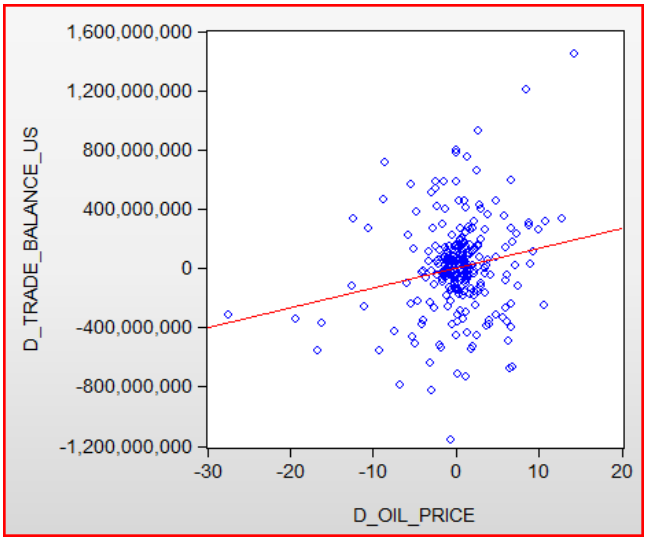


Figure 3h. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_us" and "d_oil_price".

Sample: 1992M02 2014M03
Included observations: 266

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.443	-0.443	52.858	0.000
		2	0.099	-0.121	55.499	0.000
		3	-0.158	-0.206	62.269	0.000
		4	0.069	-0.109	63.560	0.000
		5	-0.048	-0.096	64.183	0.000
		6	0.043	-0.049	64.698	0.000
		7	-0.068	-0.100	65.982	0.000
		8	0.074	-0.014	67.498	0.000
		9	-0.150	-0.172	73.730	0.000
		10	0.111	-0.074	77.145	0.000
		11	-0.040	-0.048	77.583	0.000
		12	0.044	-0.042	78.129	0.000
		13	0.003	0.012	78.132	0.000
		14	-0.015	-0.022	78.196	0.000
		15	-0.038	-0.066	78.604	0.000
		16	0.104	0.066	81.707	0.000
		17	-0.110	-0.044	85.166	0.000
		18	0.153	0.099	91.901	0.000
		19	-0.188	-0.065	102.07	0.000
		20	0.041	-0.107	102.56	0.000
		21	-0.020	-0.056	102.68	0.000
		22	0.083	0.021	104.70	0.000
		23	-0.113	-0.115	108.42	0.000
		24	0.201	0.129	120.28	0.000
		25	-0.163	0.009	128.15	0.000
		26	0.123	0.040	132.65	0.000
		27	-0.162	-0.051	140.52	0.000
		28	0.111	-0.044	144.17	0.000
		29	-0.056	-0.041	145.12	0.000
		30	0.126	0.118	149.95	0.000
		31	-0.119	0.008	154.25	0.000
		32	-0.048	-0.144	154.94	0.000
		33	0.058	0.046	155.98	0.000
		34	-0.018	-0.085	156.09	0.000
		35	0.009	-0.020	156.11	0.000
		36	0.062	0.059	157.29	0.000

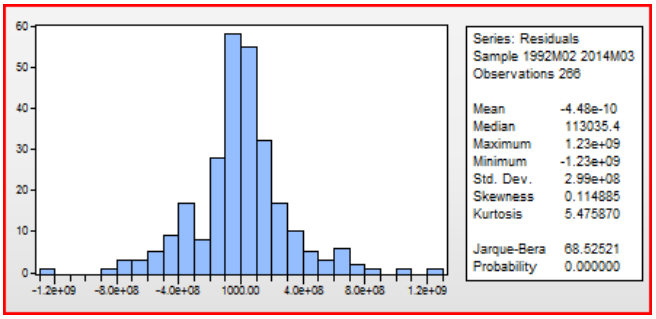


Figure 3i. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_us" and "d_gas_price".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	9.538891	Prob. F(1,264)	0.0022
Obs*R-squared	9.275994	Prob. Chi-Square(1)	0.0023
Scaled explained SS	20.44808	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 13:06
Sample: 1992M02 2014M03
Included observations: 266

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.67E+16	1.14E+16	7.588001	0.0000
D_GAS_PRICE	2.56E+17	8.28E+16	3.088509	0.0022

R-squared	0.034872	Mean dependent var	8.92E+16
Adjusted R-squared	0.031216	S.D. dependent var	1.89E+17
S.E. of regression	1.86E+17	Akaike info criterion	82.37455
Sum squared resid	9.13E+36	Schwarz criterion	82.40149
Log likelihood	-10953.81	Hannan-Quinn criter.	82.38537
F-statistic	9.538891	Durbin-Watson stat	1.020730
Prob(F-statistic)	0.002226		

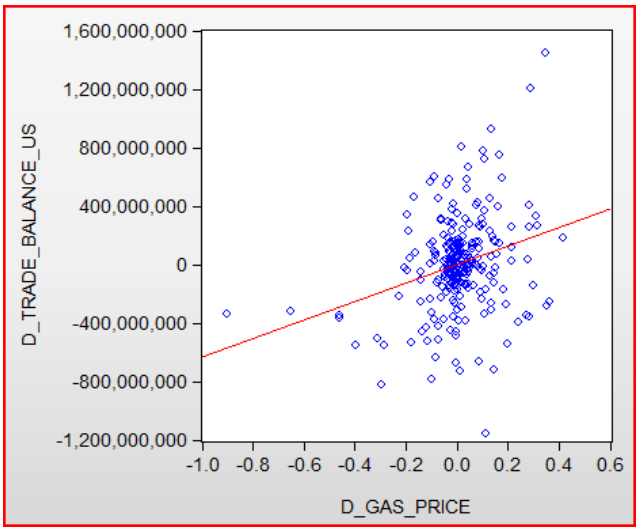


Figure 3j. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_us" and "d_gas_price".

Sample: 2001M02 2014M05
Included observations: 160

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.517	-0.517	43.561	0.000
		2	0.074	-0.263	44.465	0.000
		3	0.037	-0.075	44.688	0.000
		4	-0.081	-0.106	45.789	0.000
		5	0.029	-0.086	45.933	0.000
		6	0.007	-0.041	45.941	0.000
		7	-0.078	-0.125	46.963	0.000
		8	-0.013	-0.190	46.990	0.000
		9	0.073	-0.073	47.910	0.000
		10	-0.061	-0.081	48.558	0.000
		11	0.012	-0.102	48.584	0.000
		12	0.176	0.174	53.989	0.000
		13	-0.212	-0.009	61.921	0.000
		14	0.071	-0.086	62.809	0.000
		15	0.119	0.124	65.339	0.000
		16	-0.193	-0.031	72.021	0.000
		17	0.109	-0.026	74.189	0.000
		18	-0.097	-0.105	75.900	0.000
		19	0.001	-0.089	75.900	0.000
		20	0.058	-0.035	76.524	0.000
		21	-0.030	-0.056	76.694	0.000
		22	0.043	0.053	77.043	0.000
		23	-0.021	-0.005	77.130	0.000
		24	-0.027	-0.136	77.270	0.000
		25	0.062	0.028	78.012	0.000
		26	-0.038	-0.037	78.294	0.000
		27	0.043	-0.016	78.656	0.000
		28	-0.049	0.060	79.134	0.000
		29	0.005	-0.009	79.138	0.000
		30	0.035	0.060	79.383	0.000
		31	-0.049	0.004	79.862	0.000
		32	0.089	0.089	81.462	0.000
		33	-0.123	-0.017	84.550	0.000
		34	0.122	0.032	87.602	0.000
		35	-0.197	-0.188	95.681	0.000
		36	0.154	-0.073	100.64	0.000

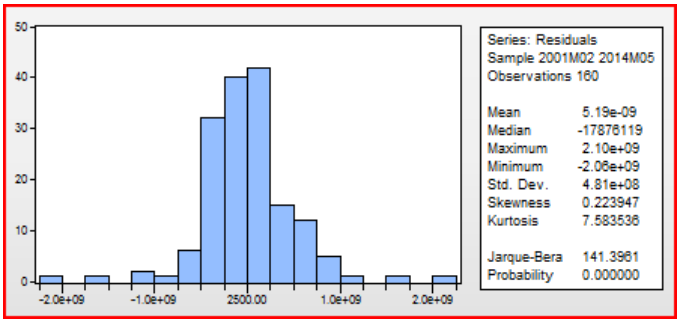


Figure 3k. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_ger" and "d_exchange_eu".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.233756	Prob. F(1,158)	0.0740
Obs*R-squared	3.209011	Prob. Chi-Square(1)	0.0732
Scaled explained SS	10.30089	Prob. Chi-Square(1)	0.0013

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 13:25
Sample: 2001M02 2014M05
Included observations: 160

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.48E+17	4.75E+16	5.213407	0.0000
D_EXCHANGE_EU	-6.49E+16	3.61E+16	-1.798265	0.0740

R-squared	0.020056	Mean dependent var	2.30E+17
Adjusted R-squared	0.013854	S.D. dependent var	5.92E+17
S.E. of regression	5.88E+17	Akaike info criterion	84.67988
Sum squared resid	5.46E+37	Schwarz criterion	84.71832
Log likelihood	-6772.391	Hannan-Quinn criter.	84.69549
F-statistic	3.233756	Durbin-Watson stat	0.957618
Prob(F-statistic)	0.074044		

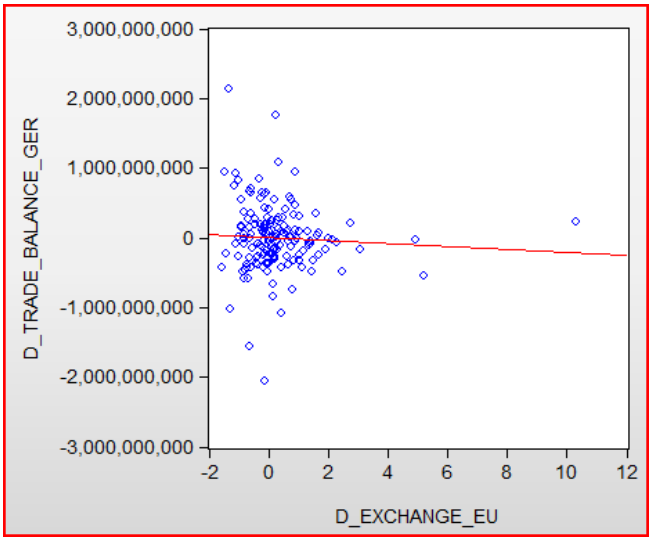


Figure 3l. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_ger" and "d_exchange_eu".

Sample: 2001M02 2014M03
Included observations: 158

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.509	-0.509	41.637	0.000
		2	0.072	-0.252	42.480	0.000
		3	0.034	-0.069	42.668	0.000
		4	-0.092	-0.121	44.044	0.000
		5	0.026	-0.109	44.154	0.000
		6	0.009	-0.060	44.168	0.000
		7	-0.073	-0.131	45.058	0.000
		8	-0.022	-0.203	45.137	0.000
		9	0.078	-0.087	46.181	0.000
		10	-0.067	-0.108	46.951	0.000
		11	0.013	-0.137	46.980	0.000
		12	0.191	0.159	53.266	0.000
		13	-0.211	-0.010	61.052	0.000
		14	0.078	-0.064	62.118	0.000
		15	0.115	0.148	64.446	0.000
		16	-0.209	-0.035	72.207	0.000
		17	0.127	-0.010	75.119	0.000
		18	-0.104	-0.088	77.056	0.000
		19	-0.018	-0.103	77.113	0.000
		20	0.059	-0.059	77.760	0.000
		21	-0.025	-0.079	77.878	0.000
		22	0.054	0.052	78.422	0.000
		23	-0.019	-0.001	78.493	0.000
		24	-0.024	-0.134	78.602	0.000
		25	0.056	0.032	79.198	0.000
		26	-0.028	-0.039	79.343	0.000
		27	0.042	-0.013	79.690	0.000
		28	-0.066	0.048	80.530	0.000
		29	0.005	-0.044	80.536	0.000
		30	0.028	0.051	80.687	0.000
		31	-0.053	0.003	81.249	0.000
		32	0.107	0.099	83.546	0.000
		33	-0.143	-0.027	87.668	0.000
		34	0.140	0.028	91.661	0.000
		35	-0.195	-0.183	99.479	0.000
		36	0.158	-0.062	104.66	0.000

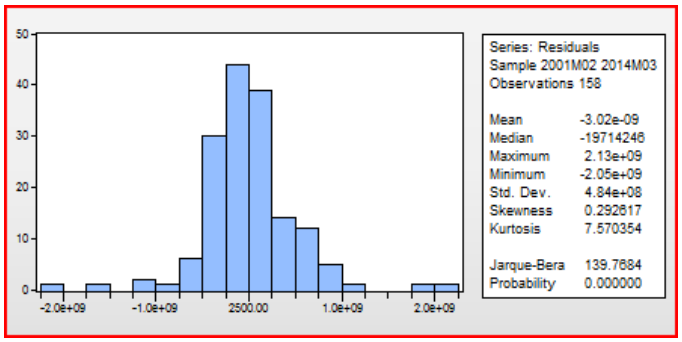


Figure 3m. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_ger" and "d_gdp_ger".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.107668	Prob. F(1,156)	0.7433
Obs*R-squared	0.108973	Prob. Chi-Square(1)	0.7413
Scaled explained SS	0.348991	Prob. Chi-Square(1)	0.5547

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 13:30
Sample: 2001M02 2014M03
Included observations: 158

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.33E+17	4.79E+16	4.861360	0.0000
D_GDP_GER	19296.87	58808.93	0.328128	0.7433

R-squared	0.000690	Mean dependent var	2.33E+17
Adjusted R-squared	-0.005716	S.D. dependent var	6.00E+17
S.E. of regression	6.01E+17	Akaike info criterion	84.72610
Sum squared resid	5.64E+37	Schwarz criterion	84.76486
Log likelihood	-6691.362	Hannan-Quinn criter.	84.74184
F-statistic	0.107668	Durbin-Watson stat	0.965304
Prob(F-statistic)	0.743255		

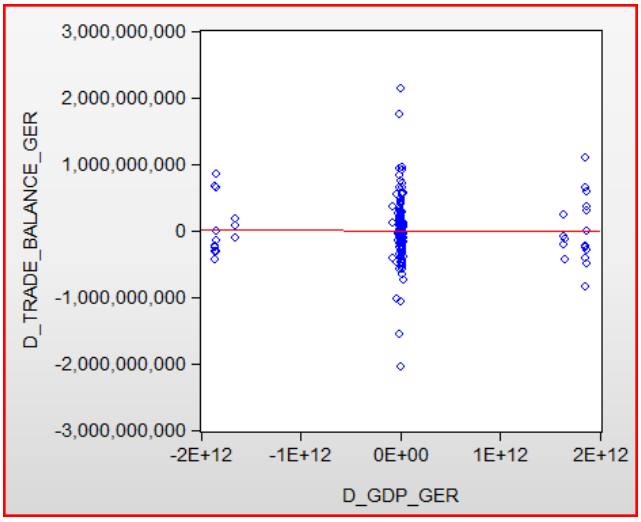


Figure 3n. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_ger" and "d_gdp_ger".

Sample: 2003M04 2013M12
Included observations: 129

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.533	-0.533	37.542	0.000
		2	0.088	-0.275	38.570	0.000
		3	0.054	-0.049	38.963	0.000
		4	-0.096	-0.088	40.216	0.000
		5	0.005	-0.123	40.220	0.000
		6	0.026	-0.072	40.310	0.000
		7	-0.088	-0.149	41.383	0.000
		8	-0.011	-0.218	41.400	0.000
		9	0.093	-0.076	42.630	0.000
		10	-0.084	-0.092	43.621	0.000
		11	0.015	-0.138	43.652	0.000
		12	0.200	0.170	49.420	0.000
		13	-0.257	-0.051	59.068	0.000
		14	0.131	-0.077	61.587	0.000
		15	0.116	0.184	63.590	0.000
		16	-0.263	-0.061	73.910	0.000
		17	0.165	-0.037	78.020	0.000
		18	-0.091	-0.071	79.273	0.000
		19	-0.027	-0.080	79.388	0.000
		20	0.056	-0.063	79.870	0.000
		21	-0.019	-0.079	79.927	0.000
		22	0.028	0.045	80.051	0.000
		23	0.003	-0.021	80.052	0.000
		24	-0.020	-0.142	80.116	0.000
		25	0.024	0.021	80.206	0.000
		26	-0.009	-0.090	80.221	0.000
		27	0.034	-0.047	80.416	0.000
		28	-0.060	0.077	81.025	0.000
		29	0.034	-0.051	81.220	0.000
		30	-0.015	-0.005	81.258	0.000
		31	-0.046	-0.037	81.627	0.000
		32	0.131	0.088	84.619	0.000
		33	-0.151	-0.028	88.655	0.000
		34	0.135	0.024	91.877	0.000
		35	-0.193	-0.195	98.591	0.000
		36	0.157	-0.098	103.10	0.000

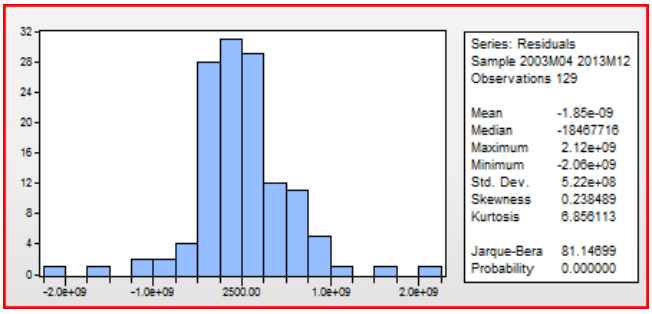


Figure 3o. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_ger" and "d_gdp_russia".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.714634	Prob. F(1,127)	0.3995
Obs*R-squared	0.721826	Prob. Chi-Square(1)	0.3955
Scaled explained SS	2.048519	Prob. Chi-Square(1)	0.1524

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 13:34
Sample: 2003M04 2013M12
Included observations: 129

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.70E+17	5.78E+16	4.662508	0.0000
D_GDP_RUSSIA	-0.001205	0.001425	-0.845360	0.3995

R-squared	0.005596	Mean dependent var	2.70E+17
Adjusted R-squared	-0.002234	S.D. dependent var	6.56E+17
S.E. of regression	6.57E+17	Akaike info criterion	84.90488
Sum squared resid	5.47E+37	Schwarz criterion	84.94922
Log likelihood	-5474.365	Hannan-Quinn criter.	84.92289
F-statistic	0.714634	Durbin-Watson stat	0.988035
Prob(F-statistic)	0.399500		

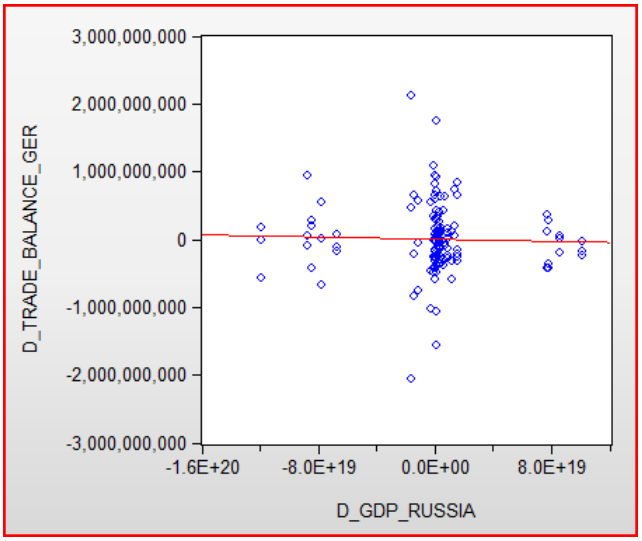


Figure 3p. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_ger" and "d_gdp_russia".

Sample: 2001M02 2014M10
Included observations: 165

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.516	-0.516	44.690	0.000
		2	0.077	-0.258	45.680	0.000
		3	0.049	-0.050	46.097	0.000
		4	-0.105	-0.110	47.972	0.000
		5	0.040	-0.091	48.243	0.000
		6	-0.036	-0.105	48.467	0.000
		7	-0.064	-0.188	49.187	0.000
		8	0.001	-0.223	49.187	0.000
		9	0.078	-0.080	50.269	0.000
		10	-0.056	-0.082	50.826	0.000
		11	-0.013	-0.158	50.857	0.000
		12	0.214	0.153	59.124	0.000
		13	-0.211	0.002	67.179	0.000
		14	0.088	-0.039	68.591	0.000
		15	0.110	0.184	70.823	0.000
		16	-0.203	0.034	78.463	0.000
		17	0.130	0.061	81.618	0.000
		18	-0.126	-0.040	84.609	0.000
		19	-0.028	-0.105	84.754	0.000
		20	0.134	0.045	88.141	0.000
		21	-0.119	-0.053	90.840	0.000
		22	0.070	0.009	91.780	0.000
		23	-0.002	-0.018	91.780	0.000
		24	-0.017	-0.140	91.834	0.000
		25	0.060	0.017	92.554	0.000
		26	-0.048	-0.062	93.007	0.000
		27	0.044	-0.038	93.397	0.000
		28	-0.075	-0.008	94.516	0.000
		29	0.031	-0.091	94.708	0.000
		30	-0.013	-0.007	94.744	0.000
		31	-0.063	-0.091	95.555	0.000
		32	0.115	-0.018	98.308	0.000
		33	-0.141	-0.042	102.43	0.000
		34	0.151	0.008	107.25	0.000
		35	-0.134	-0.143	111.03	0.000
		36	0.078	-0.064	112.34	0.000

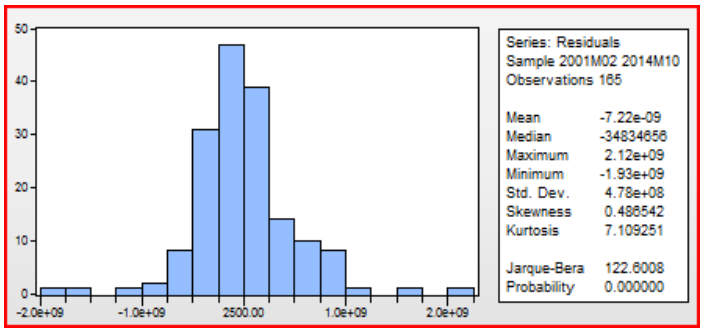


Figure 3q. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_ger" and "d_oil_price".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	4.487074	Prob. F(1,163)	0.0357
Obs*R-squared	4.420443	Prob. Chi-Square(1)	0.0355
Scaled explained SS	13.17744	Prob. Chi-Square(1)	0.0003

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 13:42
Sample: 2001M02 2014M10
Included observations: 165

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.33E+17	4.35E+16	5.350664	0.0000
D_OIL_PRICE	-1.62E+16	7.64E+15	-2.118271	0.0357

R-squared	0.026791	Mean dependent var	2.27E+17
Adjusted R-squared	0.020820	S.D. dependent var	5.64E+17
S.E. of regression	5.58E+17	Akaike info criterion	84.57547
Sum squared resid	5.07E+37	Schwarz criterion	84.61312
Log likelihood	-6975.476	Hannan-Quinn criter.	84.59075
F-statistic	4.487074	Durbin-Watson stat	1.038297
Prob(F-statistic)	0.035668		

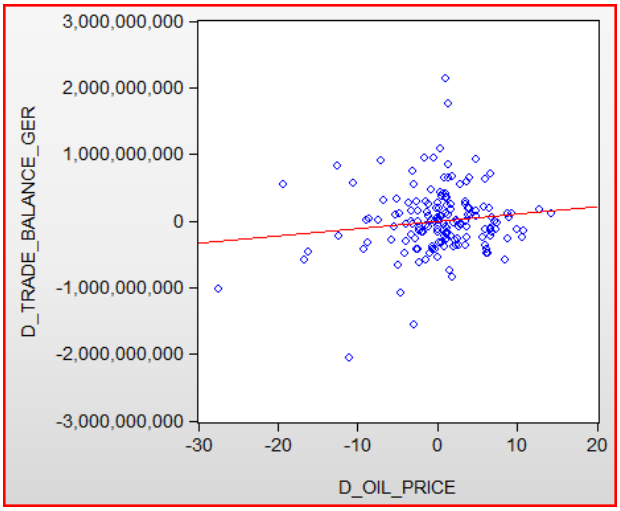


Figure 3r. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_ger" and "d_oil_price".

Sample: 2001M02 2014M10
Included observations: 165

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.508	-0.508	43.302	0.000
		2	0.073	-0.249	44.194	0.000
		3	0.035	-0.065	44.406	0.000
		4	-0.084	-0.105	45.611	0.000
		5	0.019	-0.101	45.670	0.000
		6	-0.011	-0.088	45.693	0.000
		7	-0.074	-0.173	46.658	0.000
		8	-0.012	-0.227	46.683	0.000
		9	0.084	-0.093	47.940	0.000
		10	-0.058	-0.096	48.547	0.000
		11	-0.014	-0.169	48.583	0.000
		12	0.215	0.142	56.943	0.000
		13	-0.198	0.007	64.071	0.000
		14	0.085	-0.021	65.386	0.000
		15	0.110	0.192	67.625	0.000
		16	-0.215	0.004	76.185	0.000
		17	0.119	0.022	78.835	0.000
		18	-0.107	-0.065	80.985	0.000
		19	-0.034	-0.119	81.207	0.000
		20	0.112	0.013	83.589	0.000
		21	-0.083	-0.063	84.897	0.000
		22	0.051	0.007	85.394	0.000
		23	0.010	-0.006	85.414	0.000
		24	-0.020	-0.140	85.490	0.000
		25	0.064	0.030	86.296	0.000
		26	-0.031	-0.030	86.485	0.000
		27	0.036	-0.006	86.744	0.000
		28	-0.081	0.030	88.065	0.000
		29	0.022	-0.072	88.165	0.000
		30	-0.001	0.027	88.165	0.000
		31	-0.060	-0.029	88.906	0.000
		32	0.111	0.040	91.438	0.000
		33	-0.144	-0.023	95.746	0.000
		34	0.148	0.012	100.34	0.000
		35	-0.137	-0.158	104.30	0.000
		36	0.072	-0.102	105.42	0.000

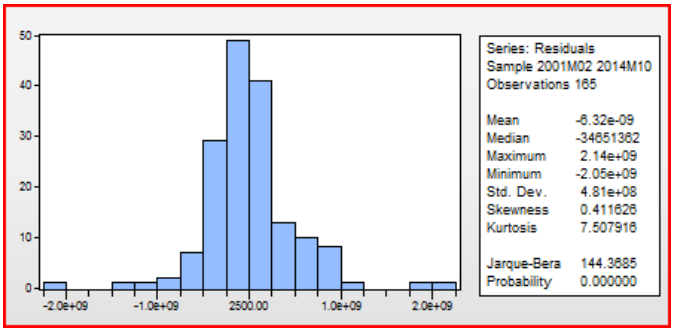


Figure 3s. Serial correlation test (left) ; normality test (right) both between "d_trade_balance_ger" and "d_gas_price".

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	4.009354	Prob. F(1,163)	0.0469
Obs*R-squared	3.961116	Prob. Chi-Square(1)	0.0466
Scaled explained SS	12.57873	Prob. Chi-Square(1)	0.0004

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/28/15 Time: 13:45
Sample: 2001M02 2014M10
Included observations: 165

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.35E+17	4.54E+16	5.176990	0.0000
D_GAS_PRICE	-5.23E+17	2.61E+17	-2.002337	0.0469

R-squared	0.024007	Mean dependent var	2.30E+17
Adjusted R-squared	0.018019	S.D. dependent var	5.87E+17
S.E. of regression	5.82E+17	Akaike info criterion	84.66104
Sum squared resid	5.52E+37	Schwarz criterion	84.69869
Log likelihood	-6982.536	Hannan-Quinn criter.	84.67633
F-statistic	4.009354	Durbin-Watson stat	1.032221
Prob(F-statistic)	0.046907		

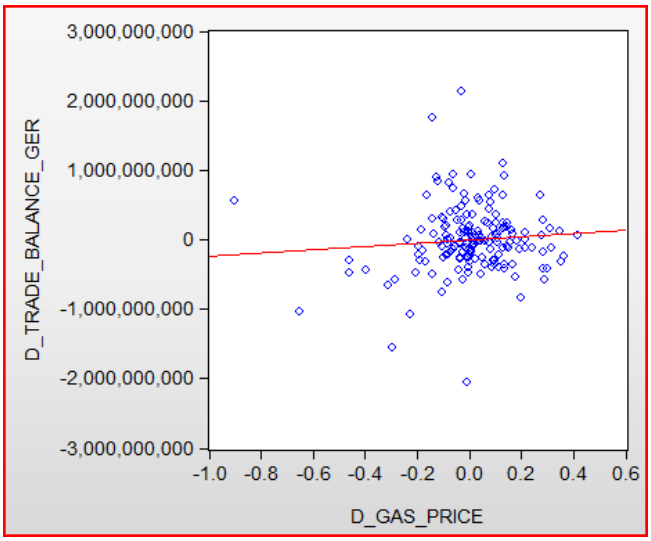
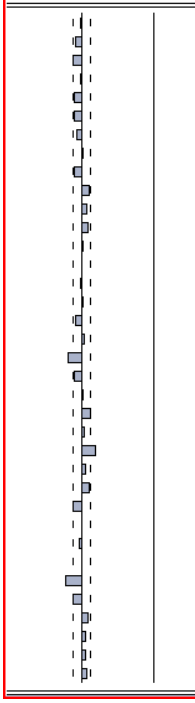


Figure 3t. Heteroskedasticity test (left) ; linearity test (right) both between "d_trade_balance_ger" and "d_gas_price".

Appendix C: Serial Correlation tests Models USA

Serial correlation test + signification test AR-model (USA):

Sample: 1992M03 2014M03
Included observations: 265



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.019	-0.019	0.0959	0.757
		2	-0.094	-0.095	2.4830	0.289
		3	-0.115	-0.120	6.0615	0.109
		4	-0.023	-0.039	6.2103	0.184
		5	-0.109	-0.137	9.4428	0.093
		6	-0.108	-0.144	12.607	0.050
		7	-0.077	-0.132	14.235	0.047
		8	0.021	-0.060	14.362	0.073
		9	-0.105	-0.195	17.404	0.043
		10	0.101	0.013	20.254	0.027
		11	0.072	-0.014	21.697	0.027
		12	0.090	0.022	23.951	0.021
		13	0.012	0.002	23.992	0.031
		14	-0.007	-0.021	24.004	0.046
		15	-0.009	-0.003	24.025	0.065
		16	0.019	0.034	24.129	0.087
		17	-0.084	-0.045	26.154	0.072
		18	0.031	0.050	26.432	0.090
		19	-0.202	-0.190	38.139	0.006
		20	-0.112	-0.162	41.765	0.003
		21	0.022	-0.055	41.899	0.004
		22	0.116	-0.011	45.810	0.002
		23	0.028	-0.063	46.046	0.003
		24	0.199	0.158	57.642	0.000
		25	0.044	0.020	58.207	0.000
		26	0.106	0.109	61.517	0.000
		27	-0.139	-0.055	67.282	0.000
		28	-0.007	0.016	67.297	0.000
		29	-0.036	0.033	67.681	0.000
		30	0.002	0.096	67.682	0.000
		31	-0.241	-0.174	85.186	0.000
		32	-0.117	-0.149	89.375	0.000
		33	0.093	0.037	92.002	0.000
		34	0.051	-0.116	92.812	0.000
		35	0.048	0.019	93.510	0.000
		36	0.081	-0.031	95.521	0.000

Figure 4a. AR model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 02/02/15 Time: 11:41
Sample (adjusted): 1992M03 2014M03
Included observations: 265 after adjustments

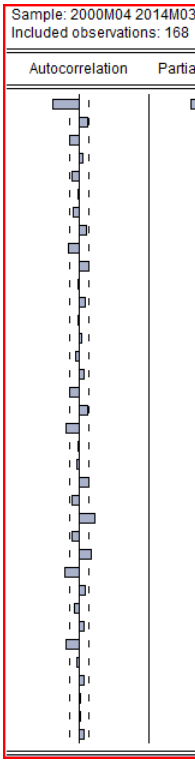
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7362055.	17707743	0.415753	0.6779
D_TRADE_BALANCE_US(...	-0.391058	0.057193	-6.837505	0.0000

R-squared	0.150932	Mean dependent var	5960000.
Adjusted R-squared	0.147704	S.D. dependent var	3.12E+08
S.E. of regression	2.88E+08	Akaike info criterion	41.80402
Sum squared resid	2.19E+19	Schwarz criterion	41.83103
Log likelihood	-5537.032	Hannan-Quinn criter.	41.81487
F-statistic	46.75148	Durbin-Watson stat	2.022743
Prob(F-statistic)	0.000000		

Figure 5a. AR model: Least Squares estimation

Serial correlation test + signification test dl 1 – model (USA):

Sample: 2000M04 2014M03
Included observations: 168



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.385	-0.385	25.388	0.000
		2	0.121	-0.032	27.919	0.000
		3	-0.150	-0.134	31.822	0.000
		4	0.063	-0.047	32.503	0.000
		5	-0.100	-0.105	34.261	0.000
		6	-0.014	-0.124	34.294	0.000
		7	-0.094	-0.179	35.877	0.000
		8	0.100	-0.034	37.672	0.000
		9	-0.161	-0.198	42.329	0.000
		10	0.135	-0.063	45.603	0.000
		11	-0.014	-0.006	45.637	0.000
		12	0.083	0.015	46.885	0.000
		13	-0.015	0.022	46.929	0.000
		14	0.028	0.017	47.077	0.000
		15	-0.053	-0.034	47.596	0.000
		16	0.081	0.063	48.820	0.000
		17	-0.139	-0.052	52.500	0.000
		18	0.131	0.071	55.743	0.000
		19	-0.189	-0.089	62.585	0.000
		20	-0.010	-0.173	62.606	0.000
		21	-0.037	-0.124	62.867	0.000
		22	0.146	0.041	67.058	0.000
		23	-0.106	-0.100	69.265	0.000
		24	0.233	0.140	80.010	0.000
		25	-0.112	0.046	82.535	0.000
		26	0.188	0.130	89.614	0.000
		27	-0.211	-0.027	98.636	0.000
		28	0.092	-0.008	100.37	0.000
		29	-0.075	0.010	101.52	0.000
		30	0.080	0.118	102.83	0.000
		31	-0.197	-0.060	110.91	0.000
		32	-0.048	-0.227	111.39	0.000
		33	0.076	0.021	112.62	0.000
		34	0.016	-0.081	112.68	0.000
		35	0.009	-0.022	112.69	0.000
		36	0.079	0.010	114.06	0.000

Figure 4b. DL1 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 02/02/15 Time: 12:08
Sample (adjusted): 2000M04 2014M03
Included observations: 168 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3696176.	29855492	0.123802	0.9016
D_EXCHANGE_US(-1)	17859971	38951406	0.458519	0.6472

R-squared	0.001265	Mean dependent var	4951190.
Adjusted R-squared	-0.004752	S.D. dependent var	3.84E+08
S.E. of regression	3.85E+08	Akaike info criterion	42.38899
Sum squared resid	2.46E+19	Schwarz criterion	42.42618
Log likelihood	-3558.675	Hannan-Quinn criter.	42.40409
F-statistic	0.210240	Durbin-Watson stat	2.752984
Prob(F-statistic)	0.647179		

Figure 5b. DL1 model: Least Squares estimation

Serial correlation test + signification test dl 2 – model (USA):

Sample: 2003M05 2014M01
Included observations: 129

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.382	-0.382	19.301	0.000
		2	0.104	-0.050	20.734	0.000
		3	-0.139	-0.137	23.329	0.000
		4	0.081	-0.020	24.219	0.000
		5	-0.109	-0.099	25.832	0.000
		6	-0.034	-0.148	25.988	0.000
		7	-0.085	-0.185	26.984	0.000
		8	0.102	-0.035	28.429	0.000
		9	-0.154	-0.192	31.758	0.000
		10	0.123	-0.064	33.905	0.000
		11	0.005	0.007	33.909	0.000
		12	0.072	0.015	34.653	0.001
		13	-0.017	0.020	34.696	0.001
		14	0.033	0.026	34.856	0.002
		15	-0.068	-0.055	35.534	0.002
		16	0.109	0.086	37.303	0.002
		17	-0.157	-0.045	41.020	0.001
		18	0.147	0.093	44.323	0.001
		19	-0.203	-0.086	50.638	0.000
		20	-0.006	-0.171	50.642	0.000
		21	-0.044	-0.132	50.952	0.000
		22	0.150	0.036	54.483	0.000
		23	-0.126	-0.115	57.012	0.000
		24	0.246	0.148	66.764	0.000
		25	-0.102	0.064	68.462	0.000
		26	0.181	0.125	73.816	0.000
		27	-0.163	0.035	78.243	0.000
		28	0.062	0.009	78.889	0.000
		29	-0.073	-0.003	79.786	0.000
		30	0.048	0.098	80.186	0.000
		31	-0.161	-0.022	84.638	0.000
		32	-0.060	-0.207	85.264	0.000
		33	0.096	0.061	86.901	0.000
		34	-0.007	-0.090	86.910	0.000
		35	0.016	-0.018	86.959	0.000
		36	0.051	0.004	87.432	0.000

Figure 4c. DL2 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 02/02/15 Time: 12:08
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4346001.	37755083	0.115110	0.9085
D_EXCHANGE_US(-1)	7218564.	47108782	0.153232	0.8785
D_GDP_RUSSIA(-1)	-1.59E-13	9.51E-13	-0.166868	0.8677

R-squared	0.000334	Mean dependent var	4841085.
Adjusted R-squared	-0.015534	S.D. dependent var	4.24E+08
S.E. of regression	4.27E+08	Akaike info criterion	42.60777
Sum squared resid	2.30E+19	Schwarz criterion	42.67428
Log likelihood	-2745.201	Hannan-Quinn criter.	42.63479
F-statistic	0.021042	Durbin-Watson stat	2.752891
Prob(F-statistic)	0.979181		

Figure 5c. DL2 model: Least Squares estimation

Serial correlation test + signification test dl 3 – model (USA):

Sample: 2003M05 2014M01
Included observations: 129

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.452	-0.452	26.920	0.000
		2	0.144	-0.075	29.693	0.000
		3	-0.133	-0.123	32.079	0.000
		4	0.097	-0.007	33.345	0.000
		5	-0.145	-0.128	36.204	0.000
		6	0.002	-0.159	36.204	0.000
		7	-0.086	-0.197	37.224	0.000
		8	0.129	-0.022	39.533	0.000
		9	-0.160	-0.163	43.153	0.000
		10	0.112	-0.093	44.949	0.000
		11	-0.018	-0.038	44.996	0.000
		12	0.090	0.018	46.158	0.000
		13	-0.085	-0.046	47.199	0.000
		14	0.090	0.012	48.401	0.000
		15	-0.072	-0.031	49.161	0.000
		16	0.134	0.112	51.858	0.000
		17	-0.188	-0.041	57.202	0.000
		18	0.201	0.134	63.366	0.000
		19	-0.167	0.023	67.650	0.000
		20	0.002	-0.096	67.651	0.000
		21	-0.089	-0.114	68.887	0.000
		22	0.159	0.054	72.876	0.000
		23	-0.193	-0.132	78.796	0.000
		24	0.255	0.121	89.276	0.000
		25	-0.162	0.014	93.517	0.000
		26	0.205	0.079	100.40	0.000
		27	-0.175	-0.014	105.45	0.000
		28	0.104	0.002	107.26	0.000
		29	-0.099	-0.041	108.93	0.000
		30	0.123	0.091	111.52	0.000
		31	-0.147	0.039	115.26	0.000
		32	-0.032	-0.174	115.43	0.000
		33	0.086	0.088	116.73	0.000
		34	-0.019	-0.033	116.79	0.000
		35	-0.020	0.020	116.87	0.000
		36	0.084	0.064	118.14	0.000

Figure 4d. DL3 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 02/02/15 Time: 12:09
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

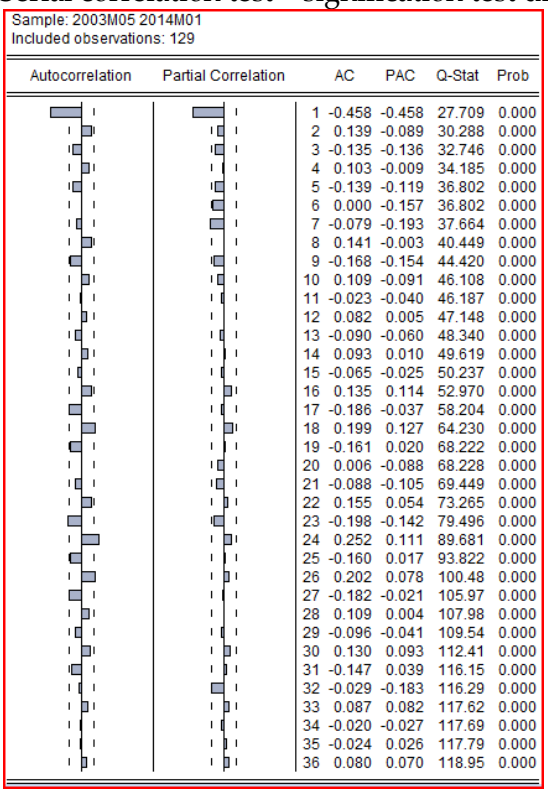
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3787092.	36656410	-0.103313	0.9179
D_EXCHANGE_US(-1)	-4900323.	45789077	-0.107019	0.9149
D_GDP_RUSSIA(-1)	1.09E-13	9.25E-13	0.117739	0.9065
D_OIL_PRICE(-1)	18035617	5891354.	3.061371	0.0027

R-squared	0.070057	Mean dependent var	4841085.
Adjusted R-squared	0.047739	S.D. dependent var	4.24E+08
S.E. of regression	4.14E+08	Akaike info criterion	42.55097
Sum squared resid	2.14E+19	Schwarz criterion	42.63965
Log likelihood	-2740.538	Hannan-Quinn criter.	42.58701
F-statistic	3.138957	Durbin-Watson stat	2.890559
Prob(F-statistic)	0.027800		

Figure 5d. DL3 model: Least Squares estimation

Serial correlation test + signification test dl 4 – model (USA):

Sample: 2003M05 2014M01
Included observations: 129



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.458	-0.458	27.709	0.000
		2	0.139	-0.089	30.288	0.000
		3	-0.135	-0.136	32.746	0.000
		4	0.103	-0.009	34.185	0.000
		5	-0.139	-0.119	36.802	0.000
		6	0.000	-0.157	36.802	0.000
		7	-0.079	-0.193	37.664	0.000
		8	0.141	-0.003	40.449	0.000
		9	-0.168	-0.154	44.420	0.000
		10	0.109	-0.091	46.108	0.000
		11	-0.023	-0.040	46.187	0.000
		12	0.082	0.005	47.148	0.000
		13	-0.090	-0.060	48.340	0.000
		14	0.093	0.010	49.619	0.000
		15	-0.065	-0.025	50.237	0.000
		16	0.135	0.114	52.970	0.000
		17	-0.186	-0.037	58.204	0.000
		18	0.199	0.127	64.230	0.000
		19	-0.161	0.020	68.222	0.000
		20	0.006	-0.088	68.228	0.000
		21	-0.088	-0.105	69.449	0.000
		22	0.155	0.054	73.265	0.000
		23	-0.198	-0.142	79.496	0.000
		24	0.252	0.111	89.681	0.000
		25	-0.160	0.017	93.822	0.000
		26	0.202	0.078	100.48	0.000
		27	-0.182	-0.021	105.97	0.000
		28	0.109	0.004	107.98	0.000
		29	-0.096	-0.041	109.54	0.000
		30	0.130	0.093	112.41	0.000
		31	-0.147	0.039	116.15	0.000
		32	-0.029	-0.183	116.29	0.000
		33	0.087	0.082	117.62	0.000
		34	-0.020	-0.027	117.69	0.000
		35	-0.024	0.026	117.79	0.000
		36	0.080	0.070	118.95	0.000

Figure 4e. DL4 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 02/02/15 Time: 12:09
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

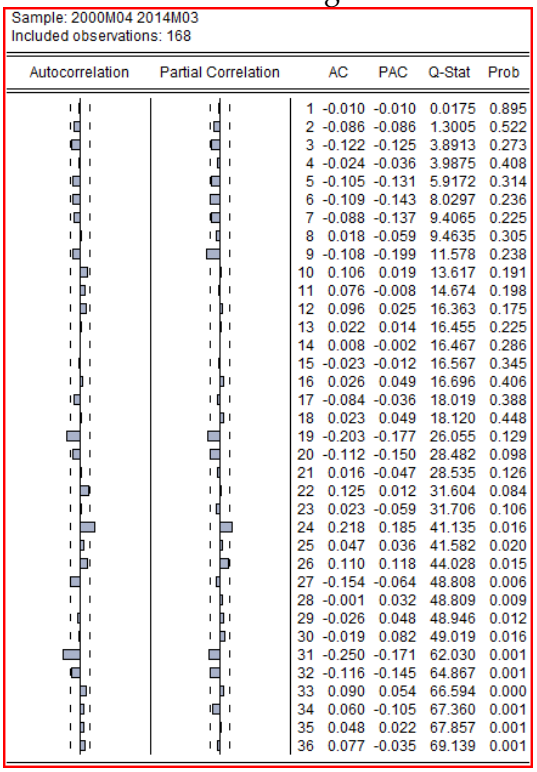
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4018883.	36765189	-0.109312	0.9131
D_EXCHANGE_US(-1)	-5317623.	45928480	-0.115781	0.9080
D_GDP_RUSSIA(-1)	1.75E-13	9.36E-13	0.186916	0.8520
D_OIL_PRICE(-1)	15050621	8175192.	1.841011	0.0680
D_GAS_PRICE(-1)	1.44E+08	2.72E+08	0.528302	0.5982

R-squared	0.072146	Mean dependent var	4841085.
Adjusted R-squared	0.042215	S.D. dependent var	4.24E+08
S.E. of regression	4.15E+08	Akaike info criterion	42.56423
Sum squared resid	2.14E+19	Schwarz criterion	42.67508
Log likelihood	-2740.393	Hannan-Quinn criter.	42.60927
F-statistic	2.410416	Durbin-Watson stat	2.903391
Prob(F-statistic)	0.052720		

Figure 5e. DL4 model: Least Squares estimation

Serial correlation test + signification test ARDL 1 model (USA):

Sample: 2000M04 2014M03
Included observations: 168



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.010	-0.010	0.0175	0.895
		2	-0.086	-0.086	1.3005	0.522
		3	-0.122	-0.125	3.8913	0.273
		4	-0.024	-0.036	3.9875	0.408
		5	-0.105	-0.131	5.9172	0.314
		6	-0.109	-0.143	8.0297	0.236
		7	-0.088	-0.137	9.4065	0.225
		8	0.018	-0.059	9.4635	0.305
		9	-0.108	-0.199	11.578	0.238
		10	0.106	0.019	13.617	0.191
		11	0.076	-0.008	14.674	0.198
		12	0.096	0.025	16.363	0.175
		13	0.022	0.014	16.455	0.225
		14	0.008	-0.002	16.467	0.286
		15	-0.023	-0.012	16.567	0.345
		16	0.026	0.049	16.696	0.406
		17	-0.084	-0.036	18.019	0.388
		18	0.023	0.049	18.120	0.448
		19	-0.203	-0.177	26.055	0.129
		20	-0.112	-0.150	28.482	0.098
		21	0.016	-0.047	28.535	0.126
		22	0.125	0.012	31.604	0.084
		23	0.023	-0.059	31.706	0.106
		24	0.218	0.185	41.135	0.016
		25	0.047	0.036	41.582	0.020
		26	0.110	0.118	44.028	0.015
		27	-0.154	-0.064	48.808	0.006
		28	-0.001	0.032	48.809	0.009
		29	-0.026	0.048	48.946	0.012
		30	-0.019	0.082	49.019	0.016
		31	-0.250	-0.171	62.030	0.001
		32	-0.116	-0.145	64.867	0.001
		33	0.090	0.054	66.594	0.000
		34	0.060	-0.105	67.360	0.001
		35	0.048	0.022	67.857	0.001
		36	0.077	-0.035	69.139	0.001

Figure 4f. ARDL1 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 02/02/15 Time: 12:04
Sample (adjusted): 2000M04 2014M03
Included observations: 168 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4526093.	27558900	0.164233	0.8697
D_TRADE_BALANCE_US(...	-0.393479	0.072049	-5.461281	0.0000
D_EXCHANGE_US(-1)	20744997	35958457	0.576916	0.5648

R-squared	0.154160	Mean dependent var	4951190.
Adjusted R-squared	0.143907	S.D. dependent var	3.84E+08
S.E. of regression	3.56E+08	Akaike info criterion	42.23474
Sum squared resid	2.09E+19	Schwarz criterion	42.29052
Log likelihood	-3544.718	Hannan-Quinn criter.	42.25738
F-statistic	15.03617	Durbin-Watson stat	2.003267
Prob(F-statistic)	0.000001		

Figure 5f. ARDL1 model: Least Squares estimation

Serial correlation test + signification test ARDL 2 model (USA):

Sample: 2003M05 2014M01
Included observations: 129

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.017	-0.017	0.0360	0.849
		2	-0.094	-0.095	1.2217	0.543
		3	-0.098	-0.102	2.4976	0.476
		4	-0.007	-0.021	2.5045	0.644
		5	-0.121	-0.144	4.4981	0.480
		6	-0.132	-0.159	6.8971	0.330
		7	-0.084	-0.137	7.8813	0.343
		8	0.037	-0.043	8.0702	0.427
		9	-0.107	-0.192	9.6872	0.376
		10	0.098	0.020	11.043	0.354
		11	0.087	0.004	12.126	0.354
		12	0.093	0.026	13.363	0.343
		13	0.023	0.020	13.439	0.415
		14	0.008	0.001	13.449	0.491
		15	-0.018	-0.009	13.499	0.564
		16	0.044	0.074	13.785	0.615
		17	-0.100	-0.039	15.282	0.575
		18	0.037	0.076	15.491	0.628
		19	-0.205	-0.177	21.941	0.287
		20	-0.123	-0.153	24.296	0.230
		21	0.001	-0.058	24.296	0.279
		22	0.119	0.014	26.517	0.230
		23	0.013	-0.059	26.544	0.276
		24	0.238	0.208	35.623	0.060
		25	0.064	0.051	36.295	0.067
		26	0.120	0.123	38.641	0.053
		27	-0.112	-0.008	40.722	0.044
		28	-0.023	0.015	40.811	0.056
		29	-0.045	0.033	41.156	0.067
		30	-0.037	0.082	41.395	0.081
		31	-0.218	-0.124	49.601	0.018
		32	-0.112	-0.135	51.793	0.015
		33	0.096	0.081	53.431	0.014
		34	0.036	-0.125	53.665	0.017
		35	0.030	0.022	53.826	0.022
		36	0.066	-0.042	54.614	0.024

Figure 4g. ARDL2 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 02/02/15 Time: 12:05
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3695489.	34961360	0.105702	0.9160
D_TRADE_BALANCE_US(...	-0.388742	0.082986	-4.684434	0.0000
D_EXCHANGE_US(-1)	10109075	43626943	0.231716	0.8171
D_GDP_RUSSIA(-1)	-4.00E-13	8.82E-13	-0.453426	0.6510

R-squared	0.149619	Mean dependent var	4841085.
Adjusted R-squared	0.129210	S.D. dependent var	4.24E+08
S.E. of regression	3.96E+08	Akaike info criterion	42.46154
Sum squared resid	1.96E+19	Schwarz criterion	42.55021
Log likelihood	-2734.769	Hannan-Quinn criter.	42.49757
F-statistic	7.331000	Durbin-Watson stat	2.026742
Prob(F-statistic)	0.000144		

Figure 5g. ARDL2 model: Least Squares estimation

Serial correlation test + signification test ARDL 3 model (USA):

Sample: 2003M05 2014M01
Included observations: 129

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.041	-0.041	0.2175	0.641
		2	-0.097	-0.098	1.4613	0.482
		3	-0.083	-0.092	2.3837	0.497
		4	-0.010	-0.029	2.3983	0.663
		5	-0.129	-0.152	4.6709	0.457
		6	-0.110	-0.144	6.3183	0.388
		7	-0.091	-0.153	7.4533	0.383
		8	0.054	-0.029	7.8531	0.448
		9	-0.118	-0.200	9.8085	0.366
		10	0.075	-0.014	10.616	0.388
		11	0.065	-0.025	11.225	0.425
		12	0.111	0.038	12.993	0.370
		13	-0.025	-0.043	13.085	0.441
		14	0.050	0.028	13.457	0.491
		15	-0.009	-0.009	13.469	0.566
		16	0.083	0.098	14.491	0.562
		17	-0.082	-0.006	15.499	0.560
		18	0.088	0.139	16.669	0.546
		19	-0.143	-0.080	19.822	0.405
		20	-0.134	-0.116	22.604	0.309
		21	-0.065	-0.059	23.275	0.330
		22	0.079	0.009	24.260	0.334
		23	-0.053	-0.085	24.710	0.365
		24	0.219	0.188	32.451	0.116
		25	0.017	0.010	32.496	0.144
		26	0.111	0.081	34.529	0.122
		27	-0.084	-0.043	35.701	0.122
		28	0.021	0.016	35.775	0.148
		29	-0.030	-0.002	35.926	0.176
		30	0.052	0.115	36.390	0.196
		31	-0.178	-0.069	41.832	0.093
		32	-0.079	-0.084	42.922	0.094
		33	0.067	0.112	43.718	0.100
		34	0.018	-0.070	43.773	0.122
		35	-0.006	0.057	43.780	0.147
		36	0.100	0.049	45.605	0.131

Figure 4h. ARDL3 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 02/02/15 Time: 12:06
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

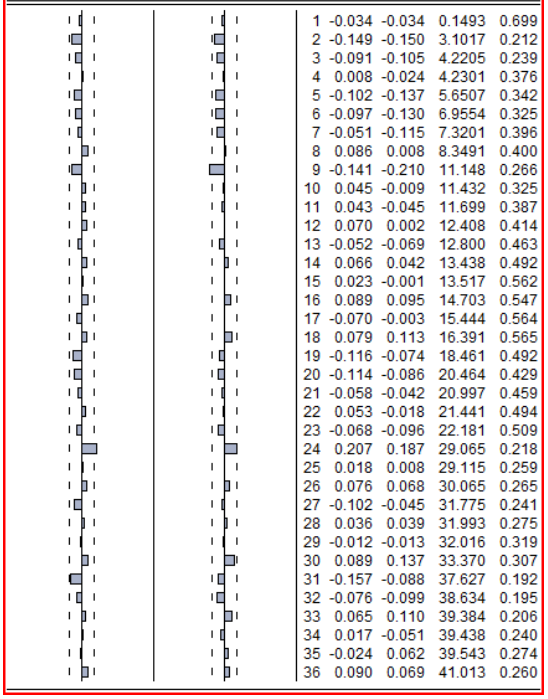
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7556177.	32518426	-0.232366	0.8166
D_TRADE_BALANCE_US(...	-0.465073	0.078727	-5.907441	0.0000
D_EXCHANGE_US(-1)	-5898814.	40612678	-0.145246	0.8848
D_GDP_RUSSIA(-1)	-8.14E-14	8.21E-13	-0.099069	0.9212
D_OIL_PRICE(-1)	24667986	5344551.	4.615539	0.0000

R-squared	0.274295	Mean dependent var	4841085.
Adjusted R-squared	0.250886	S.D. dependent var	4.24E+08
S.E. of regression	3.67E+08	Akaike info criterion	42.31850
Sum squared resid	1.67E+19	Schwarz criterion	42.42934
Log likelihood	-2724.543	Hannan-Quinn criter.	42.36354
F-statistic	11.71711	Durbin-Watson stat	2.075447
Prob(F-statistic)	0.000000		

Figure 5h. ARDL3 model: Least Squares estimation

Serial correlation test + signification test ARDL 4 model (USA):

Sample: 2003M05 2014M01
Included observations: 129



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.034	-0.034	0.1493	0.699
		2	-0.149	-0.150	3.1017	0.212
		3	-0.091	-0.105	4.2205	0.239
		4	0.008	-0.024	4.2301	0.376
		5	-0.102	-0.137	5.6507	0.342
		6	-0.097	-0.130	6.9554	0.325
		7	-0.051	-0.115	7.3201	0.396
		8	0.086	0.008	8.3491	0.400
		9	-0.141	-0.210	11.148	0.266
		10	0.045	-0.009	11.432	0.325
		11	0.043	-0.045	11.699	0.387
		12	0.070	0.002	12.408	0.414
		13	-0.052	-0.069	12.800	0.463
		14	0.066	0.042	13.438	0.492
		15	0.023	-0.001	13.517	0.562
		16	0.089	0.095	14.703	0.547
		17	-0.070	-0.003	15.444	0.564
		18	0.079	0.113	16.391	0.565
		19	-0.116	-0.074	18.461	0.492
		20	-0.114	-0.086	20.464	0.429
		21	-0.058	-0.042	20.997	0.459
		22	0.053	-0.018	21.441	0.494
		23	-0.068	-0.096	22.181	0.509
		24	0.207	0.187	29.065	0.218
		25	0.018	0.008	29.115	0.259
		26	0.076	0.068	30.065	0.265
		27	-0.102	-0.045	31.775	0.241
		28	0.036	0.039	31.993	0.275
		29	-0.012	-0.013	32.016	0.319
		30	0.089	0.137	33.370	0.307
		31	-0.157	-0.088	37.627	0.192
		32	-0.076	-0.099	38.634	0.195
		33	0.065	0.110	39.384	0.206
		34	0.017	-0.051	39.438	0.240
		35	-0.024	0.062	39.543	0.274
		36	0.090	0.069	41.013	0.260

Figure 4i. ARDL4 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 02/02/15 Time: 12:06
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8595526.	32162414	-0.267254	0.7897
D_TRADE_BALANCE_US(...	-0.498824	0.079758	-6.254190	0.0000
D_EXCHANGE_US(-1)	-7350009.	40169431	-0.182975	0.8551
D_GDP_RUSSIA(-1)	1.23E-13	8.19E-13	0.150362	0.8807
D_OIL_PRICE(-1)	15287062	7149956.	2.138064	0.0345
D_GAS_PRICE(-1)	4.75E+08	2.44E+08	1.948139	0.0537

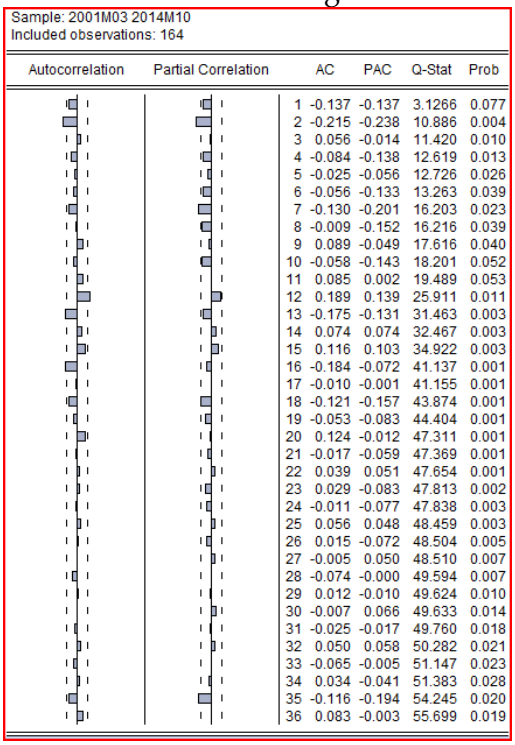
R-squared	0.296017	Mean dependent var	4841085.
Adjusted R-squared	0.267400	S.D. dependent var	4.24E+08
S.E. of regression	3.63E+08	Akaike info criterion	42.30361
Sum squared resid	1.62E+19	Schwarz criterion	42.43663
Log likelihood	-2722.583	Hannan-Quinn criter.	42.35766
F-statistic	10.34404	Durbin-Watson stat	2.061237
Prob(F-statistic)	0.000000		

Figure 5i. ARDL4 model: Least Squares estimation

Appendix D: Serial Correlation tests Models Germany

Serial correlation test + signification test AR-model (GER):

Sample: 2001M03 2014M10
Included observations: 164



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.137	-0.137	3.1266	0.077
		2	-0.215	-0.238	10.886	0.004
		3	0.056	-0.014	11.420	0.010
		4	-0.084	-0.138	12.619	0.013
		5	-0.025	-0.056	12.726	0.026
		6	-0.056	-0.133	13.263	0.039
		7	-0.130	-0.201	16.203	0.023
		8	-0.009	-0.152	16.216	0.039
		9	0.089	-0.049	17.616	0.040
		10	-0.058	-0.143	18.201	0.052
		11	0.085	0.002	19.489	0.053
		12	0.189	0.139	25.911	0.011
		13	-0.175	-0.131	31.463	0.003
		14	0.074	0.074	32.467	0.003
		15	0.116	0.103	34.922	0.003
		16	-0.184	-0.072	41.137	0.001
		17	-0.010	-0.001	41.155	0.001
		18	-0.121	-0.157	43.874	0.001
		19	-0.053	-0.083	44.404	0.001
		20	0.124	-0.012	47.311	0.001
		21	-0.017	-0.059	47.369	0.001
		22	0.039	0.051	47.654	0.001
		23	0.029	-0.083	47.813	0.002
		24	-0.011	-0.077	47.838	0.003
		25	0.056	0.048	48.459	0.003
		26	0.015	-0.072	48.504	0.005
		27	-0.005	0.050	48.510	0.007
		28	-0.074	-0.000	49.594	0.007
		29	0.012	-0.010	49.624	0.010
		30	-0.007	0.066	49.633	0.014
		31	-0.025	-0.017	49.760	0.018
		32	0.050	0.058	50.282	0.021
		33	-0.065	-0.005	51.147	0.023
		34	0.034	-0.041	51.383	0.028
		35	-0.116	-0.194	54.245	0.020
		36	0.083	-0.003	55.699	0.019

Figure 4j. AR model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 02/02/15 Time: 14:20
Sample (adjusted): 2001M03 2014M10
Included observations: 164 after adjustments

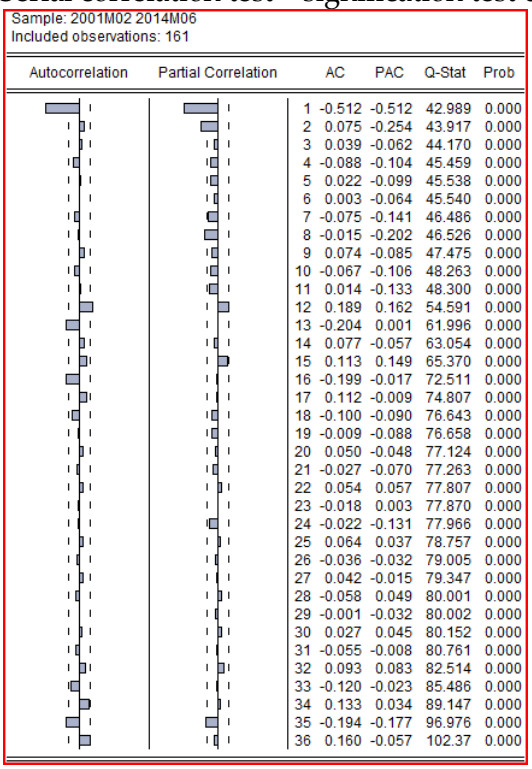
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1361331.	32528697	-0.041850	0.9667
D_TRADE_BALANCE_GER(-1)	-0.512621	0.067440	-7.601147	0.0000

R-squared	0.262891	Mean dependent var	-621042.7
Adjusted R-squared	0.258341	S.D. dependent var	4.84E+08
S.E. of regression	4.17E+08	Akaike info criterion	42.54512
Sum squared resid	2.81E+19	Schwarz criterion	42.58292
Log likelihood	-3486.700	Hannan-Quinn criter.	42.56047
F-statistic	57.77743	Durbin-Watson stat	2.264498
Prob(F-statistic)	0.000000		

Figure 5j. AR model: Least Squares estimation

Serial correlation test + signification test dl 1 – model (GER):

Sample: 2001M02 2014M06
Included observations: 161



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.512	-0.512	42.989	0.000
		2	0.075	-0.254	43.917	0.000
		3	0.039	-0.062	44.170	0.000
		4	-0.088	-0.104	45.459	0.000
		5	0.022	-0.099	45.538	0.000
		6	0.003	-0.064	45.540	0.000
		7	-0.075	-0.141	46.486	0.000
		8	-0.015	-0.202	46.526	0.000
		9	0.074	-0.085	47.475	0.000
		10	-0.067	-0.106	48.263	0.000
		11	0.014	-0.133	48.300	0.000
		12	0.189	0.162	54.591	0.000
		13	-0.204	0.001	61.996	0.000
		14	0.077	-0.057	63.054	0.000
		15	0.113	0.149	65.370	0.000
		16	-0.199	-0.017	72.511	0.000
		17	0.112	-0.009	74.807	0.000
		18	-0.100	-0.090	76.643	0.000
		19	-0.009	-0.088	76.658	0.000
		20	0.050	-0.048	77.124	0.000
		21	-0.027	-0.070	77.263	0.000
		22	0.054	0.057	77.807	0.000
		23	-0.018	0.003	77.870	0.000
		24	-0.022	-0.131	77.966	0.000
		25	0.064	0.037	78.757	0.000
		26	-0.036	-0.032	79.005	0.000
		27	0.042	-0.015	79.347	0.000
		28	-0.058	0.049	80.001	0.000
		29	-0.001	-0.032	80.002	0.000
		30	0.027	0.045	80.152	0.000
		31	-0.055	-0.008	80.761	0.000
		32	0.093	0.083	82.514	0.000
		33	-0.120	-0.023	85.486	0.000
		34	0.133	0.034	89.147	0.000
		35	-0.194	-0.177	96.976	0.000
		36	0.160	-0.057	102.37	0.000

Figure 4k. DL1 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 02/02/15 Time: 14:26
Sample (adjusted): 2001M02 2014M06
Included observations: 161 after adjustments

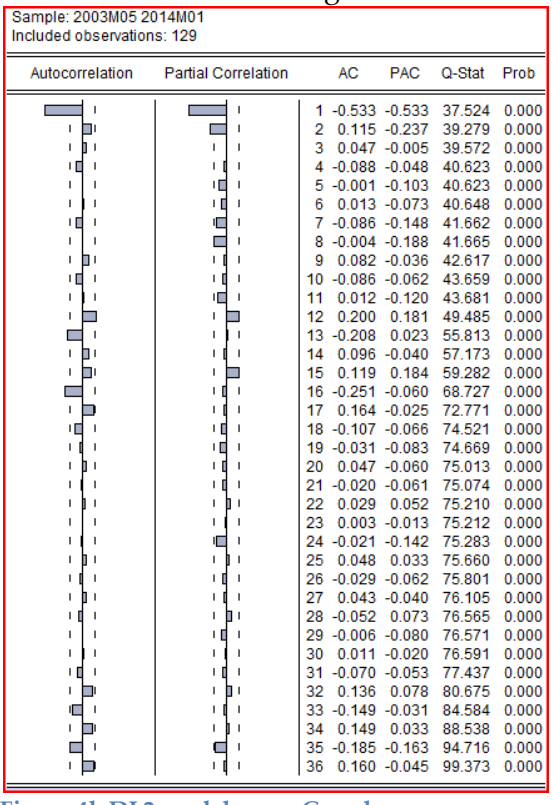
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4851024.	38763526	-0.125144	0.9006
D_EXCHANGE_EU(-1)	11194339	29559196	0.378709	0.7054

R-squared	0.000901	Mean dependent var	-1865571.
Adjusted R-squared	-0.005382	S.D. dependent var	4.80E+08
S.E. of regression	4.82E+08	Akaike info criterion	42.83537
Sum squared resid	3.69E+19	Schwarz criterion	42.87365
Log likelihood	-3446.247	Hannan-Quinn criter.	42.85091
F-statistic	0.143421	Durbin-Watson stat	3.023231
Prob(F-statistic)	0.705409		

Figure 5k. DL1 model: Least Squares estimation

Serial correlation test + signification test dl 2 – model (GER):

Sample: 2003M05 2014M01
Included observations: 129



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.533	-0.533	37.524	0.000
		2	0.115	-0.237	39.279	0.000
		3	0.047	-0.005	39.572	0.000
		4	-0.088	-0.048	40.623	0.000
		5	-0.001	-0.103	40.623	0.000
		6	0.013	-0.073	40.648	0.000
		7	-0.086	-0.148	41.662	0.000
		8	-0.004	-0.188	41.665	0.000
		9	0.082	-0.036	42.617	0.000
		10	-0.086	-0.062	43.659	0.000
		11	0.012	-0.120	43.681	0.000
		12	0.200	0.181	49.485	0.000
		13	-0.208	0.023	55.813	0.000
		14	0.096	-0.040	57.173	0.000
		15	0.119	0.184	59.282	0.000
		16	-0.251	-0.060	68.727	0.000
		17	0.164	-0.025	72.771	0.000
		18	-0.107	-0.066	74.521	0.000
		19	-0.031	-0.083	74.669	0.000
		20	0.047	-0.060	75.013	0.000
		21	-0.020	-0.061	75.074	0.000
		22	0.029	0.052	75.210	0.000
		23	0.003	-0.013	75.212	0.000
		24	-0.021	-0.142	75.283	0.000
		25	0.048	0.033	75.660	0.000
		26	-0.029	-0.062	75.801	0.000
		27	0.043	-0.040	76.105	0.000
		28	-0.052	0.073	76.565	0.000
		29	-0.006	-0.080	76.571	0.000
		30	0.011	-0.020	76.591	0.000
		31	-0.070	-0.053	77.437	0.000
		32	0.136	0.078	80.675	0.000
		33	-0.149	-0.031	84.584	0.000
		34	0.149	0.033	88.538	0.000
		35	-0.185	-0.163	94.716	0.000
		36	0.160	-0.045	99.373	0.000

Figure 4l. DL2 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 02/02/15 Time: 14:27
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6231969.	46578757	0.133794	0.8938
D_EXCHANGE_EU(-1)	45852939	51396627	0.892139	0.3740
D_GDP_RUSSIA(-1)	-7.99E-13	1.17E-12	-0.683119	0.4958

R-squared	0.008245	Mean dependent var	10898302
Adjusted R-squared	-0.007497	S.D. dependent var	5.24E+08
S.E. of regression	5.26E+08	Akaike info criterion	43.02229
Sum squared resid	3.49E+19	Schwarz criterion	43.08880
Log likelihood	-2771.938	Hannan-Quinn criter.	43.04931
F-statistic	0.523778	Durbin-Watson stat	3.057091
Prob(F-statistic)	0.593563		

Figure 5l. DL2 model: Least Squares estimation

Serial correlation test + signification test dl 3 – model (GER):

Sample: 2003M05 2014M01
Included observations: 129

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.537	-0.537	38.090	0.000
		2	0.122	-0.234	40.061	0.000
		3	0.042	-0.005	40.298	0.000
		4	-0.082	-0.041	41.206	0.000
		5	-0.011	-0.109	41.223	0.000
		6	0.020	-0.076	41.279	0.000
		7	-0.088	-0.149	42.363	0.000
		8	-0.010	-0.198	42.376	0.000
		9	0.089	-0.041	43.487	0.000
		10	-0.088	-0.062	44.580	0.000
		11	0.011	-0.125	44.597	0.000
		12	0.204	0.178	50.584	0.000
		13	-0.204	0.033	56.635	0.000
		14	0.097	-0.029	58.028	0.000
		15	0.122	0.199	60.238	0.000
		16	-0.253	-0.049	69.830	0.000
		17	0.159	-0.023	73.640	0.000
		18	-0.099	-0.057	75.133	0.000
		19	-0.033	-0.068	75.297	0.000
		20	0.036	-0.054	75.495	0.000
		21	-0.013	-0.066	75.521	0.000
		22	0.022	0.046	75.595	0.000
		23	0.009	-0.010	75.607	0.000
		24	-0.019	-0.146	75.668	0.000
		25	0.048	0.031	76.037	0.000
		26	-0.022	-0.053	76.118	0.000
		27	0.039	-0.043	76.367	0.000
		28	-0.054	0.067	76.848	0.000
		29	-0.013	-0.097	76.878	0.000
		30	0.013	-0.039	76.906	0.000
		31	-0.073	-0.062	77.814	0.000
		32	0.135	0.077	80.967	0.000
		33	-0.151	-0.037	84.979	0.000
		34	0.155	0.034	89.243	0.000
		35	-0.180	-0.148	95.056	0.000
		36	0.165	-0.025	100.00	0.000

Figure 4m. DL3 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 02/02/15 Time: 14:27
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4664335.	46799707	0.099666	0.9208
D_EXCHANGE_EU(-1)	41178985	52259849	0.787966	0.4322
D_GDP_RUSSIA(-1)	-7.27E-13	1.18E-12	-0.616165	0.5389
D_OIL_PRICE(-1)	4103920.	7582298.	0.541250	0.5893

R-squared	0.010564	Mean dependent var	10898302
Adjusted R-squared	-0.013182	S.D. dependent var	5.24E+08
S.E. of regression	5.27E+08	Akaike info criterion	43.03545
Sum squared resid	3.48E+19	Schwarz criterion	43.12413
Log likelihood	-2771.787	Hannan-Quinn criter.	43.07148
F-statistic	0.444876	Durbin-Watson stat	3.065137
Prob(F-statistic)	0.721349		

Figure 5m. DL3 model: Least Squares estimation

Serial correlation test + signification test dl 4 – model (GER):

Sample: 2003M05 2014M01
Included observations: 129

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.551	-0.551	40.067	0.000
		2	0.124	-0.258	42.100	0.000
		3	0.044	-0.020	42.358	0.000
		4	-0.082	-0.044	43.273	0.000
		5	-0.024	-0.134	43.350	0.000
		6	0.052	-0.065	43.728	0.000
		7	-0.089	-0.115	44.820	0.000
		8	-0.014	-0.181	44.848	0.000
		9	0.093	-0.042	46.059	0.000
		10	-0.080	-0.046	46.976	0.000
		11	0.001	-0.112	46.976	0.000
		12	0.188	0.157	52.061	0.000
		13	-0.219	-0.012	59.018	0.000
		14	0.081	-0.096	59.982	0.000
		15	0.150	0.176	63.305	0.000
		16	-0.251	-0.029	72.764	0.000
		17	0.161	-0.001	76.697	0.000
		18	-0.084	-0.053	77.783	0.000
		19	-0.027	-0.057	77.895	0.000
		20	0.027	-0.052	78.009	0.000
		21	0.009	-0.057	78.023	0.000
		22	-0.003	0.042	78.025	0.000
		23	0.008	-0.007	78.034	0.000
		24	-0.025	-0.144	78.132	0.000
		25	0.026	0.003	78.246	0.000
		26	-0.013	-0.056	78.275	0.000
		27	0.049	-0.032	78.673	0.000
		28	-0.051	0.082	79.103	0.000
		29	-0.012	-0.090	79.126	0.000
		30	0.024	-0.057	79.222	0.000
		31	-0.078	-0.091	80.280	0.000
		32	0.137	0.051	83.565	0.000
		33	-0.149	-0.051	87.448	0.000
		34	0.152	0.050	91.570	0.000
		35	-0.187	-0.141	97.856	0.000
		36	0.168	-0.026	102.97	0.000

Figure 4n. DL4 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 02/02/15 Time: 14:28
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5553940.	46749549	0.118802	0.9056
D_EXCHANGE_EU(-1)	38975874	52232251	0.746203	0.4570
D_GDP_RUSSIA(-1)	-8.92E-13	1.19E-12	-0.750917	0.4541
D_OIL_PRICE(-1)	12358237	10470650	1.180274	0.2402
D_GAS_PRICE(-1)	-3.94E+08	3.45E+08	-1.141572	0.2558

R-squared	0.020855	Mean dependent var	10898302
Adjusted R-squared	-0.010731	S.D. dependent var	5.24E+08
S.E. of regression	5.27E+08	Akaike info criterion	43.04050
Sum squared resid	3.44E+19	Schwarz criterion	43.15135
Log likelihood	-2771.112	Hannan-Quinn criter.	43.08554
F-statistic	0.660264	Durbin-Watson stat	3.093071
Prob(F-statistic)	0.620764		

Figure 5n. DL4 model: Least Squares estimation

Serial correlation test + signification test ARDL 1 model (GER):

Sample: 2001M03 2014M06
Included observations: 160

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.135	-0.135	2.9909	0.084
		2	-0.209	-0.231	10.141	0.006
		3	0.054	-0.013	10.630	0.014
		4	-0.106	-0.158	12.486	0.014
		5	-0.013	-0.051	12.514	0.028
		6	-0.025	-0.105	12.621	0.049
		7	-0.135	-0.188	15.729	0.028
		8	-0.030	-0.158	15.879	0.044
		9	0.073	-0.067	16.790	0.052
		10	-0.049	-0.143	17.212	0.070
		11	0.107	0.019	19.219	0.057
		12	0.181	0.143	24.963	0.015
		13	-0.176	-0.117	30.429	0.004
		14	0.066	0.062	31.192	0.005
		15	0.110	0.093	33.341	0.004
		16	-0.180	-0.079	39.144	0.001
		17	-0.012	-0.022	39.172	0.002
		18	-0.098	-0.135	40.935	0.002
		19	-0.044	-0.055	41.296	0.002
		20	0.065	-0.068	42.089	0.003
		21	0.027	-0.020	42.229	0.004
		22	0.058	0.056	42.866	0.005
		23	-0.016	-0.103	42.913	0.007
		24	-0.013	-0.074	42.948	0.010
		25	0.065	0.039	43.752	0.012
		26	0.014	-0.074	43.790	0.016
		27	0.008	0.040	43.803	0.022
		28	-0.070	0.005	44.754	0.023
		29	-0.017	-0.012	44.814	0.031
		30	0.017	0.053	44.873	0.040
		31	-0.002	0.014	44.874	0.051
		32	0.035	0.068	45.116	0.062
		33	-0.055	-0.038	45.739	0.069
		34	0.003	-0.040	45.741	0.086
		35	-0.139	-0.203	49.726	0.051
		36	0.153	0.040	54.612	0.024

Figure 4o. ARDL1 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 02/02/15 Time: 14:20
Sample (adjusted): 2001M03 2014M06
Included observations: 160 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1767753.	33667501	-0.052506	0.9582
D_TRADE_BALANCE_GER(-1)	-0.510954	0.068704	-7.437007	0.0000
D_EXCHANGE_EU(-1)	11346.86	25644994	0.000442	0.9996

R-squared	0.261138	Mean dependent var	-1079794.
Adjusted R-squared	0.251726	S.D. dependent var	4.82E+08
S.E. of regression	4.17E+08	Akaike info criterion	42.55208
Sum squared resid	2.73E+19	Schwarz criterion	42.60974
Log likelihood	-3401.167	Hannan-Quinn criter.	42.57549
F-statistic	27.74443	Durbin-Watson stat	2.261325
Prob(F-statistic)	0.000000		

Figure 5o. ARDL1 model: Least Squares estimation

Serial correlation test + signification test ARDL 2 model (GER):

Sample: 2003M05 2014M01
Included observations: 129

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.142	-0.142	2.6605	0.103
		2	-0.171	-0.195	6.5343	0.038
		3	0.086	0.031	7.5178	0.057
		4	-0.120	-0.142	9.4562	0.051
		5	-0.049	-0.074	9.7875	0.081
		6	-0.030	-0.110	9.9146	0.128
		7	-0.137	-0.189	12.505	0.085
		8	-0.014	-0.128	12.532	0.129
		9	0.087	-0.025	13.589	0.138
		10	-0.077	-0.130	14.427	0.154
		11	0.103	0.027	15.958	0.143
		12	0.201	0.159	21.783	0.040
		13	-0.175	-0.111	26.234	0.016
		14	0.095	0.087	27.548	0.016
		15	0.121	0.122	29.716	0.013
		16	-0.243	-0.123	38.579	0.001
		17	0.023	0.007	38.661	0.002
		18	-0.077	-0.110	39.566	0.002
		19	-0.088	-0.058	40.756	0.003
		20	0.051	-0.068	41.163	0.004
		21	0.032	-0.005	41.319	0.005
		22	0.039	0.048	41.564	0.007
		23	0.001	-0.118	41.564	0.010
		24	-0.004	-0.073	41.567	0.014
		25	0.047	0.044	41.927	0.018
		26	0.016	-0.102	41.969	0.025
		27	0.024	0.057	42.062	0.032
		28	-0.075	0.012	42.993	0.035
		29	-0.024	-0.078	43.094	0.045
		30	-0.009	0.024	43.108	0.057
		31	-0.030	-0.012	43.262	0.071
		32	0.089	0.079	44.634	0.068
		33	-0.066	-0.058	45.401	0.074
		34	0.001	-0.035	45.402	0.091
		35	-0.119	-0.193	47.956	0.071
		36	0.156	0.057	52.351	0.038

Figure 4p. ARDL2 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 02/02/15 Time: 14:21
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

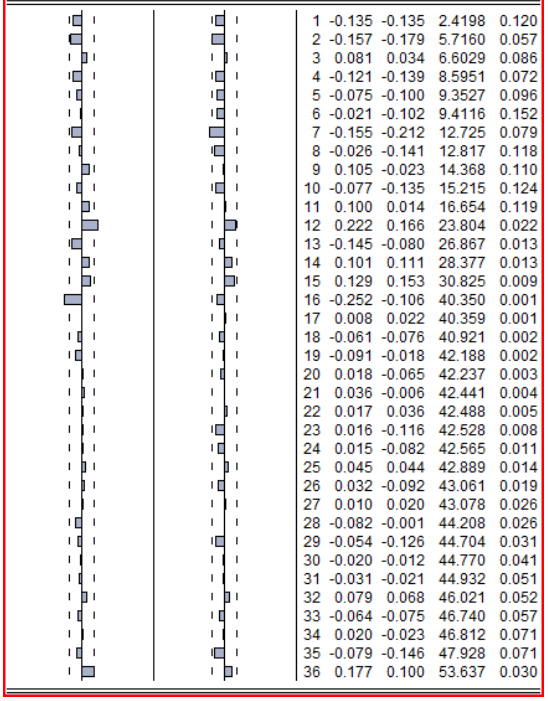
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10925530	39883271	0.273938	0.7846
D_TRADE_BALANCE_GER(-1)	-0.523434	0.076427	-6.848854	0.0000
D_EXCHANGE_EU(-1)	28633088	44073870	0.649661	0.5171
D_GDP_RUSSIA(-1)	-9.22E-13	1.00E-12	-0.920617	0.3590

R-squared	0.278857	Mean dependent var	10898302
Adjusted R-squared	0.261550	S.D. dependent var	5.24E+08
S.E. of regression	4.50E+08	Akaike info criterion	42.71916
Sum squared resid	2.53E+19	Schwarz criterion	42.80783
Log likelihood	-2751.386	Hannan-Quinn criter.	42.75519
F-statistic	16.11201	Durbin-Watson stat	2.255711
Prob(F-statistic)	0.000000		

Figure 5p. ARDL2 model: Least Squares estimation

Serial correlation test + signification test ARDL 3 model (GER):

Sample: 2003M05 2014M01
Included observations: 129



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.135	-0.135	2.4198	0.120
		2	-0.157	-0.179	5.7160	0.057
		3	0.081	0.034	6.6029	0.086
		4	-0.121	-0.139	8.5951	0.072
		5	-0.075	-0.100	9.3527	0.096
		6	-0.021	-0.102	9.4116	0.152
		7	-0.155	-0.212	12.725	0.079
		8	-0.026	-0.141	12.817	0.118
		9	0.105	-0.023	14.368	0.110
		10	-0.077	-0.135	15.215	0.124
		11	0.100	0.014	16.654	0.119
		12	0.222	0.166	23.804	0.022
		13	-0.145	-0.080	26.867	0.013
		14	0.101	0.111	28.377	0.013
		15	0.129	0.153	30.825	0.009
		16	-0.252	-0.106	40.350	0.001
		17	0.008	0.022	40.359	0.001
		18	-0.061	-0.076	40.921	0.002
		19	-0.091	-0.018	42.188	0.002
		20	0.018	-0.065	42.237	0.003
		21	0.036	-0.006	42.441	0.004
		22	0.017	0.036	42.488	0.005
		23	0.016	-0.116	42.528	0.008
		24	0.015	-0.082	42.565	0.011
		25	0.045	0.044	42.889	0.014
		26	0.032	-0.092	43.061	0.019
		27	0.010	0.020	43.078	0.026
		28	-0.082	-0.001	44.208	0.026
		29	-0.054	-0.126	44.704	0.031
		30	-0.020	-0.012	44.770	0.041
		31	-0.031	-0.021	44.932	0.051
		32	0.079	0.068	46.021	0.052
		33	-0.064	-0.075	46.740	0.057
		34	0.020	-0.023	46.812	0.071
		35	-0.079	-0.146	47.928	0.071
		36	0.177	0.100	53.637	0.030

Figure 4q. ARDL3 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 02/02/15 Time: 14:21
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

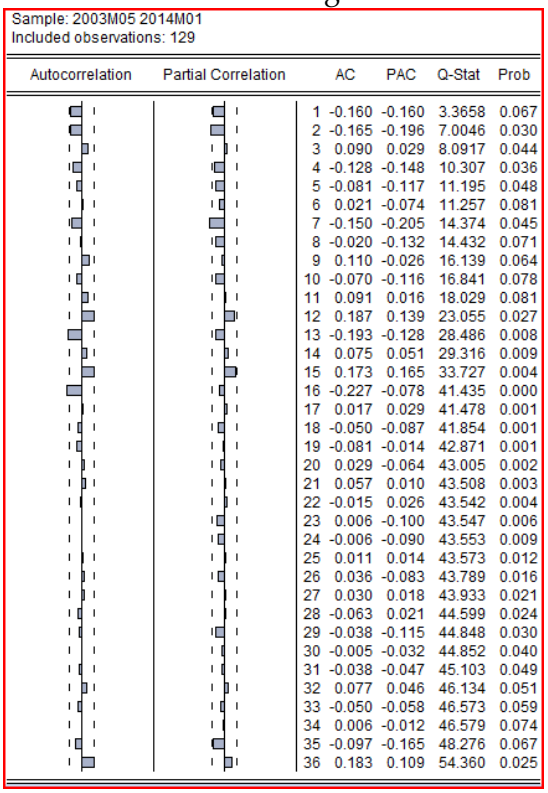
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6678211.	39607017	0.168612	0.8664
D_TRADE_BALANCE_GER(-1)	-0.545863	0.076789	-7.108562	0.0000
D_EXCHANGE_EU(-1)	14632095	44384244	0.329669	0.7422
D_GDP_RUSSIA(-1)	-7.24E-13	9.99E-13	-0.724625	0.4700
D_OIL_PRICE(-1)	11645577	6503917.	1.790548	0.0758

R-squared	0.297033	Mean dependent var	10898302
Adjusted R-squared	0.274356	S.D. dependent var	5.24E+08
S.E. of regression	4.46E+08	Akaike info criterion	42.70913
Sum squared resid	2.47E+19	Schwarz criterion	42.81998
Log likelihood	-2749.739	Hannan-Quinn criter.	42.75417
F-statistic	13.09879	Durbin-Watson stat	2.242222
Prob(F-statistic)	0.000000		

Figure 5q. ARDL3 model: Least Squares estimation

Serial correlation test + signification test ARDL 4 model (GER):

Sample: 2003M05 2014M01
Included observations: 129



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.160	-0.160	3.3658	0.067
		2	-0.165	-0.196	7.0046	0.030
		3	0.090	0.029	8.0917	0.044
		4	-0.128	-0.148	10.307	0.036
		5	-0.081	-0.117	11.195	0.048
		6	0.021	-0.074	11.257	0.081
		7	-0.150	-0.205	14.374	0.045
		8	-0.020	-0.132	14.432	0.071
		9	0.110	-0.026	16.139	0.064
		10	-0.070	-0.116	16.841	0.078
		11	0.091	0.016	18.029	0.081
		12	0.187	0.139	23.055	0.027
		13	-0.193	-0.128	28.486	0.008
		14	0.075	0.051	29.316	0.009
		15	0.173	0.165	33.727	0.004
		16	-0.227	-0.078	41.435	0.000
		17	0.017	0.029	41.478	0.001
		18	-0.050	-0.087	41.854	0.001
		19	-0.081	-0.014	42.871	0.001
		20	0.029	-0.064	43.005	0.002
		21	0.057	0.010	43.508	0.003
		22	-0.015	0.026	43.542	0.004
		23	0.006	-0.100	43.547	0.006
		24	-0.006	-0.090	43.553	0.009
		25	0.011	0.014	43.573	0.012
		26	0.036	-0.083	43.789	0.016
		27	0.030	0.018	43.933	0.021
		28	-0.063	0.021	44.599	0.024
		29	-0.038	-0.115	44.848	0.030
		30	-0.005	-0.032	44.852	0.040
		31	-0.038	-0.047	45.103	0.049
		32	0.077	0.046	46.134	0.051
		33	-0.050	-0.058	46.573	0.059
		34	0.006	-0.012	46.579	0.074
		35	-0.097	-0.165	48.276	0.067
		36	0.183	0.109	54.360	0.025

Figure 4r. ARDL4 model: error Correlogram

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 02/02/15 Time: 14:22
Sample (adjusted): 2003M05 2014M01
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7752278.	39360082	0.196958	0.8442
D_TRADE_BALANCE_GER(-1)	-0.550239	0.076348	-7.206983	0.0000
D_EXCHANGE_EU(-1)	11799300	44136221	0.267338	0.7897
D_GDP_RUSSIA(-1)	-9.19E-13	1.00E-12	-0.919574	0.3596
D_OIL_PRICE(-1)	21522090	8906572.	2.416428	0.0171
D_GAS_PRICE(-1)	-4.69E+08	2.91E+08	-1.611456	0.1096

R-squared	0.311567	Mean dependent var	10898302
Adjusted R-squared	0.283582	S.D. dependent var	5.24E+08
S.E. of regression	4.44E+08	Akaike info criterion	42.70374
Sum squared resid	2.42E+19	Schwarz criterion	42.83676
Log likelihood	-2748.392	Hannan-Quinn criter.	42.75779
F-statistic	11.13333	Durbin-Watson stat	2.291401
Prob(F-statistic)	0.000000		

Figure 5r. ARDL4 model: Least Squares estimation

Appendix E: Trade Balance Regressions

Dependent Variable: D_TRADE_BALANCE_US
Method: Least Squares
Date: 04/15/15 Time: 11:36
Sample (adjusted): 1992M03 2014M03
Included observations: 265 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	231789.3	16541064	0.014013	0.9888
D_TRADE_BALANCE_US(...	-0.459001	0.054354	-8.444593	0.0000
D_OIL_PRICE(-1)	23821435	3729950.	6.386530	0.0000

R-squared	0.265308	Mean dependent var	5960000.
Adjusted R-squared	0.259700	S.D. dependent var	3.12E+08
S.E. of regression	2.69E+08	Akaike info criterion	41.66688
Sum squared resid	1.89E+19	Schwarz criterion	41.70740
Log likelihood	-5517.861	Hannan-Quinn criter.	41.68316
F-statistic	47.30600	Durbin-Watson stat	2.080960
Prob(F-statistic)	0.000000		

Figure 6.

Dependent Variable: D_TRADE_BALANCE_GER
Method: Least Squares
Date: 04/15/15 Time: 11:37
Sample (adjusted): 2001M03 2014M10
Included observations: 164 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5360566.	32391883	-0.165491	0.8688
D_TRADE_BALANCE_GER(-1)	-0.528307	0.067572	-7.818380	0.0000
D_OIL_PRICE(-1)	10250859	5764178.	1.778373	0.0772

R-squared	0.277091	Mean dependent var	-621042.7
Adjusted R-squared	0.268111	S.D. dependent var	4.84E+08
S.E. of regression	4.14E+08	Akaike info criterion	42.53786
Sum squared resid	2.76E+19	Schwarz criterion	42.59457
Log likelihood	-3485.105	Hannan-Quinn criter.	42.56088
F-statistic	30.85567	Durbin-Watson stat	2.265498
Prob(F-statistic)	0.000000		

Figure 7.

Appendix F: Out of Sample Forecasts Models

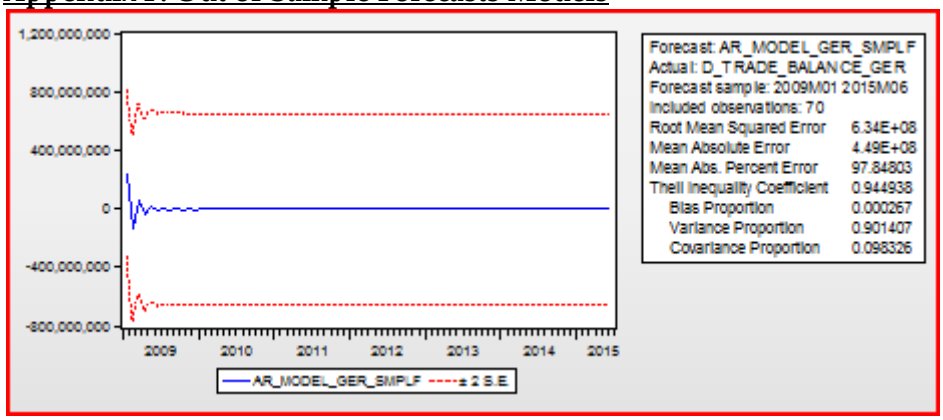


Figure 8a. Out of sample Forecast output "ar_model_ger" .

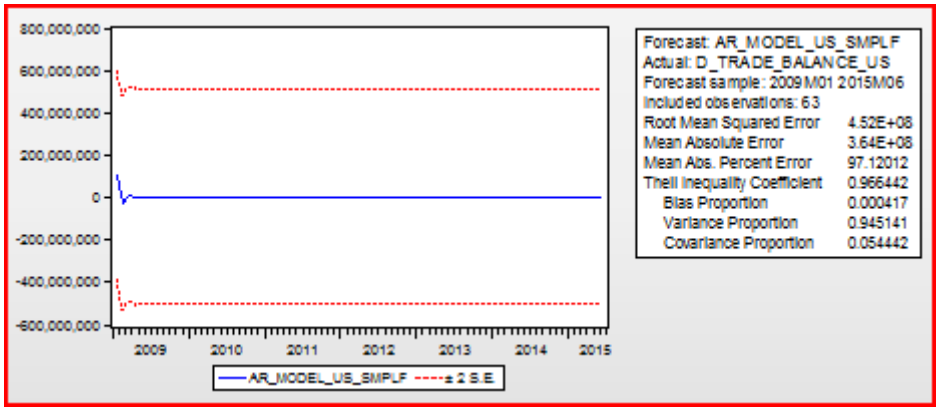


Figure 8b. Out of sample Forecast output "ar_model_us" .

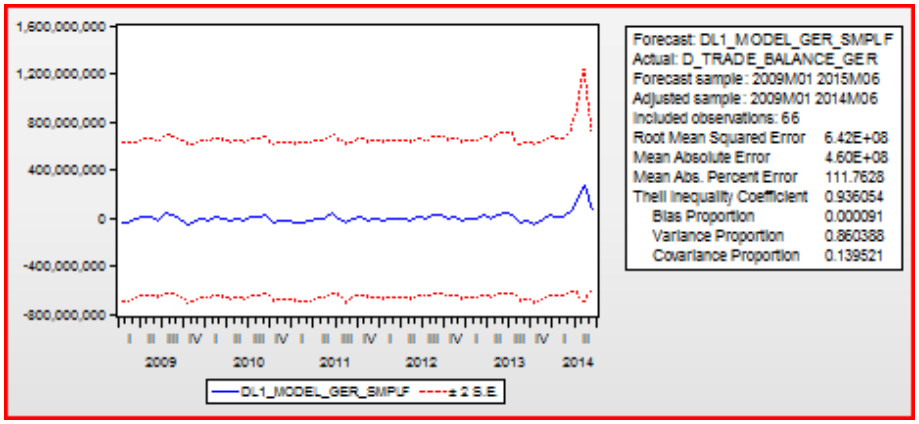


Figure 8c. Out of sample Forecast output "dl1_model_ger" .

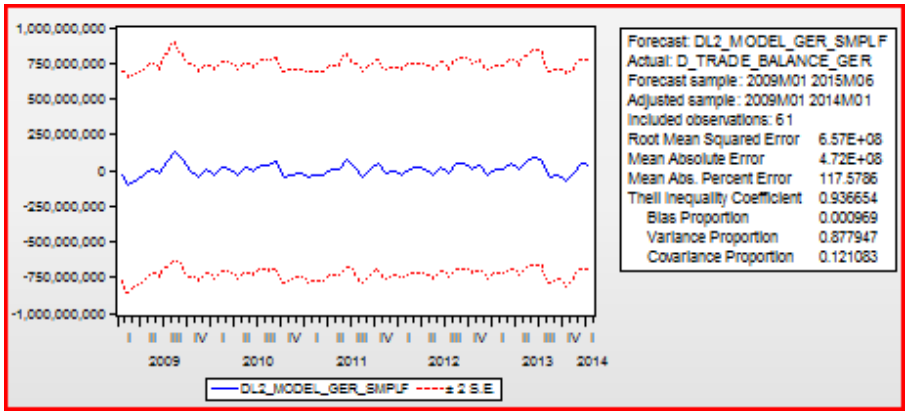


Figure 8d. Out of sample Forecast output "dl2_model_ger" .

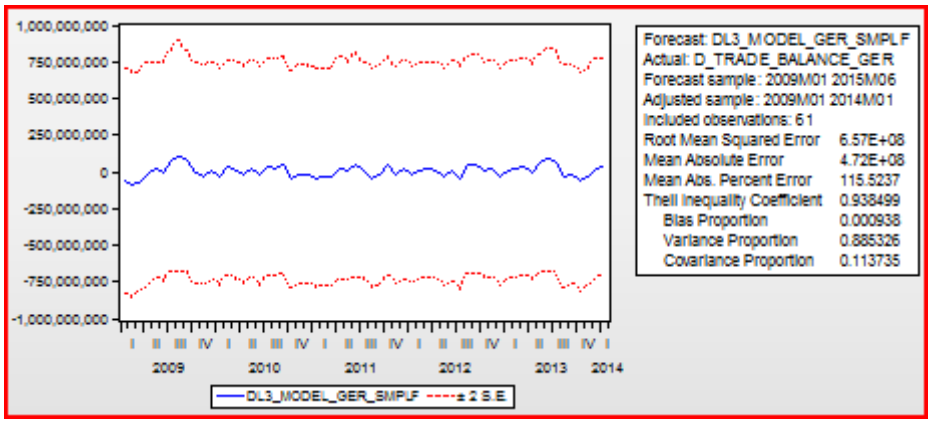


Figure 8e. Out of sample Forecast output "dl3_model_ger" .

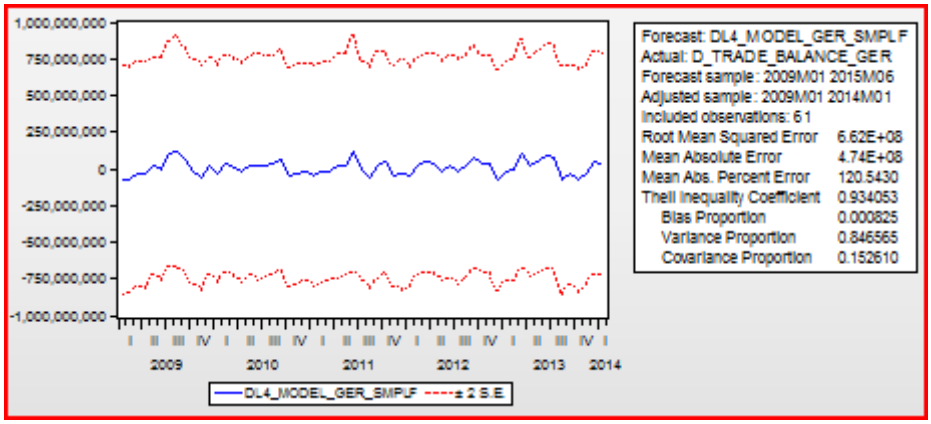


Figure 8f. Out of sample Forecast output "dl4_model_ger" .

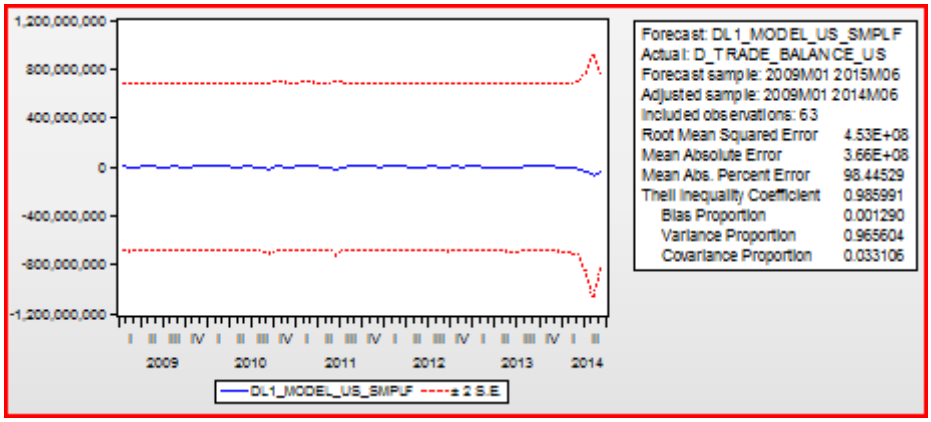


Figure 8g. Out of sample Forecast output "dl1_model_us" .

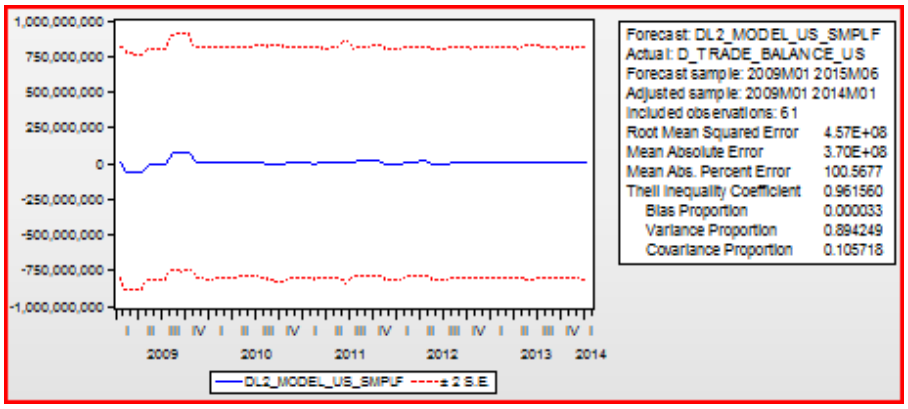


Figure 8h. Out of sample Forecast output "dl2_model_us" .

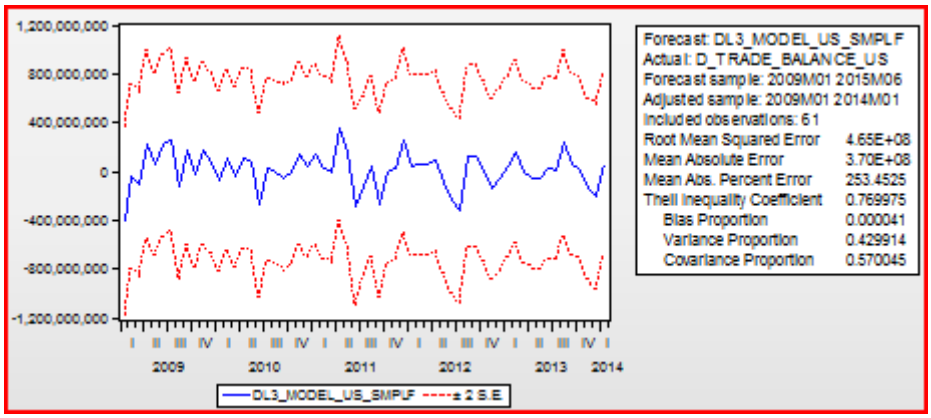


Figure 8i. Out of sample Forecast output "dl3_model_us" .

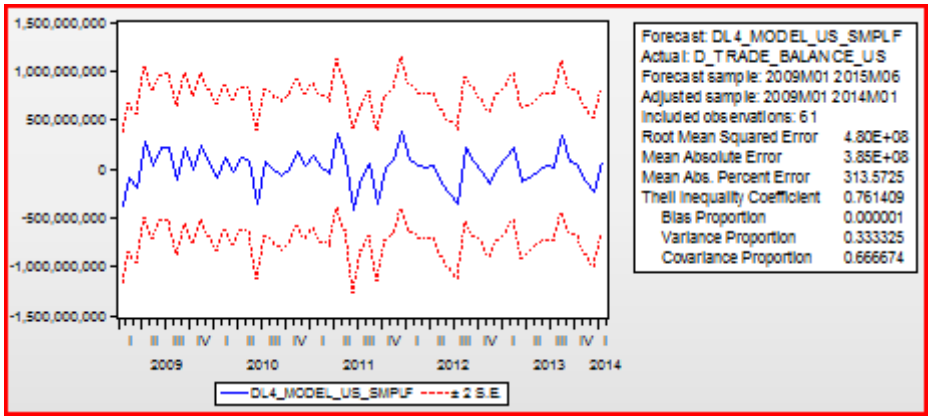


Figure 8j. Out of sample Forecast output "dl4_model_us" .

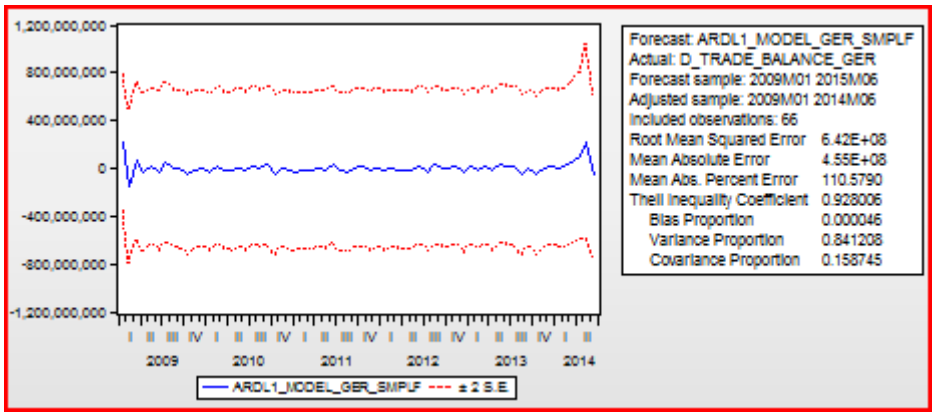


Figure 8k. Out of sample Forecast output "ardl1_model_ger" .

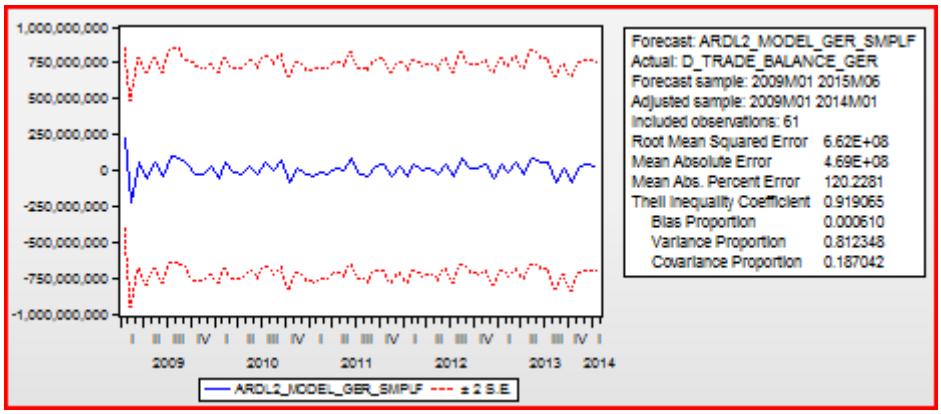


Figure 8l. Out of sample Forecast output "ardl2_model_ger" .

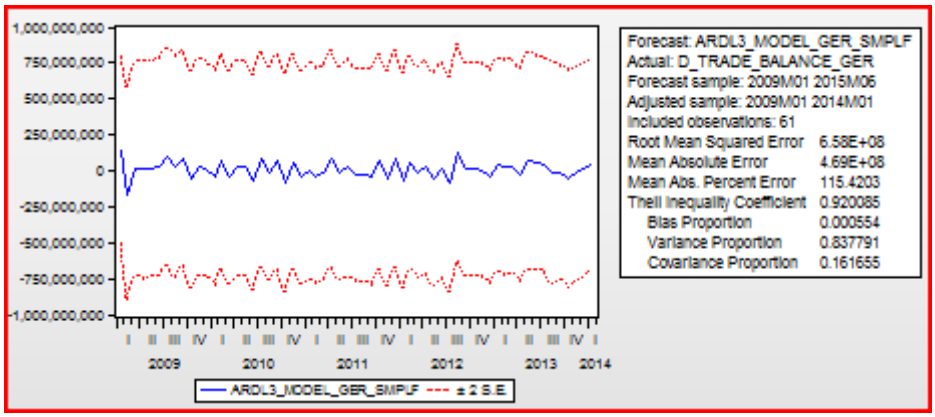


Figure 8m. Out of sample Forecast output "ardl3_model_ger" .

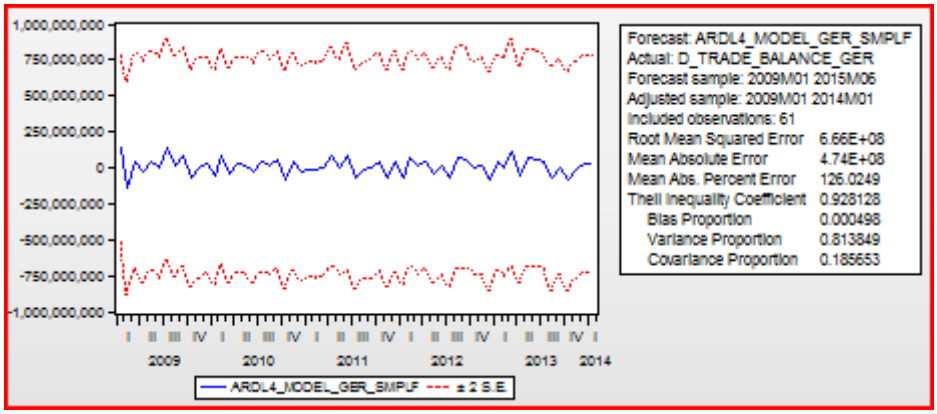


Figure 8n. Out of sample Forecast output "ardl4_model_ger" .

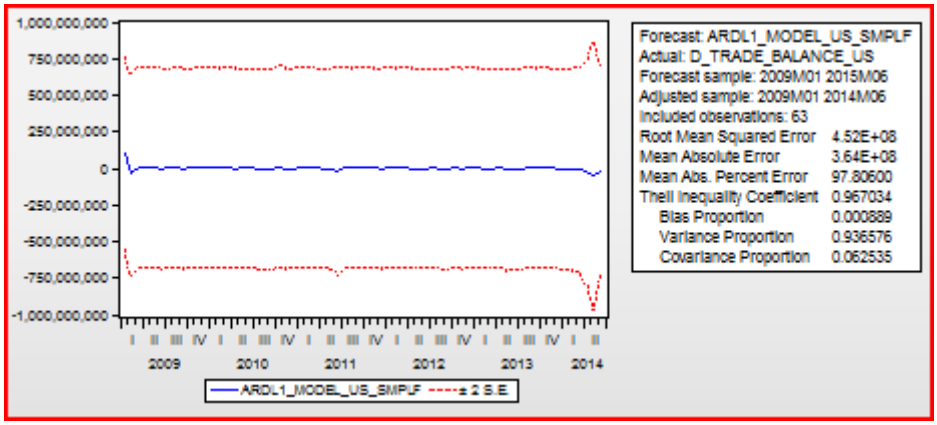


Figure 8o. Out of sample Forecast output "ardl1_model_us" .

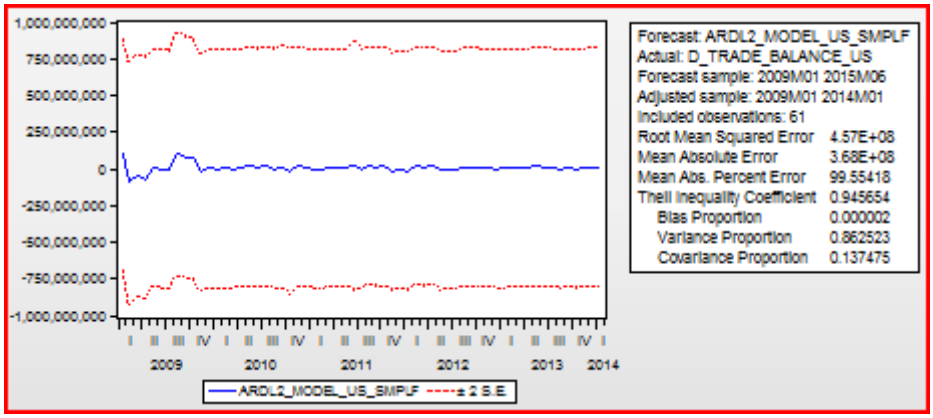


Figure 8p. Out of sample Forecast output "ardl2_model_us" .

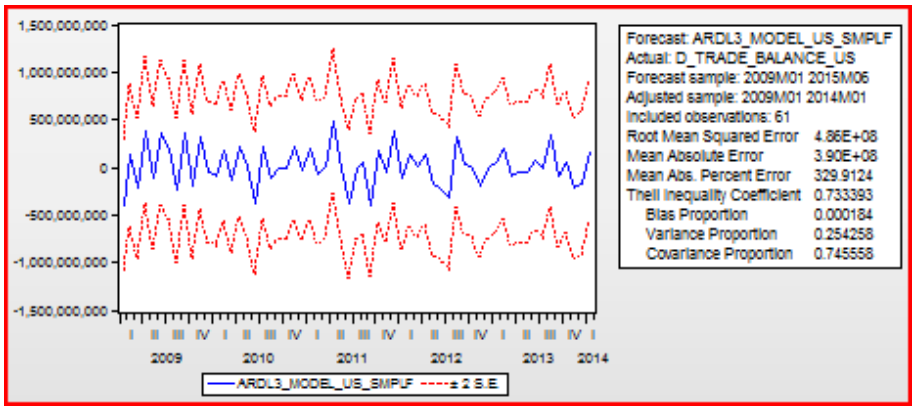


Figure 8q. Out of sample Forecast output "ardl3_model_us" .

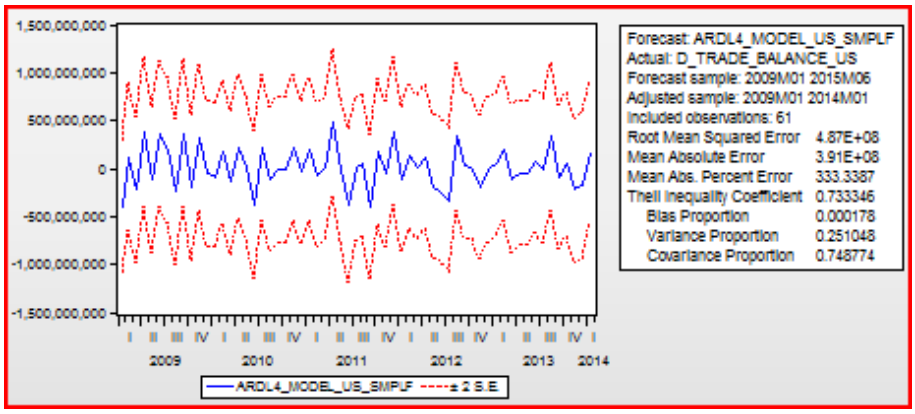


Figure 8r. Out of sample Forecast output "ardl4_model_us" .

Appendix G: Seemingly Unrelated Regression (SUR)

Sample: 2003M04 2013M12
Included observations: 129
Total system (balanced) observations 258
Linear estimation after one-step weighting matrix

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	20335146	58442279	0.347953	0.7282
C(2)	-6.65E-07	1.05E-06	-0.634790	0.5262
C(3)	-1.47E-13	9.05E-13	-0.162735	0.8709
C(4)	-4047868.	44147656	-0.091689	0.9270
C(5)	1182997.	7958745.	0.148641	0.8820
C(6)	6.88E+08	2.65E+08	2.596606	0.0100
C(7)	4227128.	45369818	0.093170	0.9258
C(8)	3.50E-05	5.79E-05	0.605172	0.5456
C(9)	5.88E-15	1.16E-12	0.005079	0.9960
C(10)	-53367438	52004680	-1.026205	0.3058
C(11)	17036104	10190562	1.671753	0.0958
C(12)	-1.55E+08	3.37E+08	-0.460407	0.6456

Determinant residual covariance 4.15E+34

Equation: D_TRADE_BALANCE_US = C(1)+C(2)*D_GDP_US+C(3)
*D_GDP_RUSSIA+C(4)*D_EXCHANGE_US+C(5)*D_OIL_PRICE+C(6)
*D_GAS_PRICE
Observations: 129

R-squared	0.095161	Mean dependent var	-1003101.
Adjusted R-squared	0.058379	S.D. dependent var	4.22E+08
S.E. of regression	4.10E+08	Sum squared resid	2.07E+19
Durbin-Watson stat	2.875860		

Equation: D_TRADE_BALANCE_GER = C(7)+C(8)*D_GDP_GER+C(9)
*D_GDP_RUSSIA+C(10)*D_EXCHANGE_EU+C(11)*D_OIL_PRICE
+C(12)*D_GAS_PRICE
Observations: 129

R-squared	0.032673	Mean dependent var	5902155.
Adjusted R-squared	-0.006649	S.D. dependent var	5.22E+08
S.E. of regression	5.24E+08	Sum squared resid	3.37E+19
Durbin-Watson stat	3.086890		

	D_TRADE_BALANCE_US	D_TRADE_BALANCE_GER
D_TRADE_BALANCE_US	1.000000	0.094910
D_TRADE_BALANCE_GER	0.094910	1.000000

Figure 9. Seemingly Unrelated Regression (SUR).

Appendix H: Johansen Cointegration Tests

Included observations: 125 after adjustments
Trend assumption: Linear deterministic trend
Series: LGEXCHANGE_US LGGAS_PRICE LGGDP_RUSSIA LGGDP_US LGOIL_PRICE LGTRADE_BALANCE_US
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.257342	105.3894	95.75366	0.0092
At most 1	0.193440	68.19944	69.81889	0.0668
At most 2	0.177117	41.32739	47.85613	0.1785
At most 3	0.081539	16.95980	29.79707	0.6430
At most 4	0.049203	6.327795	15.49471	0.6568
At most 5	0.000167	0.020895	3.841466	0.8850

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.257342	37.18992	40.07757	0.1021
At most 1	0.193440	26.87205	33.87687	0.2702
At most 2	0.177117	24.36759	27.58434	0.1224
At most 3	0.081539	10.63200	21.13162	0.6839
At most 4	0.049203	6.306900	14.26460	0.5742
At most 5	0.000167	0.020895	3.841466	0.8850

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LGEXCHANG...	LGGAS_PRICE	LGGDP_RUS...	LGGDP_US	LGOIL_PRICE	LGTRADE_BALANCE_US
0.647098	-13.55189	0.765411	32.25658	-0.099524	1.723548
-9.485804	-4.314944	-1.308144	8.675469	4.631630	-4.302066
-4.078285	17.04533	-0.194626	2.791490	-14.22475	0.950924
-8.070312	-4.224592	-0.295808	4.300093	3.529241	1.091207
5.307424	-4.356604	-1.245007	-11.33125	2.271028	1.054334
-7.275141	-1.527528	-0.011648	-7.002420	-0.020792	1.565400

Unrestricted Adjustment Coefficients (alpha):

D(LGEXCHA...	0.001910	0.005489	0.004863	0.002822	-0.002514	-3.77E-05
D(LGGAS_PR...	0.016875	0.008311	-0.011661	0.000155	-0.001457	-1.79E-06
D(LGGDP_R...	0.052808	0.116995	0.074808	-0.009304	0.082899	-0.003304
D(LGGDP_US)	0.000205	5.30E-05	0.000101	-6.92E-05	2.76E-05	1.23E-05
D(LGOIL_PRI...	0.027687	0.005010	-0.001604	-0.010386	-0.004453	-0.000123
D(LGTRADE_...	-0.086599	0.103619	-0.048662	-0.033706	-0.012290	0.000591

1 Cointegrating Equation(s): Log likelihood 1244.081

Normalized cointegrating coefficients (standard error in parentheses)

LGEXCHANG...	LGGAS_PRICE	LGGDP_RUS...	LGGDP_US	LGOIL_PRICE	LGTRADE_BALANCE_US
1.000000	-20.94256	1.182836	49.84804	-0.153800	2.663502
	(6.08025)	(0.50142)	(9.38673)	(4.09939)	(1.31830)

Adjustment coefficients (standard error in parentheses)

D(LGEXCHA...	0.001236
	(0.00150)
D(LGGAS_PR...	0.010920
	(0.00290)
D(LGGDP_R...	0.034172
	(0.03659)
D(LGGDP_US)	0.000133
	(7.0E-05)
D(LGOIL_PRI...	0.017916
	(0.00420)
D(LGTRADE_...	-0.056038
	(0.02153)

2 Cointegrating Equation(s): Log likelihood 1257.517

Normalized cointegrating coefficients (standard error in parentheses)

LGEXCHANG...	LGGAS_PRICE	LGGDP_RUS...	LGGDP_US	LGOIL_PRICE	LGTRADE_BALANCE_US
1.000000	0.000000	0.160119	0.164579	-0.481159	0.500508
		(0.04162)	(0.68439)	(0.20474)	(0.10944)
0.000000	1.000000	-0.048834	-2.372368	-0.015631	-0.103282
		(0.02351)	(0.38655)	(0.11564)	(0.06181)

Adjustment coefficients (standard error in parentheses)

D(LGEXCHA...	-0.050833	-0.049563
	(0.02146)	(0.03210)
D(LGGAS_PR...	-0.067912	-0.264551
	(0.04188)	(0.06265)
D(LGGDP_R...	-1.075618	-1.220470
	(0.52580)	(0.78651)
D(LGGDP_US)	-0.000370	-0.003004
	(0.00103)	(0.00154)
D(LGOIL_PRI...	-0.029606	-0.396825
	(0.06154)	(0.09206)
D(LGTRADE_...	-1.038947	0.726474
	(0.30047)	(0.44946)

3 Cointegrating Equation(s): Log likelihood 1269.701

Normalized cointegrating coefficients (standard error in parentheses)

LGEXCHANG...	LGGAS_PRICE	LGGDP_RUS...	LGGDP_US	LGOIL_PRICE	LGTRADE_BALANCE_US
1.000000	0.000000	0.000000	-5.281195	1.493763	-0.089045
			(1.02255)	(0.31904)	(0.16883)
0.000000	1.000000	0.000000	-0.711477	-0.617957	0.076524
			(0.26086)	(0.08139)	(0.04307)
0.000000	0.000000	1.000000	34.01071	-12.33406	3.681962
			(6.83589)	(2.13283)	(1.12865)

Adjustment coefficients (standard error in parentheses)

D(LGEXCHA...	-0.070668	0.033334	-0.006666
	(0.02280)	(0.04892)	(0.00337)
D(LGGAS_PR...	-0.020355	-0.463319	0.004315
	(0.04393)	(0.09427)	(0.00649)
D(LGGDP_R...	-1.380708	0.054665	-0.127186
	(0.56681)	(1.21626)	(0.08372)
D(LGGDP_US)	-0.000782	-0.001282	6.78E-05
	(0.00112)	(0.00240)	(0.00017)
D(LGOIL_PRI...	-0.023066	-0.424157	0.014950
	(0.06695)	(0.14365)	(0.00989)
D(LGTRADE_...	-0.840490	-0.102986	-0.192362
	(0.32301)	(0.69310)	(0.04771)

4 Cointegrating Equation(s): Log likelihood 1275.017

Normalized cointegrating coefficients (standard error in parentheses)

LGEXCHANG...	LGGAS_PRICE	LGGDP_RUS...	LGGDP_US	LGOIL_PRICE	LGTRADE_BALANCE_US
1.000000	0.000000	0.000000	0.000000	-0.081387	-0.390557
				(0.34385)	(0.25601)
0.000000	1.000000	0.000000	0.000000	-0.830160	0.035905
				(0.08061)	(0.06001)
0.000000	0.000000	1.000000	0.000000	-2.190147	5.623690
				(2.47717)	(1.84430)
0.000000	0.000000	0.000000	1.000000	-0.298256	-0.057092
				(0.07846)	(0.05841)

Adjustment coefficients (standard error in parentheses)

D(LGEXCHA...	-0.093441	0.021413	-0.007500	0.134927
	(0.02867)	(0.04938)	(0.00340)	(0.07385)
D(LGGAS_PR...	-0.021609	-0.463976	0.004269	0.584552
	(0.05572)	(0.09596)	(0.00661)	(0.14350)
D(LGGDP_R...	-1.305626	0.093968	-0.124434	2.887200
	(0.71877)	(1.23791)	(0.08526)	(1.85123)
D(LGGDP_US)	-0.000224	-0.000990	8.83E-05	0.007051
	(0.00141)	(0.00244)	(0.00017)	(0.00364)
D(LGOIL_PRI...	0.060750	-0.380281	0.018022	0.887405
	(0.08379)	(0.14431)	(0.00994)	(0.21581)
D(LGTRADE_...	-0.568469	0.039409	-0.182391	-2.175233
	(0.40724)	(0.70138)	(0.04831)	(1.04887)

5 Cointegrating Equation(s): Log likelihood 1278.171

Normalized cointegrating coefficients (standard error in parentheses)

LGEXCHANG...	LGGAS_PRICE	LGGDP_RUS...	LGGDP_US	LGOIL_PRICE	LGTRADE_BALANCE_US
1.000000	0.000000	0.000000	0.000000	0.000000	-0.502299
					(0.15391)
0.000000	1.000000	0.000000	0.000000	0.000000	-1.103867
					(0.23346)
0.000000	0.000000	1.000000	0.000000	0.000000	2.616718
					(0.59973)
0.000000	0.000000	0.000000	1.000000	0.000000	-0.466584
					(0.10240)
0.000000	0.000000	0.000000	0.000000	1.000000	-1.372955
					(0.26896)

Adjustment coefficients (standard error in parentheses)

D(LGEXCHA...	-0.106786	0.032367	-0.004370	0.163418	-0.039697
	(0.03072)	(0.04995)	(0.00433)	(0.07736)	(0.03372)
D(LGGAS_PR...	-0.029344	-0.457627	0.006083	0.601066	0.199928
	(0.06006)	(0.09766)	(0.00846)	(0.15126)	(0.06594)
D(LGGDP_R...	-0.865646	-0.267189	-0.227644	1.947852	-0.372079
	(0.76632)	(1.24603)	(0.10791)	(1.92981)	(0.84125)
D(LGGDP_US)	-7.71E-05	-0.001110	5.39E-05	0.006739	-0.001394
	(0.00153)	(0.00248)	(0.00021)	(0.00384)	(0.00167)
D(LGOIL_PRI...	0.037116	-0.360881	0.023567	0.937864	-0.003509
	(0.09017)	(0.14661)	(0.01270)	(0.22706)	(0.09898)
D(LGTRADE_...	-0.633699	0.092954	-0.167089	-2.035967	1.033879
	(0.43895)	(0.71372)	(0.06181)	(1.10539)	(0.48186)

Figure 10. Johansen Cointegration Test (USA)

Included observations: 58 after adjustments
Trend assumption: Linear deterministic trend
Series: LGTRADE_BALANCE_GER LGOIL_PRICE LGGDP_RUSSIA LGGDP_GER LGGAS_PRICE LGEXCHANGE...
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.515326	90.15444	95.75366	0.1141
At most 1	0.339031	48.14622	69.81889	0.7159
At most 2	0.228600	24.13141	47.85613	0.9397
At most 3	0.102226	9.077622	29.79707	0.9908
At most 4	0.034634	2.823096	15.49471	0.9743
At most 5	0.013336	0.778688	3.841466	0.3775

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.515326	42.00821	40.07757	0.0299
At most 1	0.339031	24.01481	33.87687	0.4545
At most 2	0.228600	15.05379	27.58434	0.7440
At most 3	0.102226	6.254525	21.13162	0.9773
At most 4	0.034634	2.044408	14.26460	0.9897
At most 5	0.013336	0.778688	3.841466	0.3775

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LGTRADE_B...	LGOIL_PRICE	LGGDP_RUS...	LGGDP_GER	LGGAS_PRICE	LGEXCHANGE_EU
3.710037	5.855215	0.764568	-2.909424	-18.25634	10.75913
-2.783532	23.33017	0.873394	-1.368770	-26.82014	-4.579011
1.576644	-16.53357	0.617646	-2.465332	12.56930	14.69415
-1.654085	7.761445	0.511587	-3.704945	-3.585468	-18.23666
3.050074	-19.98472	1.668670	3.063229	25.38408	17.45325
0.705919	8.014289	0.157688	-3.212872	-10.99466	4.279648

Unrestricted Adjustment Coefficients (alpha):

D(LGTRADE_...	-0.094716	0.224423	-0.108306	0.071054	-0.013261	-0.008353
D(LGOIL_PRI...	0.000125	0.020457	0.012078	-0.004133	-0.003313	0.001404
D(LGGDP_R...	-0.043390	-0.046634	0.085428	0.067513	-0.044483	0.018960
D(LGGDP_G...	0.050018	0.009100	0.021783	0.021970	0.025226	0.009827
D(LGGAS_PR...	0.015642	0.004366	0.000292	-0.002983	-0.005002	0.000696
D(LGEXCHA...	-0.002504	-0.003014	-0.000663	-0.000377	0.000395	0.001128

1 Cointegrating Equation(s): Log likelihood 361.2296

Normalized cointegrating coefficients (standard error in parentheses)

LGTRADE_B...	LGOIL_PRICE	LGGDP_RUS...	LGGDP_GER	LGGAS_PRICE	LGEXCHANGE_EU
1.000000	1.578209	0.206081	-0.784203	-4.920798	2.900006
	(1.35428)	(0.09126)	(0.32577)	(1.90642)	(0.78368)

Adjustment coefficients (standard error in parentheses)

D(LGTRADE_...	-0.351400
	(0.33953)
D(LGOIL_PRI...	0.000464
	(0.03282)
D(LGGDP_R...	-0.160978
	(0.26945)
D(LGGDP_G...	0.185567
	(0.12272)
D(LGGAS_PR...	0.058032
	(0.02207)
D(LGEXCHA...	-0.009290
	(0.00765)

2 Cointegrating Equation(s): Log likelihood 373.2370

Normalized cointegrating coefficients (standard error in parentheses)

LGTRADE_B...	LGOIL_PRICE	LGGDP_RUS...	LGGDP_GER	LGGAS_PRICE	LGEXCHANGE_EU
1.000000	0.000000	0.123705	-0.582018	-2.614250	2.701145
		(0.08085)	(0.24202)	(0.37977)	(0.67584)
0.000000	1.000000	0.052196	-0.128110	-1.461497	0.126005
		(0.01963)	(0.05876)	(0.09221)	(0.16410)

Adjustment coefficients (standard error in parentheses)

D(LGTRADE_...	-0.976090	4.681254
	(0.38251)	(1.98370)
D(LGOIL_PRI...	-0.056480	0.478006
	(0.03745)	(0.19420)
D(LGGDP_R...	-0.031172	-1.342027
	(0.33467)	(1.73564)
D(LGGDP_G...	0.160237	0.505166
	(0.15323)	(0.79467)
D(LGGAS_PR...	0.045878	0.193449
	(0.02736)	(0.14189)
D(LGEXCHA...	-0.000899	-0.084991
	(0.00924)	(0.04789)

3 Cointegrating Equation(s): Log likelihood 380.7639

Normalized cointegrating coefficients (standard error in parentheses)

LGTRADE_B...	LGOIL_PRICE	LGGDP_RUS...	LGGDP_GER	LGGAS_PRICE	LGEXCHANGE_EU
1.000000	0.000000	0.000000	-0.229275	-1.895187	1.496532
			(0.33311)	(0.51259)	(0.89553)
0.000000	1.000000	0.000000	0.020724	-1.158100	-0.382263
			(0.08082)	(0.12437)	(0.21728)
0.000000	0.000000	1.000000	-2.851477	-5.812696	9.737753
			(1.65430)	(2.54562)	(4.44735)

Adjustment coefficients (standard error in parentheses)

D(LGTRADE_...	-1.146850	6.471938	0.056698
	(0.39296)	(2.34136)	(0.10547)
D(LGOIL_PRI...	-0.037436	0.278307	0.025423
	(0.03814)	(0.22726)	(0.01024)
D(LGGDP_R...	0.103518	-2.754465	-0.021140
	(0.34565)	(2.05947)	(0.09278)
D(LGGDP_G...	0.194581	0.145016	0.059644
	(0.16074)	(0.95772)	(0.04314)
D(LGGAS_PR...	0.046338	0.188628	0.015953
	(0.02890)	(0.17217)	(0.00776)
D(LGEXCHA...	-0.001944	-0.074035	-0.004957
	(0.00974)	(0.05802)	(0.00261)

4 Cointegrating Equation(s): Log likelihood 383.8911

Normalized cointegrating coefficients (standard error in parentheses)

LGTRADE_B...	LGOIL_PRICE	LGGDP_RUS...	LGGDP_GER	LGGAS_PRICE	LGEXCHANGE_EU
1.000000	0.000000	0.000000	0.000000	-2.326538	2.959288
				(0.51594)	(0.96963)
0.000000	1.000000	0.000000	0.000000	-1.119110	-0.514481
				(0.12045)	(0.22637)
0.000000	0.000000	1.000000	0.000000	-11.17737	27.92993
				(5.52678)	(10.3867)
0.000000	0.000000	0.000000	1.000000	-1.881365	6.379914
				(1.58138)	(2.97193)

Adjustment coefficients (standard error in parentheses)

D(LGTRADE_...	-1.264380	7.023421	0.093049	-0.027857
	(0.40964)	(2.39283)	(0.11178)	(0.43497)
D(LGOIL_PRI...	-0.030601	0.246232	0.023309	-0.042832
	(0.04008)	(0.23412)	(0.01094)	(0.04256)
D(LGGDP_R...	-0.008153	-2.230470	0.013399	-0.270670
	(0.35957)	(2.10033)	(0.09812)	(0.38180)
D(LGGDP_G...	0.158240	0.315537	0.070883	-0.293079
	(0.16846)	(0.98404)	(0.04597)	(0.17888)
D(LGGAS_PR...	0.051273	0.165473	0.014426	-0.041150
	(0.03038)	(0.17744)	(0.00829)	(0.03226)
D(LGEXCHA...	-0.001321	-0.076958	-0.005149	0.014441
	(0.01027)	(0.06000)	(0.00280)	(0.01091)

5 Cointegrating Equation(s): Log likelihood 384.9133

Normalized cointegrating coefficients (standard error in parentheses)

LGTRADE_B...	LGOIL_PRICE	LGGDP_RUS...	LGGDP_GER	LGGAS_PRICE	LGEXCHANGE_EU
1.000000	0.000000	0.000000	0.000000	0.000000	-1.622677
					(1.46119)
0.000000	1.000000	0.000000	0.000000	0.000000	-2.718496
					(0.82248)
0.000000	0.000000	1.000000	0.000000	0.000000	5.916836
					(3.37076)
0.000000	0.000000	0.000000	1.000000	0.000000	2.674687
					(1.16824)
0.000000	0.000000	0.000000	0.000000	1.000000	-1.969435
					(0.64967)

Adjustment coefficients (standard error in parentheses)

D(LGTRADE_...	-1.304826	7.288436	0.070921	-0.068478	-6.242605
	(0.47540)	(2.86799)	(0.17305)	(0.49788)	(3.42254)
D(LGOIL_PRI...	-0.040705	0.312439	0.017781	-0.052980	-0.468413
	(0.04640)	(0.27993)	(0.01689)	(0.04860)	(0.33406)
D(LGGDP_R...	-0.143830	-1.341489	-0.060828	-0.406931	1.745413
	(0.41479)	(2.50236)	(0.15099)	(0.43441)	(2.98621)
D(LGGDP_G...	0.235182	-0.188599	0.112977	-0.215805	-0.321834
	(0.19375)	(1.16886)	(0.07053)	(0.20291)	(1.39486)
D(LGGAS_PR...	0.036016	0.265440	0.006079	-0.056473	-0.515277
	(0.03487)	(0.21035)	(0.01269)	(0.03652)	(0.25102)
D(LGEXCHA...	-0.000117	-0.084848	-0.004491	0.015650	0.129608
	(0.01192)	(0.07190)	(0.00434)	(0.01248)	(0.08580)

Figure 11. Johansen Cointegration Test (Germany)

Appendix I: Vector Error Correction Estimates

Sample (adjusted): 2003M06 2013M12
Included observations: 127 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
LGTRADE_BALANCE_...	1.000000	0.000000
LGEXCHANGE_US(-1)	0.000000	1.000000
LGGAS_PRICE(-1)	22.00670	-10.84969
	(4.46757)	(2.22708)
	[4.92588]	[-4.87172]
LGGDP_RUSSIA(-1)	-0.184948	0.288070
	(0.34373)	(0.17135)
	[-0.53805]	[1.68116]
LGGDP_US(-1)	-15.63998	8.331733
	(6.70800)	(3.34393)
	[-2.33154]	[2.49160]
LGOIL_PRICE(-1)	-13.25614	5.950597
	(2.94856)	(1.46985)
	[-4.49581]	[4.04843]
C	603.9503	-341.0487

Error Correction:	D(LGTRADE...	D(LGEXCHA...	D(LGGAS_P...	D(LGGDP_...	D(LGGDP_US)	D(LGOIL_P...
CointEq1	-0.549950	-0.005597	-0.011557	-0.600151	-0.000159	0.039080
	(0.10809)	(0.00663)	(0.01388)	(0.16871)	(0.00035)	(0.02164)
	[-5.08804]	[-0.84473]	[-0.83244]	[-3.55726]	[-0.45215]	[1.80618]
CointEq2	-1.104187	-0.017408	0.004983	-1.237587	-0.000457	0.091681
	(0.21334)	(0.01308)	(0.02740)	(0.33300)	(0.00070)	(0.04271)
	[-5.17570]	[-1.33117]	[0.18185]	[-3.71647]	[-0.65712]	[2.14676]
D(LGTRADE_BALANCE...	-0.314543	0.003888	0.007052	0.503423	-2.37E-05	-0.051222
	(0.10844)	(0.00665)	(0.01393)	(0.16927)	(0.00035)	(0.02171)
	[-2.90053]	[0.58488]	[0.50624]	[2.97412]	[-0.06711]	[-2.35958]
D(LGTRADE_BALANCE...	-0.043125	0.007656	0.013763	0.214861	8.33E-06	-0.036103
	(0.08795)	(0.00539)	(0.01130)	(0.13728)	(0.00029)	(0.01761)
	[-0.49035]	[1.42018]	[1.21832]	[1.56517]	[0.02902]	[-2.05068]
D(LGEXCHANGE_US(-1))	-0.550748	0.434156	-0.032932	2.175605	0.000574	0.023959
	(1.50531)	(0.09227)	(0.19335)	(2.34961)	(0.00491)	(0.30133)
	[-0.36587]	[4.70521]	[-0.17032]	[0.92594]	[0.11693]	[0.07951]
D(LGEXCHANGE_US(-2))	1.811917	-0.183194	-0.051572	3.658347	0.000221	-0.052569
	(1.51515)	(0.09287)	(0.19462)	(2.36499)	(0.00494)	(0.30330)
	[1.19586]	[-1.97248]	[-0.26499]	[1.54688]	[0.04471]	[-0.17332]
D(LGGAS_PRICE(-1))	0.856399	-0.066263	0.439704	-2.464487	-0.003956	0.069673
	(0.85450)	(0.05238)	(0.10976)	(1.33377)	(0.00279)	(0.17105)
	[1.00223]	[-1.26508]	[4.00611]	[-1.84776]	[-1.41892]	[0.40732]
D(LGGAS_PRICE(-2))	-0.999308	-0.033245	-0.106864	0.655918	-0.004824	0.059801
	(0.87887)	(0.05387)	(0.11289)	(1.37182)	(0.00287)	(0.17593)
	[-1.13703]	[-0.61710]	[-0.94663]	[0.47814]	[-1.68227]	[0.33991]
D(LGGDP_RUSSIA(-1))	0.124807	0.003041	-0.002786	0.008240	-4.34E-06	-0.005246
	(0.06101)	(0.00374)	(0.00784)	(0.09523)	(0.00020)	(0.01221)
	[2.04573]	[0.81315]	[-0.35552]	[0.08653]	[-0.02178]	[-0.42955]

D(LGGDP_RUSSIA(-2))	0.080271	-0.000471	-0.001407	-0.005535	6.44E-05	-0.009741
	(0.05960)	(0.00365)	(0.00766)	(0.09304)	(0.00019)	(0.01193)
	[1.34672]	[-0.12891]	[-0.18384]	[-0.05950]	[0.33102]	[-0.81643]
D(LGGDP_US(-1))	-6.054411	3.253071	15.90472	-31.97140	0.835794	16.30888
	(30.0064)	(1.83931)	(3.85426)	(46.8366)	(0.09791)	(6.00669)
	[-0.20177]	[1.76863]	[4.12653]	[-0.68262]	[8.53655]	[2.71512]
D(LGGDP_US(-2))	-36.58325	-4.454984	-12.08808	-4.510134	-0.021300	-11.25962
	(29.4824)	(1.80719)	(3.78696)	(46.0187)	(0.09620)	(5.90180)
	[-1.24085]	[-2.46514]	[-3.19203]	[-0.09801]	[-0.22141]	[-1.90783]
D(LGOIL_PRICE(-1))	1.431574	0.012065	0.071483	1.632673	0.005365	0.127041
	(0.66081)	(0.04051)	(0.08488)	(1.03144)	(0.00216)	(0.13228)
	[2.16641]	[0.29786]	[0.84217]	[1.58290]	[2.48828]	[0.96039]
D(LGOIL_PRICE(-2))	1.508229	0.029604	-0.029768	-0.992084	0.004032	0.103235
	(0.67851)	(0.04159)	(0.08715)	(1.05908)	(0.00221)	(0.13582)
	[2.22285]	[0.71179]	[-0.34156]	[-0.93674]	[1.82124]	[0.76006]
C	0.113650	0.005365	-0.008492	0.102713	0.000556	-0.008717
	(0.06546)	(0.00401)	(0.00841)	(0.10218)	(0.00021)	(0.01310)
	[1.73608]	[1.33702]	[-1.00985]	[1.00519]	[2.60466]	[-0.66517]
R-squared	0.517974	0.252080	0.516229	0.196386	0.776732	0.206674
Adj. R-squared	0.457720	0.158590	0.455757	0.095934	0.748823	0.107509
Sum sq. resids	18.35140	0.068953	0.302778	44.71081	0.000195	0.735381
S.E. equation	0.404786	0.024812	0.051994	0.631826	0.001321	0.081030
F-statistic	8.596602	2.696334	8.536743	1.955030	27.83136	2.084131
Log likelihood	-57.36564	297.2206	203.2677	-113.9130	669.7272	146.9185
Akaike AIC	1.139616	-4.444420	-2.964846	2.030126	-10.31066	-2.077457
Schwarz SC	1.475544	-4.108492	-2.628918	2.366053	-9.974736	-1.741529
Mean dependent	-0.000609	0.001792	0.006167	-0.005161	0.003236	0.009804
S.D. dependent	0.549685	0.027050	0.070479	0.664504	0.002635	0.085772

Determinant resid covariance (dof adj.)	4.90E-16
Determinant resid covariance	2.30E-16
Log likelihood	1205.174
Akaike information criterion	-17.37282
Schwarz criterion	-15.08851

Figure 12. Vector Error Correction Estimates (USA)

Sample (adjusted): 2003M06 2013M12
Included observations: 74 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
LGTRADE_BALANCE_...	1.000000	0.000000
LGEXCHANGE_EU(-1)	0.000000	1.000000
LGOIL_PRICE(-1)	16.46267	-3.607673
	(4.48255)	(0.69909)
	[3.67261]	[-5.16051]
LGGDP_RUSSIA(-1)	0.860466	-0.111590
	(0.38754)	(0.06044)
	[2.22033]	[-1.84628]
LGGDP_GER(-1)	-6.560544	1.117920
	(0.91478)	(0.14267)
	[-7.17168]	[7.83579]
LGGAS_PRICE(-1)	-28.77134	5.478235
	(6.39259)	(0.99698)
	[-4.50073]	[5.49483]
C	90.58954	-21.22034

Error Correction:	D(LGTRADE...	D(LGEXCHA...	D(LGOIL_P...	D(LGGDP_...	D(LGGDP_...	D(LGGAS_P...
CointEq1	-0.630306	0.008540	0.089861	-0.128705	-0.090063	0.035339
	(0.25331)	(0.00510)	(0.02826)	(0.16874)	(0.12067)	(0.02117)
	[-2.48826]	[1.67601]	[3.17935]	[-0.76276]	[-0.74635]	[1.66965]
CointEq2	-3.846402	0.045172	0.491027	-0.437551	-1.282529	0.159550
	(1.54359)	(0.03105)	(0.17223)	(1.02822)	(0.73533)	(0.12897)
	[-2.49185]	[1.45483]	[2.85097]	[-0.42554]	[-1.74414]	[1.23706]
D(LGTRADE_BALANCE...	-0.290451	-0.007139	-0.055127	0.126202	-0.015068	-0.029605
	(0.21154)	(0.00426)	(0.02360)	(0.14091)	(0.10077)	(0.01768)
	[-1.37304]	[-1.67767]	[-2.33556]	[0.89562]	[-0.14952]	[-1.67494]
D(LGTRADE_BALANCE...	0.023796	-0.002310	-0.001235	0.115040	-0.038614	-0.006758
	(0.13314)	(0.00268)	(0.01486)	(0.08869)	(0.06343)	(0.01112)
	[0.17872]	[-0.86258]	[-0.08314]	[1.29712]	[-0.60882]	[-0.60752]
D(LGEXCHANGE_EU(-1))	-1.577548	0.287604	-0.478894	6.805354	-1.492874	-0.362135
	(7.38217)	(0.14849)	(0.82369)	(4.91744)	(3.51671)	(0.61682)
	[-0.21370]	[1.93682]	[-0.58140]	[1.38392]	[-0.42451]	[-0.58710]
D(LGEXCHANGE_EU(-2))	5.837226	-0.154809	1.397028	-6.309210	4.144796	0.822974
	(6.22158)	(0.12515)	(0.69419)	(4.14435)	(2.96383)	(0.51984)
	[0.93822]	[-1.23701]	[2.01245]	[-1.52237]	[1.39846]	[1.58312]
D(LGOIL_PRICE(-1))	0.720245	0.035747	0.380125	0.559815	-1.899145	0.288142
	(1.77035)	(0.03561)	(0.19753)	(1.17927)	(0.84336)	(0.14792)
	[0.40684]	[1.00383]	[1.92437]	[0.47471]	[-2.25189]	[1.94794]
D(LGOIL_PRICE(-2))	3.021488	0.002070	0.261487	-0.621501	-1.919321	0.131008
	(1.64850)	(0.03316)	(0.18394)	(1.09811)	(0.78531)	(0.13774)
	[1.83287]	[0.06244]	[1.42161]	[-0.56597]	[-2.44403]	[0.95112]
D(LGGDP_RUSSIA(-1))	-0.200157	0.009621	-0.019090	0.041662	-0.057590	-0.013542
	(0.18874)	(0.00380)	(0.02106)	(0.12572)	(0.08991)	(0.01577)
	[-1.06052]	[2.53413]	[-0.90650]	[0.33139]	[-0.64054]	[-0.85873]

D(LGGDP_RUSSIA(-2))	0.160047	-0.003942	0.011141	-0.079647	-0.201158	-0.000707
	(0.15535)	(0.00312)	(0.01733)	(0.10348)	(0.07400)	(0.01298)
	[1.03026]	[-1.26139]	[0.64275]	[-0.76969]	[-2.71822]	[-0.05444]
D(LGGDP_GER(-1))	0.281699	0.009542	0.069910	-0.339875	0.330696	0.051333
	(0.26190)	(0.00527)	(0.02922)	(0.17446)	(0.12476)	(0.02188)
	[1.07559]	[1.81131]	[2.39233]	[-1.94816]	[2.65057]	[2.34576]
D(LGGDP_GER(-2))	0.773686	0.002116	0.058969	-0.209499	0.169538	0.036519
	(0.25990)	(0.00523)	(0.02900)	(0.17312)	(0.12381)	(0.02172)
	[2.97691]	[0.40474]	[2.03352]	[-1.21012]	[1.36935]	[1.68170]
D(LGGAS_PRICE(-1))	-1.653874	-0.038901	-0.104464	-0.852914	1.812860	0.347481
	(2.21999)	(0.04466)	(0.24770)	(1.47879)	(1.05756)	(0.18549)
	[-0.74499]	[-0.87114]	[-0.42173]	[-0.57676]	[1.71420]	[1.87330]
D(LGGAS_PRICE(-2))	-3.375262	0.076987	-0.205438	-1.088169	2.678781	-0.374299
	(1.95828)	(0.03939)	(0.21850)	(1.30446)	(0.93288)	(0.16362)
	[-1.72358]	[1.95443]	[-0.94021]	[-0.83419]	[2.87151]	[-2.28755]
C	-0.064763	0.001605	0.000986	0.001116	0.009676	0.004376
	(0.08845)	(0.00178)	(0.00987)	(0.05892)	(0.04214)	(0.00739)
	[-0.73221]	[0.90239]	[0.09995]	[0.01894]	[0.22963]	[0.59216]
R-squared	0.583211	0.394756	0.409098	0.215963	0.521101	0.535476
Adj. R-squared	0.484312	0.251139	0.268884	0.029920	0.407463	0.425251
Sum sq. resids	33.10824	0.013396	0.412188	14.69083	7.513462	0.231143
S.E. equation	0.749104	0.015068	0.083584	0.498996	0.356857	0.062591
F-statistic	5.897037	2.748670	2.917664	1.160826	4.585654	4.857991
Log likelihood	-75.24298	213.8221	87.04114	-45.17832	-20.36881	108.4436
Akaike AIC	2.438999	-5.373570	-1.947058	1.626441	0.955914	-2.525502
Schwarz SC	2.906040	-4.906530	-1.480018	2.093481	1.422954	-2.058462
Mean dependent	-0.069574	0.002483	0.004232	-0.003289	-0.005335	0.008552
S.D. dependent	1.043154	0.017413	0.097753	0.506633	0.463593	0.082561

Determinant resid covariance (dof adj.)	3.02E-11
Determinant resid covariance	7.75E-12
Log likelihood	316.5775
Akaike information criterion	-5.799393
Schwarz criterion	-2.623519

Figure 13. Vector Error Correction Estimates (Germany)

Appendix J: OLS Estimates

Sample: 2003M06 2014M01
Included observations: 128
Total system (unbalanced) observations 766

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.551965	0.107060	-5.155646	0.0000
C(2)	-1.105916	0.212217	-5.211256	0.0000
C(3)	-0.315562	0.107835	-2.926342	0.0035
C(4)	-0.045225	0.086819	-0.520910	0.6026
C(5)	-0.525527	1.492529	-0.352105	0.7249
C(6)	1.841197	1.500182	1.227316	0.2201
C(7)	0.872820	0.846107	1.031572	0.3026
C(8)	-0.977735	0.867160	-1.127515	0.2599
C(9)	0.124937	0.060743	2.056820	0.0401
C(10)	0.080150	0.059345	1.350559	0.1773
C(11)	-5.914608	29.86807	-0.198024	0.8431
C(12)	-36.46428	29.34884	-1.242444	0.2145
C(13)	1.419012	0.654397	2.168428	0.0305
C(14)	1.491225	0.669208	2.228344	0.0262
C(15)	0.113355	0.065163	1.739544	0.0824
C(16)	-0.006945	0.006677	-1.040206	0.2986
C(17)	-0.018565	0.013235	-1.402703	0.1612
C(18)	0.003206	0.006725	0.476722	0.6337
C(19)	0.006252	0.005414	1.154667	0.2486
C(20)	0.451025	0.093081	4.845498	0.0000
C(21)	-0.163606	0.093558	-1.748705	0.0808
C(22)	-0.055278	0.052767	-1.047587	0.2952
C(23)	-0.018815	0.054080	-0.347907	0.7280
C(24)	0.003128	0.003788	0.825671	0.4093
C(25)	-0.000552	0.003701	-0.149204	0.8814
C(26)	3.346464	1.862716	1.796551	0.0729
C(27)	-4.375334	1.830334	-2.390457	0.0171
C(28)	0.003663	0.040811	0.089765	0.9285
C(29)	0.018230	0.041735	0.436812	0.6624
C(30)	0.005168	0.004064	1.271577	0.2040
C(31)	-0.010563	0.013780	-0.766562	0.4436
C(32)	0.005836	0.027314	0.213654	0.8309
C(33)	0.007554	0.013879	0.544272	0.5864
C(34)	0.014798	0.011174	1.324285	0.1859

C(35)	-0.045368	0.192104	-0.236166	0.8134
C(36)	-0.066013	0.193089	-0.341877	0.7325
C(37)	0.431606	0.108903	3.963232	0.0001
C(38)	-0.117502	0.111612	-1.052773	0.2928
C(39)	-0.002850	0.007818	-0.364546	0.7156
C(40)	-0.001348	0.007638	-0.176421	0.8600
C(41)	15.83587	3.844327	4.119282	0.0000
C(42)	-12.14680	3.777496	-3.215569	0.0014
C(43)	0.077677	0.084228	0.922227	0.3567
C(44)	-0.021383	0.086134	-0.248255	0.8040
C(45)	-0.008346	0.008387	-0.995074	0.3201
C(46)	-0.600151	0.168711	-3.557264	0.0004
C(47)	-1.237587	0.333001	-3.716470	0.0002
C(48)	0.503423	0.169268	2.974123	0.0030
C(49)	0.214861	0.137277	1.565173	0.1180
C(50)	2.175605	2.349613	0.925942	0.3548
C(51)	3.658347	2.364985	1.546879	0.1224
C(52)	-2.464487	1.333774	-1.847755	0.0651
C(53)	0.655918	1.371821	0.478137	0.6327
C(54)	0.008240	0.095227	0.086530	0.9311
C(55)	-0.005535	0.093036	-0.059496	0.9526
C(56)	-31.97140	46.83662	-0.682615	0.4951
C(57)	-4.510134	46.01872	-0.098007	0.9220
C(58)	1.632673	1.031443	1.582903	0.1139
C(59)	-0.992084	1.059080	-0.936741	0.3492
C(60)	0.102713	0.102182	1.005194	0.3152
C(61)	-0.000159	0.000353	-0.452145	0.6513
C(62)	-0.000457	0.000696	-0.657122	0.5113
C(63)	-2.37E-05	0.000354	-0.067112	0.9465
C(64)	8.33E-06	0.000287	0.029017	0.9769
C(65)	0.000574	0.004912	0.116934	0.9069
C(66)	0.000221	0.004944	0.044714	0.9643
C(67)	-0.003956	0.002788	-1.418923	0.1564
C(68)	-0.004824	0.002868	-1.682266	0.0930
C(69)	-4.34E-06	0.000199	-0.021781	0.9826
C(70)	6.44E-05	0.000194	0.331024	0.7407
C(71)	0.835794	0.097908	8.536546	0.0000
C(72)	-0.021300	0.096198	-0.221415	0.8248
C(73)	0.005365	0.002156	2.488280	0.0131
C(74)	0.004032	0.002214	1.821242	0.0690

C(75)	0.000556	0.000214	2.604664	0.0094
C(76)	0.041050	0.021504	1.908938	0.0567
C(77)	0.093370	0.042626	2.190476	0.0288
C(78)	-0.050226	0.021660	-2.318884	0.0207
C(79)	-0.034052	0.017438	-1.952689	0.0513
C(80)	-0.000683	0.299788	-0.002278	0.9982
C(81)	-0.081183	0.301325	-0.269419	0.7877
C(82)	0.053627	0.169948	0.315549	0.7524
C(83)	0.038722	0.174177	0.222314	0.8241
C(84)	-0.005373	0.012201	-0.440373	0.6598
C(85)	-0.009623	0.011920	-0.807267	0.4198
C(86)	16.17245	5.999269	2.695738	0.0072
C(87)	-11.37597	5.894976	-1.929775	0.0541
C(88)	0.139314	0.131441	1.059895	0.2896
C(89)	0.119849	0.134416	0.891628	0.3729
C(90)	-0.008428	0.013089	-0.643923	0.5198
Determinant residual covariance		2.35E-16		

Figure 14. OLS Estimate (USA)

Sample: 2003M06 2014M01
Included observations: 82
Total system (unbalanced) observations 484

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.593652	0.253166	-2.344908	0.0195
C(2)	-3.635571	1.543767	-2.355000	0.0190
C(3)	-0.277260	0.212498	-1.304763	0.1927
C(4)	0.061831	0.130617	0.473379	0.6362
C(5)	-1.026876	7.411942	-0.138544	0.8899
C(6)	6.831921	6.209379	1.100258	0.2719
C(7)	0.709328	1.780408	0.398407	0.6905
C(8)	2.816091	1.650237	1.706477	0.0887
C(9)	-0.187250	0.189547	-0.987881	0.3238
C(10)	0.158313	0.156225	1.013366	0.3115
C(11)	0.337721	0.259793	1.299961	0.1944
C(12)	0.812740	0.259619	3.130515	0.0019
C(13)	-1.682830	2.232521	-0.753780	0.4514
C(14)	-3.250319	1.967052	-1.652380	0.0993
C(15)	-0.050591	0.088273	-0.573122	0.5669
C(16)	0.005882	0.005349	1.099542	0.2722
C(17)	0.028456	0.032851	0.866200	0.3869
C(18)	-0.006551	0.004508	-1.453327	0.1469
C(19)	-0.002757	0.002897	-0.951854	0.3418
C(20)	0.214237	0.154659	1.385225	0.1668
C(21)	-0.061703	0.134261	-0.459577	0.6461
C(22)	-0.006600	0.037243	-0.177212	0.8594
C(23)	-0.018936	0.035682	-0.530688	0.5959
C(24)	0.009752	0.004242	2.298946	0.0220
C(25)	-0.004656	0.003430	-1.357514	0.1754
C(26)	0.007220	0.005522	1.307442	0.1918
C(27)	0.000723	0.005674	0.127432	0.8987
C(28)	0.005736	0.046614	0.123059	0.9021
C(29)	0.089723	0.043555	2.059999	0.0401
C(30)	0.002382	0.001931	1.233798	0.2180
C(31)	0.059771	0.026839	2.227000	0.0265
C(32)	0.313024	0.164821	1.899177	0.0583
C(33)	-0.042900	0.022616	-1.896904	0.0586
C(34)	-0.005875	0.014533	-0.404287	0.6862

C(35)	-0.565562	0.775949	-0.728865	0.4665
C(36)	1.395792	0.673610	2.072109	0.0389
C(37)	0.212020	0.186857	1.134664	0.2572
C(38)	0.170455	0.179024	0.952133	0.3416
C(39)	-0.025155	0.021283	-1.181948	0.2379
C(40)	0.008870	0.017210	0.515418	0.6066
C(41)	0.042658	0.027707	1.539596	0.1245
C(42)	0.038848	0.028468	1.364631	0.1731
C(43)	0.140012	0.233869	0.598679	0.5497
C(44)	-0.143449	0.218523	-0.656448	0.5119
C(45)	0.003269	0.009686	0.337507	0.7359
C(46)	-0.040316	0.158688	-0.254057	0.7996
C(47)	0.057527	0.973771	0.059077	0.9529
C(48)	0.044764	0.133448	0.335444	0.7375
C(49)	0.086235	0.087686	0.983450	0.3260
C(50)	6.172271	4.574722	1.349212	0.1780
C(51)	-4.754823	4.008225	-1.186266	0.2362
C(52)	0.630337	1.101004	0.572511	0.5673
C(53)	-0.437495	1.062592	-0.411724	0.6808
C(54)	0.068986	0.125444	0.549933	0.5827
C(55)	-0.058781	0.101356	-0.579945	0.5623
C(56)	-0.302484	0.165017	-1.833053	0.0675
C(57)	-0.170284	0.168593	-1.010030	0.3131
C(58)	-1.060886	1.377624	-0.770084	0.4417
C(59)	-1.472746	1.289164	-1.142404	0.2540
C(60)	-0.025837	0.057588	-0.448649	0.6539
C(61)	-0.153350	0.111437	-1.376117	0.1696
C(62)	-1.641194	0.684337	-2.398223	0.0169
C(63)	0.034180	0.093901	0.363996	0.7161
C(64)	-0.015256	0.060340	-0.252833	0.8005
C(65)	1.486777	3.221749	0.461481	0.6447
C(66)	5.272679	2.796837	1.885230	0.0601
C(67)	-2.570013	0.775832	-3.312589	0.0010
C(68)	-2.361981	0.743310	-3.177652	0.0016
C(69)	-0.053826	0.088366	-0.609126	0.5428
C(70)	-0.195343	0.071455	-2.733805	0.0065
C(71)	0.245770	0.115040	2.136380	0.0333
C(72)	0.108037	0.118199	0.914024	0.3613
C(73)	2.424196	0.971027	2.496527	0.0129
C(74)	2.860681	0.907310	3.152927	0.0017
C(75)	0.030997	0.040218	0.770717	0.4413

C(76)	0.020473	0.019340	1.058580	0.2904
C(77)	0.074356	0.118766	0.626067	0.5316
C(78)	-0.017327	0.016296	-1.063257	0.2883
C(79)	-0.005402	0.010472	-0.515835	0.6063
C(80)	-0.234911	0.559131	-0.420136	0.6746
C(81)	0.665808	0.485388	1.371702	0.1709
C(82)	0.235662	0.134645	1.750249	0.0809
C(83)	0.068024	0.129001	0.527316	0.5983
C(84)	-0.017665	0.015336	-1.151849	0.2501
C(85)	-0.001510	0.012401	-0.121740	0.9032
C(86)	0.041616	0.019965	2.084445	0.0378
C(87)	0.026444	0.020513	1.289113	0.1981
C(88)	0.460574	0.168521	2.733041	0.0066
C(89)	-0.313541	0.157463	-1.991206	0.0471
C(90)	0.005480	0.006980	0.785129	0.4328
Determinant residual covariance		1.52E-11		

Figure 15. OLS Estimate (Germany)

Appendix K: LM tests VECM

Sample: 1947M01 2015M06
Included observations: 127

Lags	LM-Stat	Prob
1	55.04712	0.0220
2	51.65761	0.0440
3	59.74234	0.0077

Probs from chi-square with 36 df.

Figure 16. LM test VECM (USA)

Sample: 1947M01 2015M06
Included observations: 74

Lags	LM-Stat	Prob
1	44.64764	0.1528
2	35.67106	0.4841
3	32.31429	0.6446

Probs from chi-square with 36 df.

Figure 17. LM test VECM (Germany)

Appendix L: Heteroskedasticity Test VECM

Sample: 1947M01 2015M06
Included observations: 127

Joint test:

Chi-sq	df	Prob.
719.7915	546	0.0000

Individual components:

Dependent	R-squared	F(26,100)	Prob.	Chi-sq(26)	Prob.
res1*res1	0.128838	0.568814	0.9497	16.36239	0.9271
res2*res2	0.275853	1.465133	0.0923	35.03329	0.1109
res3*res3	0.450376	3.151633	0.0000	57.19771	0.0004
res4*res4	0.142652	0.639952	0.9037	18.11681	0.8715
res5*res5	0.303561	1.676445	0.0365	38.55223	0.0538
res6*res6	0.312213	1.745915	0.0264	39.65101	0.0422
res2*res1	0.239395	1.210551	0.2472	30.40319	0.2512
res3*res1	0.135799	0.604376	0.9290	17.24642	0.9014
res3*res2	0.281150	1.504269	0.0782	35.70599	0.0972
res4*res1	0.393469	2.495075	0.0006	49.97053	0.0032
res4*res2	0.231682	1.159788	0.2940	29.42365	0.2922
res4*res3	0.421873	2.806628	0.0001	53.57785	0.0011
res5*res1	0.160344	0.734475	0.8147	20.36365	0.7740
res5*res2	0.202317	0.975503	0.5072	25.69425	0.4800
res5*res3	0.467491	3.376547	0.0000	59.37134	0.0002
res5*res4	0.211743	1.033163	0.4342	26.89141	0.4150
res6*res1	0.243763	1.239754	0.2229	30.95784	0.2298
res6*res2	0.467971	3.383061	0.0000	59.43229	0.0002
res6*res3	0.493429	3.746370	0.0000	62.66546	0.0001
res6*res4	0.196103	0.938231	0.5562	24.90505	0.5244
res6*res5	0.282849	1.516945	0.0741	35.92178	0.0931

Figure 18. Heteroskedasticity Test VECM (USA)

Sample: 1947M01 2015M06
Included observations: 74

Joint test:

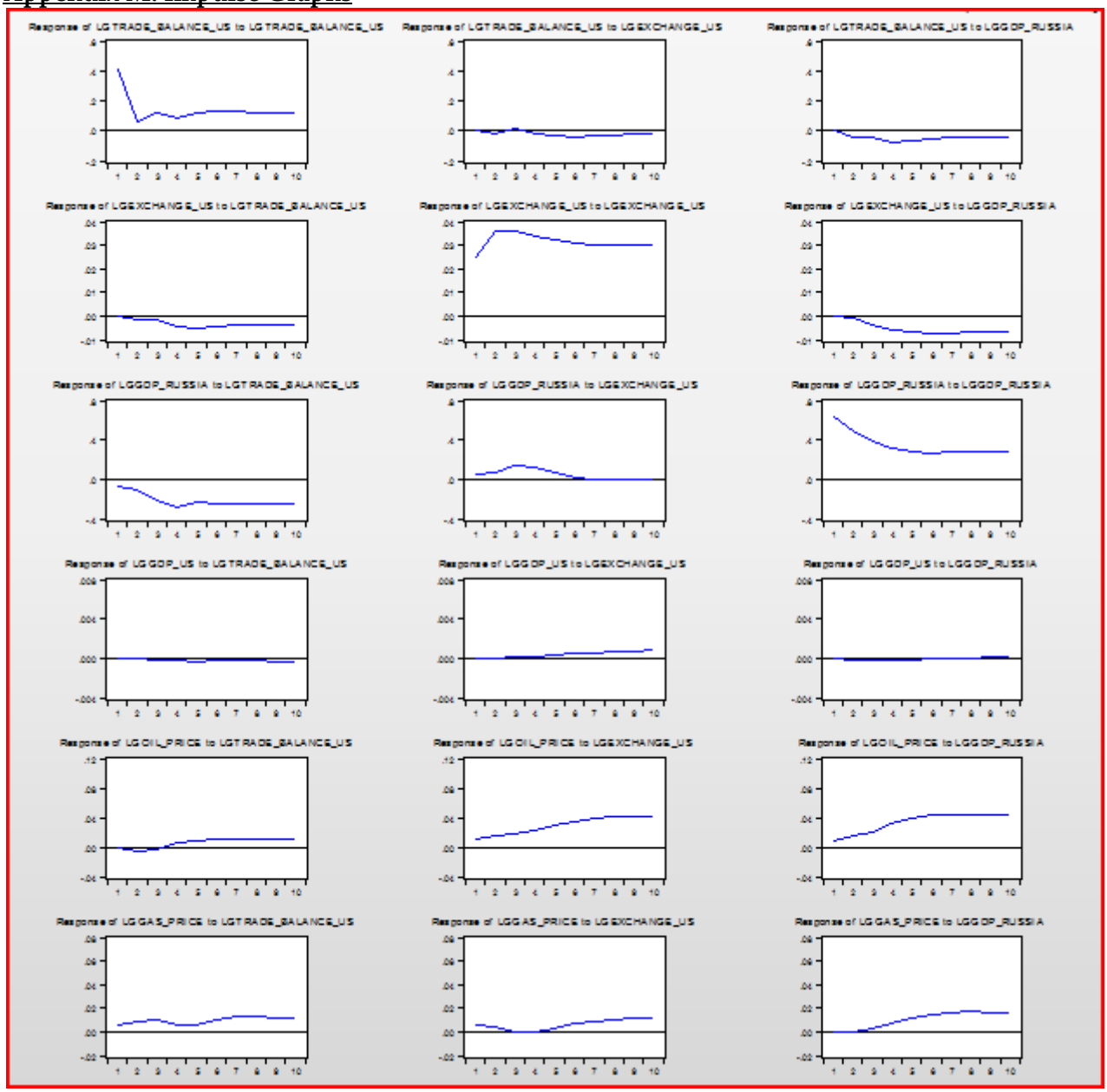
Chi-sq	df	Prob.
559.7960	546	0.3321

Individual components:

Dependent	R-squared	F(26,47)	Prob.	Chi-sq(26)	Prob.
res1*res1	0.279860	0.702504	0.8320	20.70966	0.7568
res2*res2	0.421439	1.316772	0.2024	31.18651	0.2214
res3*res3	0.745895	5.306260	0.0000	55.19622	0.0007
res4*res4	0.765937	5.915414	0.0000	56.67935	0.0005
res5*res5	0.531381	2.049800	0.0159	39.32223	0.0454
res6*res6	0.273132	0.679267	0.8542	20.21174	0.7814
res2*res1	0.337437	0.920640	0.5805	24.97033	0.5207
res3*res1	0.324603	0.868795	0.6435	24.02060	0.5748
res3*res2	0.198594	0.447959	0.9848	14.69596	0.9626
res4*res1	0.281206	0.707203	0.8273	20.80922	0.7517
res4*res2	0.267505	0.660163	0.8713	19.79535	0.8012
res4*res3	0.352557	0.984355	0.5048	26.08920	0.4582
res5*res1	0.459787	1.538563	0.0981	34.02420	0.1344
res5*res2	0.441000	1.426105	0.1428	32.63401	0.1730
res5*res3	0.318502	0.844837	0.6725	23.56918	0.6006
res5*res4	0.391474	1.162915	0.3193	28.96906	0.3125
res6*res1	0.354273	0.991774	0.4962	26.21617	0.4513
res6*res2	0.343451	0.945634	0.5505	25.41540	0.4956
res6*res3	0.252769	0.611497	0.9101	18.70493	0.8486
res6*res4	0.438316	1.410652	0.1502	32.43539	0.1791
res6*res5	0.447219	1.462483	0.1267	33.09417	0.1594

Figure 19. Heteroskedasticity Test VECM (Germany)

Appendix M: Impulse Graphs



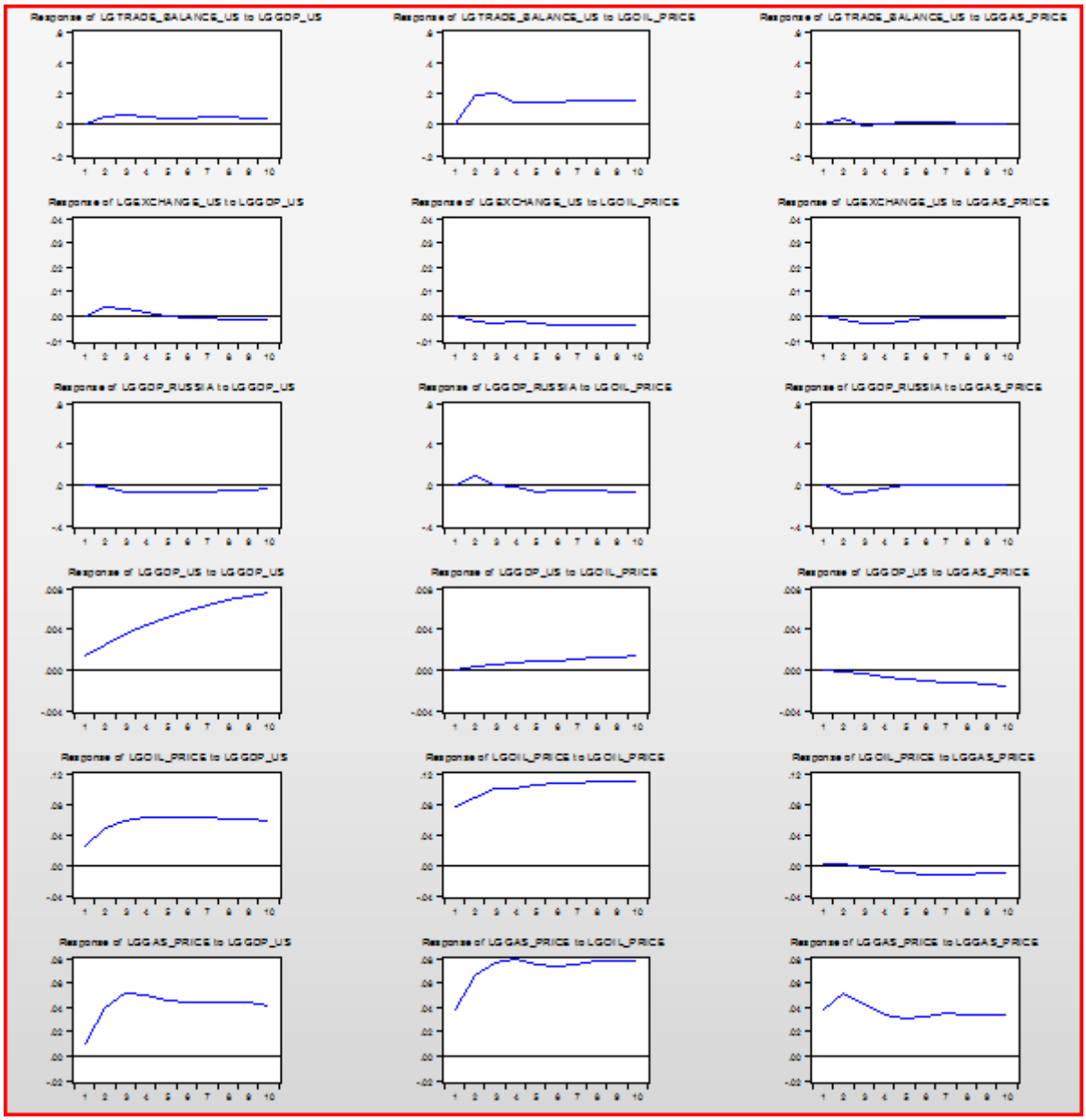
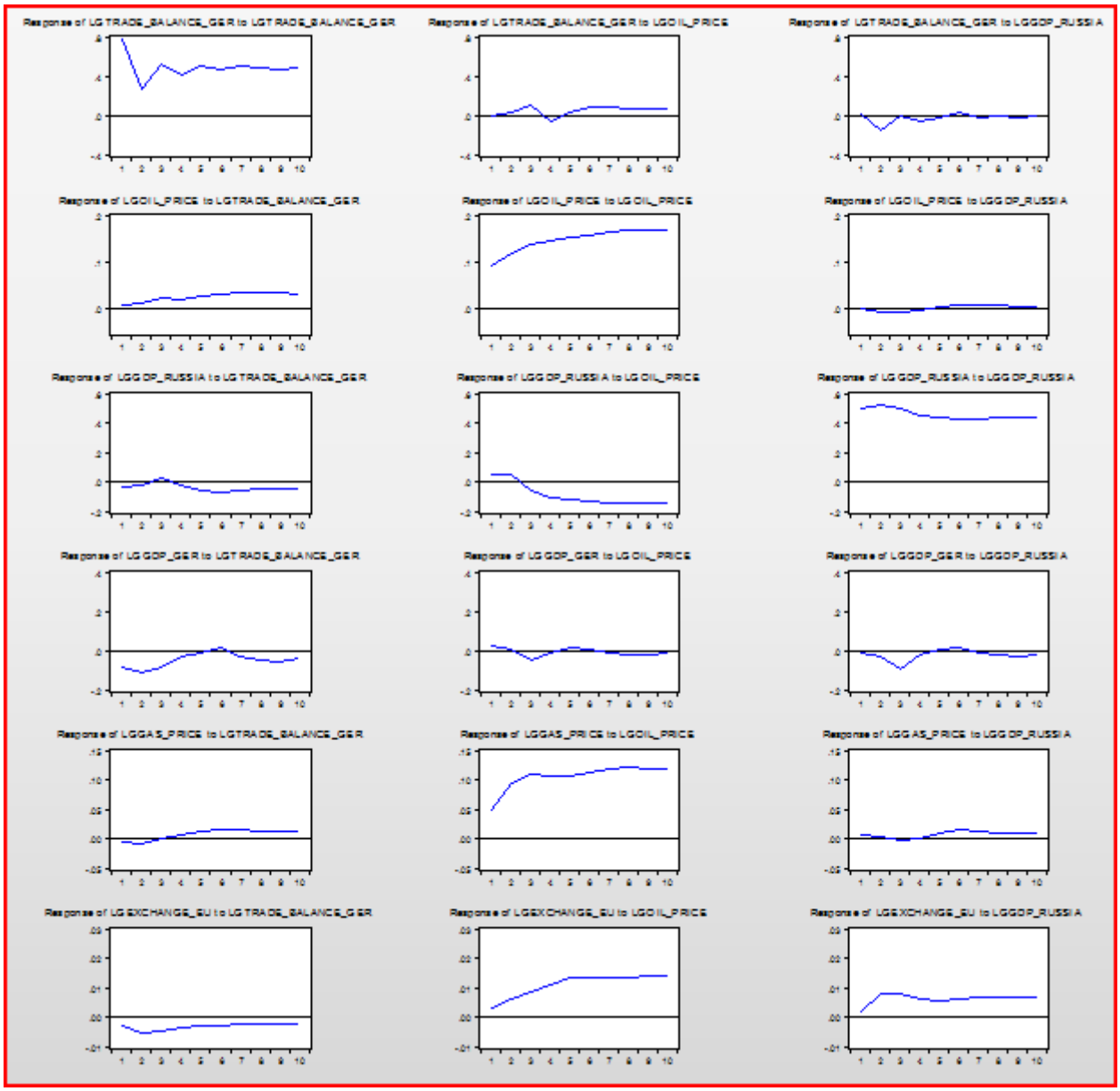


Figure 20. Impulse graphs (USA)


Response of LGTRADE_BALANCE_GER to LGTRADE_BALANCE_GER
Response of LGTRADE_BALANCE_GER to LGOIL_PRICE
Response of LGTRADE_BALANCE_GER to LGGDP_RUSSIA
Response of LGOIL_PRICE to LGTRADE_BALANCE_GER
Response of LGOIL_PRICE to LGOIL_PRICE
Response of LGOIL_PRICE to LGGDP_RUSSIA
Response of LGGDP_RUSSIA to LGTRADE_BALANCE_GER
Response of LGGDP_RUSSIA to LGOIL_PRICE
Response of LGGDP_RUSSIA to LGGDP_RUSSIA
Response of LGGDP_GER to LGTRADE_BALANCE_GER
Response of LGGDP_GER to LGOIL_PRICE
Response of LGGDP_GER to LGGDP_RUSSIA
Response of LGGAS_PRICE to LGTRADE_BALANCE_GER
Response of LGGAS_PRICE to LGOIL_PRICE
Response of LGGAS_PRICE to LGGDP_RUSSIA
Response of LGEXCHANGE_EU to LGTRADE_BALANCE_GER
Response of LGEXCHANGE_EU to LGOIL_PRICE
Response of LGEXCHANGE_EU to LGGDP_RUSSIA

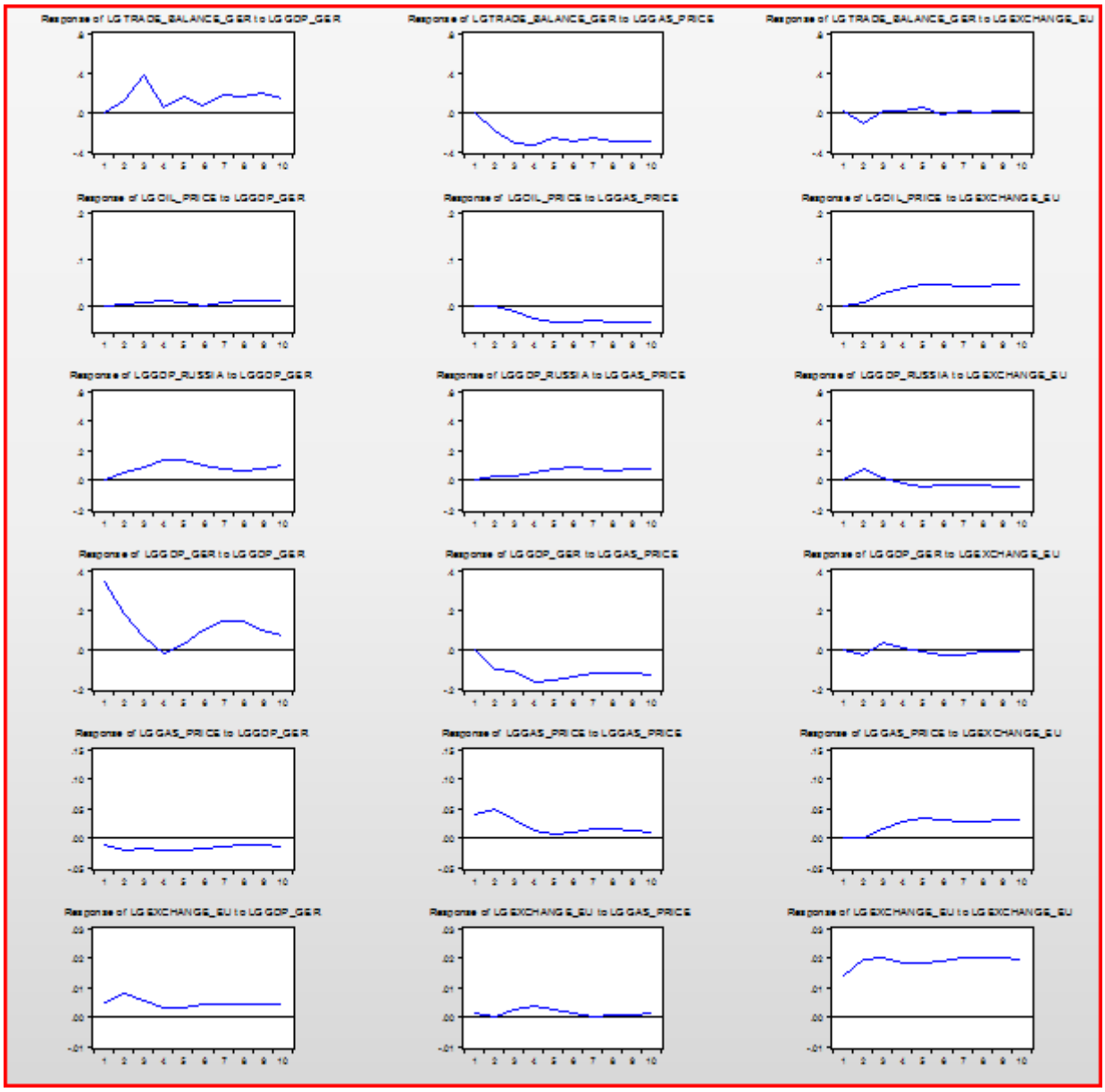


Figure 21. Impulse graphs (Germany)

Appendix N: Pairwise Granger Causality Tests

Sample: 1947M01 2015M06
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LGEXCHANGE_US does not Granger Cause LGTRADE_BALANCE_US	168	0.13314	0.8754
LGTRADE_BALANCE_US does not Granger Cause LGEXCHANGE_US		0.21307	0.8083
LGGDP_RUSSIA does not Granger Cause LGTRADE_BALANCE_US	128	0.73209	0.4830
LGTRADE_BALANCE_US does not Granger Cause LGGDP_RUSSIA		4.02126	0.0203
LGGDP_US does not Granger Cause LGTRADE_BALANCE_US	237	18.2198	4.E-08
LGTRADE_BALANCE_US does not Granger Cause LGGDP_US		0.05248	0.9489
LGOIL_PRICE does not Granger Cause LGTRADE_BALANCE_US	240	16.1837	3.E-07
LGTRADE_BALANCE_US does not Granger Cause LGOIL_PRICE		0.27175	0.7623
LGGAS_PRICE does not Granger Cause LGTRADE_BALANCE_US	240	10.1981	6.E-05
LGTRADE_BALANCE_US does not Granger Cause LGGAS_PRICE		1.27597	0.2811
LGGDP_RUSSIA does not Granger Cause LGEXCHANGE_US	128	1.77195	0.1743
LGEXCHANGE_US does not Granger Cause LGGDP_RUSSIA		1.46984	0.2340
LGGDP_US does not Granger Cause LGEXCHANGE_US	165	1.21822	0.2985
LGEXCHANGE_US does not Granger Cause LGGDP_US		0.34904	0.7059
LGOIL_PRICE does not Granger Cause LGEXCHANGE_US	170	1.12170	0.3282
LGEXCHANGE_US does not Granger Cause LGOIL_PRICE		0.09224	0.9119
LGGAS_PRICE does not Granger Cause LGEXCHANGE_US	170	1.20064	0.3036
LGEXCHANGE_US does not Granger Cause LGGAS_PRICE		0.12340	0.8840
LGGDP_US does not Granger Cause LGGDP_RUSSIA	128	3.26806	0.0414
LGGDP_RUSSIA does not Granger Cause LGGDP_US		0.01088	0.9892
LGOIL_PRICE does not Granger Cause LGGDP_RUSSIA	128	4.08135	0.0192
LGGDP_RUSSIA does not Granger Cause LGOIL_PRICE		0.54882	0.5790
LGGAS_PRICE does not Granger Cause LGGDP_RUSSIA	128	3.65493	0.0287
LGGDP_RUSSIA does not Granger Cause LGGAS_PRICE		0.13772	0.8715
LGOIL_PRICE does not Granger Cause LGGDP_US	414	0.71422	0.4902
LGGDP_US does not Granger Cause LGOIL_PRICE		2.58446	0.0767
LGGAS_PRICE does not Granger Cause LGGDP_US	278	2.52309	0.0821
LGGDP_US does not Granger Cause LGGAS_PRICE		10.3989	4.E-05
LGGAS_PRICE does not Granger Cause LGOIL_PRICE	290	0.91247	0.4027
LGOIL_PRICE does not Granger Cause LGGAS_PRICE		29.8116	2.E-12

Figure 22. Pairwise Granger Causality Tests (USA)

Sample: 1947M01 2015M06
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LGOIL_PRICE does not Granger Cause LGTRADE_BALANCE_GER	112	4.37082	0.0150
LGTRADE_BALANCE_GER does not Granger Cause LGOIL_PRICE		0.16042	0.8520
LGGDP_RUSSIA does not Granger Cause LGTRADE_BALANCE_GER	82	0.15999	0.8524
LGTRADE_BALANCE_GER does not Granger Cause LGGDP_RUSSIA		0.23545	0.7908
LGGDP_GER does not Granger Cause LGTRADE_BALANCE_GER	108	0.99466	0.3734
LGTRADE_BALANCE_GER does not Granger Cause LGGDP_GER		0.28470	0.7528
LGGAS_PRICE does not Granger Cause LGTRADE_BALANCE_GER	112	3.11416	0.0485
LGTRADE_BALANCE_GER does not Granger Cause LGGAS_PRICE		0.53408	0.5878
LGEXCHANGE_EU does not Granger Cause LGTRADE_BALANCE_GER	110	1.04500	0.3553
LGTRADE_BALANCE_GER does not Granger Cause LGEXCHANGE_EU		1.90448	0.1540
LGGDP_RUSSIA does not Granger Cause LGOIL_PRICE	128	0.54882	0.5790
LGOIL_PRICE does not Granger Cause LGGDP_RUSSIA		4.08135	0.0192
LGGDP_GER does not Granger Cause LGOIL_PRICE	275	0.15171	0.8593
LGOIL_PRICE does not Granger Cause LGGDP_GER		1.65645	0.1927
LGGAS_PRICE does not Granger Cause LGOIL_PRICE	290	0.91247	0.4027
LGOIL_PRICE does not Granger Cause LGGAS_PRICE		29.8116	2.E-12
LGEXCHANGE_EU does not Granger Cause LGOIL_PRICE	170	2.48269	0.0866
LGOIL_PRICE does not Granger Cause LGEXCHANGE_EU		0.03119	0.9693
LGGDP_GER does not Granger Cause LGGDP_RUSSIA	128	0.78868	0.4567
LGGDP_RUSSIA does not Granger Cause LGGDP_GER		4.47752	0.0133
LGGAS_PRICE does not Granger Cause LGGDP_RUSSIA	128	3.65493	0.0287
LGGDP_RUSSIA does not Granger Cause LGGAS_PRICE		0.13772	0.8715
LGEXCHANGE_EU does not Granger Cause LGGDP_RUSSIA	128	3.39847	0.0366
LGGDP_RUSSIA does not Granger Cause LGEXCHANGE_EU		2.51489	0.0850
LGGAS_PRICE does not Granger Cause LGGDP_GER	275	1.90673	0.1506
LGGDP_GER does not Granger Cause LGGAS_PRICE		3.24509	0.0405
LGEXCHANGE_EU does not Granger Cause LGGDP_GER	168	3.12254	0.0467
LGGDP_GER does not Granger Cause LGEXCHANGE_EU		0.20964	0.8111
LGEXCHANGE_EU does not Granger Cause LGGAS_PRICE	170	4.02010	0.0197
LGGAS_PRICE does not Granger Cause LGEXCHANGE_EU		0.11449	0.8919

Figure 23. Pairwise Granger Causality Tests (Germany)

Appendix O: Augmented Dickey Fuller Tests Residual VECM

Null Hypothesis: EQ01RESID_US has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.565347	0.0000
Test critical values:	1% level	-3.481623	
	5% level	-2.883930	
	10% level	-2.578788	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EQ01RESID_US)
Method: Least Squares
Date: 01/20/15 Time: 13:54
Sample (adjusted): 2003M04 2013M12
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EQ01RESID_US(-1)	-0.863764	0.090301	-9.565347	0.0000
C	-0.002481	0.036437	-0.068087	0.9458

R-squared	0.418753	Mean dependent var	-0.009688
Adjusted R-squared	0.414177	S.D. dependent var	0.540583
S.E. of regression	0.413758	Akaike info criterion	1.088310
Sum squared resid	21.74181	Schwarz criterion	1.132648
Log likelihood	-68.19597	Hannan-Quinn criter.	1.106325
F-statistic	91.49586	Durbin-Watson stat	1.986752
Prob(F-statistic)	0.000000		

Figure 24. Augmented Dickey Fuller Test Residual VECM (USA)

Null Hypothesis: EQ01RESID_GER has a unit root
Exogenous: Constant
Lag Length: 11 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.161536	0.6764
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EQ01RESID_GER)
Method: Least Squares
Date: 01/20/15 Time: 14:19
Sample (adjusted): 2005M09 2013M12
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EQ01RESID_GER(-1)	-1.799779	1.549483	-1.161536	0.2636
D(EQ01RESID_GER(-1))	1.063927	1.530416	0.695188	0.4976
D(EQ01RESID_GER(-2))	0.723900	1.424857	0.508051	0.6188
D(EQ01RESID_GER(-3))	0.910187	1.327448	0.685666	0.5034
D(EQ01RESID_GER(-4))	0.865162	1.225138	0.706175	0.4909
D(EQ01RESID_GER(-5))	0.824720	1.080461	0.763304	0.4571
D(EQ01RESID_GER(-6))	0.383418	0.974492	0.393454	0.6995
D(EQ01RESID_GER(-7))	0.117889	0.866274	0.136087	0.8936
D(EQ01RESID_GER(-8))	0.066896	0.687052	0.097367	0.9237
D(EQ01RESID_GER(-9))	-0.118630	0.520007	-0.228131	0.8226
D(EQ01RESID_GER(-10))	0.084811	0.387945	0.218615	0.8299
D(EQ01RESID_GER(-11))	-0.073126	0.236442	-0.309276	0.7614
C	0.122816	0.123367	0.995535	0.3353

R-squared	0.691491	Mean dependent var	0.050141
Adjusted R-squared	0.444684	S.D. dependent var	0.802130
S.E. of regression	0.597743	Akaike info criterion	2.113106
Sum squared resid	5.359455	Schwarz criterion	2.731630
Log likelihood	-16.58349	Hannan-Quinn criter.	2.302195
F-statistic	2.801750	Durbin-Watson stat	1.871153
Prob(F-statistic)	0.031282		

Figure 25. Augmented Dickey Fuller Test Residual VECM (Germany)

Sample (adjusted): 2003M07 2013M01
Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	43.36815	14.93800	2.903209	0.0623
DLG_EXCHANGE_US	-0.929540	0.763908	-1.216822	0.3107
DLG_GDP_RUSSIA	-0.403572	0.284420	-1.418930	0.2510
DLG_GDP_US	-0.271563	0.573644	-0.473400	0.6682
DLG_OIL_PRICE	0.017614	0.185924	0.094739	0.9305
DLG_GAS_PRICE	0.035239	0.379132	0.092946	0.9318

R-squared	0.676062	Mean dependent var	19.32067
Adjusted R-squared	0.136164	S.D. dependent var	0.988271
S.E. of regression	0.918526	Akaike info criterion	2.902628
Sum squared resid	2.531069	Schwarz criterion	3.034111
Log likelihood	-7.061824	Hannan-Quinn criter.	2.618888
F-statistic	1.252204	Durbin-Watson stat	0.335290
Prob(F-statistic)	0.454543		

Figure 26. OLS output first differences (USA)

Appendix P: Augmented Dickey Fuller Unit Root Tests and Philips Perron Unit Root Tests

Null Hypothesis: LGGDP_RUSSIA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.824177	0.0035
Test critical values:	1% level	-3.481623	
	5% level	-2.883930	
	10% level	-2.578788	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_RUSSIA)
Method: Least Squares
Date: 01/20/15 Time: 14:23
Sample (adjusted): 2003M04 2013M12
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_RUSSIA(-1)	-0.206933	0.054112	-3.824177	0.0002
C	9.476664	2.479955	3.821305	0.0002

R-squared	0.103261	Mean dependent var	-0.004774
Adjusted R-squared	0.096200	S.D. dependent var	0.659299
S.E. of regression	0.626785	Akaike info criterion	1.918955
Sum squared resid	49.89311	Schwarz criterion	1.963293
Log likelihood	-121.7726	Hannan-Quinn criter.	1.936971
F-statistic	14.62433	Durbin-Watson stat	1.969547
Prob(F-statistic)	0.000205		

Null Hypothesis: LGGDP_RUSSIA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.757246	0.0009
Test critical values:	1% level	-4.030729	
	5% level	-3.445030	
	10% level	-3.147382	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_RUSSIA)
Method: Least Squares
Date: 01/20/15 Time: 14:24
Sample (adjusted): 2003M04 2013M12
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_RUSSIA(-1)	-0.303197	0.063734	-4.757246	0.0000
C	17.36899	3.796063	4.575527	0.0000
@TREND(1947M01)	-0.004711	0.001745	-2.699127	0.0079

R-squared	0.152277	Mean dependent var	-0.004774
Adjusted R-squared	0.138821	S.D. dependent var	0.659299
S.E. of regression	0.611828	Akaike info criterion	1.878249
Sum squared resid	47.16598	Schwarz criterion	1.944756
Log likelihood	-118.1471	Hannan-Quinn criter.	1.905272
F-statistic	11.31669	Durbin-Watson stat	1.894619
Prob(F-statistic)	0.000030		

Augmented Dickey Fuller Unit root test variable lggdp_russia (left: constant ; right: constant + trend)

Null Hypothesis: D(LGGDP_RUSSIA) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.389146	0.0000
Test critical values:	1% level	-3.482879	
	5% level	-2.884477	
	10% level	-2.579080	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_RUSSIA,2)
Method: Least Squares
Date: 01/20/15 Time: 14:24
Sample (adjusted): 2003M07 2013M12
Included observations: 126 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_RUSSIA(-1))	-1.537539	0.163757	-9.389146	0.0000
D(LGGDP_RUSSIA(-1),2)	0.414552	0.128194	3.233783	0.0016
D(LGGDP_RUSSIA(-2),2)	0.290274	0.086636	3.350484	0.0011
C	-0.008140	0.057092	-0.142572	0.8869

R-squared	0.585670	Mean dependent var	-7.31E-05
Adjusted R-squared	0.575481	S.D. dependent var	0.983476
S.E. of regression	0.640785	Akaike info criterion	1.978986
Sum squared resid	50.09386	Schwarz criterion	2.069026
Log likelihood	-120.6761	Hannan-Quinn criter.	2.015566
F-statistic	57.48366	Durbin-Watson stat	2.101466
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGGDP_RUSSIA) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.350819	0.0000
Test critical values:	1% level	-4.032498	
	5% level	-3.445877	
	10% level	-3.147878	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_RUSSIA,2)
Method: Least Squares
Date: 01/20/15 Time: 14:24
Sample (adjusted): 2003M07 2013M12
Included observations: 126 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_RUSSIA(-1))	-1.537602	0.164435	-9.350819	0.0000
D(LGGDP_RUSSIA(-1),2)	0.414598	0.128724	3.220819	0.0016
D(LGGDP_RUSSIA(-2),2)	0.290299	0.086994	3.336995	0.0011
C	0.052551	1.168427	0.044976	0.9642
@TREND(1947M01)	-8.20E-05	0.001576	-0.052005	0.9586

R-squared	0.585679	Mean dependent var	-7.31E-05
Adjusted R-squared	0.571982	S.D. dependent var	0.983476
S.E. of regression	0.643420	Akaike info criterion	1.994836
Sum squared resid	50.09274	Schwarz criterion	2.107387
Log likelihood	-120.6747	Hannan-Quinn criter.	2.040562
F-statistic	42.76100	Durbin-Watson stat	2.101486
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable d_lggdp_russia (left: constant ; right: constant + trend)

Null Hypothesis: LGGDP_RUSSIA has a unit root
Exogenous: Constant
Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.822662	0.0035
Test critical values:	1% level	-3.481623	
	5% level	-2.883930	
	10% level	-2.578788	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.386768
HAC corrected variance (Bartlett kernel)	0.386391

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_RUSSIA)
Method: Least Squares
Date: 01/20/15 Time: 14:25
Sample (adjusted): 2003M04 2013M12
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_RUSSIA(-1)	-0.206933	0.054112	-3.824177	0.0002
C	9.476664	2.479955	3.821305	0.0002

R-squared	0.103261	Mean dependent var	-0.004774
Adjusted R-squared	0.096200	S.D. dependent var	0.659299
S.E. of regression	0.626785	Akaike info criterion	1.918955
Sum squared resid	49.89311	Schwarz criterion	1.963293
Log likelihood	-121.7726	Hannan-Quinn criter.	1.936971
F-statistic	14.62433	Durbin-Watson stat	1.969547
Prob(F-statistic)	0.000205		

Null Hypothesis: LGGDP_RUSSIA has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.759819	0.0009
Test critical values:	1% level	-4.030729	
	5% level	-3.445030	
	10% level	-3.147382	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.365628
HAC corrected variance (Bartlett kernel)	0.366187

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_RUSSIA)
Method: Least Squares
Date: 01/20/15 Time: 14:26
Sample (adjusted): 2003M04 2013M12
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_RUSSIA(-1)	-0.303197	0.063734	-4.757246	0.0000
C	17.36899	3.796063	4.575527	0.0000
@TREND(1947M01)	-0.004711	0.001745	-2.699127	0.0079

R-squared	0.152277	Mean dependent var	-0.004774
Adjusted R-squared	0.138821	S.D. dependent var	0.659299
S.E. of regression	0.611828	Akaike info criterion	1.878249
Sum squared resid	47.16598	Schwarz criterion	1.944756
Log likelihood	-118.1471	Hannan-Quinn criter.	1.905272
F-statistic	11.31669	Durbin-Watson stat	1.894619
Prob(F-statistic)	0.000030		

Philips Perron Unit root test variable lggdp_russia (left: constant ; right: constant + trend).

Null Hypothesis: D(LGGDP_RUSSIA) has a unit root
Exogenous: Constant
Bandwidth: 74 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-26.21322	0.0000
Test critical values:	1% level	-3.482035	
	5% level	-2.884109	
	10% level	-2.578884	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.431417
HAC corrected variance (Bartlett kernel)	0.030847

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_RUSSIA,2)
Method: Least Squares
Date: 01/20/15 Time: 14:26
Sample (adjusted): 2003M05 2013M12
Included observations: 128 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_RUSSIA(-1))	-1.086516	0.088753	-12.24206	0.0000
C	-0.005391	0.058516	-0.092125	0.9267

R-squared	0.543260	Mean dependent var	-7.79E-05
Adjusted R-squared	0.539635	S.D. dependent var	0.975701
S.E. of regression	0.662016	Akaike info criterion	2.028446
Sum squared resid	55.22134	Schwarz criterion	2.073009
Log likelihood	-127.8206	Hannan-Quinn criter.	2.046552
F-statistic	149.8680	Durbin-Watson stat	2.016742
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGGDP_RUSSIA) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 74 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-26.21712	0.0001
Test critical values:	1% level	-4.031309	
	5% level	-3.445308	
	10% level	-3.147545	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.431411
HAC corrected variance (Bartlett kernel)	0.030356

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_RUSSIA,2)
Method: Least Squares
Date: 01/20/15 Time: 14:27
Sample (adjusted): 2003M05 2013M12
Included observations: 128 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_RUSSIA(-1))	-1.086530	0.089107	-12.19352	0.0000
C	0.041346	1.177246	0.035121	0.9720
@TREND(1947M01)	-6.32E-05	0.001590	-0.039749	0.9684

R-squared	0.543266	Mean dependent var	-7.79E-05
Adjusted R-squared	0.535958	S.D. dependent var	0.975701
S.E. of regression	0.664654	Akaike info criterion	2.044059
Sum squared resid	55.22064	Schwarz criterion	2.110903
Log likelihood	-127.8198	Hannan-Quinn criter.	2.071218
F-statistic	74.34100	Durbin-Watson stat	2.016741
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable d_lggdp_russia (left: constant ; right: constant + trend).

Null Hypothesis: LGGDP_US has a unit root
Exogenous: Constant
Lag Length: 14 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.831636	0.8091
Test critical values:	1% level	-3.438433	
	5% level	-2.864998	
	10% level	-2.568666	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_US)
Method: Least Squares
Date: 01/20/15 Time: 14:28
Sample (adjusted): 1948M06 2013M12
Included observations: 787 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_US(-1)	-0.001270	0.001527	-0.831636	0.4059
D(LGGDP_US(-1))	0.324454	0.035302	9.190942	0.0000
D(LGGDP_US(-2))	0.138363	0.037183	3.721097	0.0002
D(LGGDP_US(-3))	0.179401	0.037515	4.782080	0.0000
D(LGGDP_US(-4))	-0.653101	0.037430	-17.44845	0.0000
D(LGGDP_US(-5))	-0.107341	0.043081	-2.491630	0.0129
D(LGGDP_US(-6))	-0.091153	0.042856	-2.126933	0.0337
D(LGGDP_US(-7))	0.373721	0.042130	8.870601	0.0000
D(LGGDP_US(-8))	-0.235969	0.042134	-5.600432	0.0000
D(LGGDP_US(-9))	-0.162095	0.042856	-3.782287	0.0002
D(LGGDP_US(-10))	-0.275284	0.043078	-6.390371	0.0000
D(LGGDP_US(-11))	0.192608	0.037413	5.148204	0.0000
D(LGGDP_US(-12))	-0.004651	0.037503	-0.124029	0.9013
D(LGGDP_US(-13))	-0.008793	0.037174	-0.236541	0.8131
D(LGGDP_US(-14))	-0.196075	0.035298	-5.554863	0.0000
C	0.053107	0.054154	0.980662	0.3271

Null Hypothesis: LGGDP_US has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 14 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.583269	0.2882
Test critical values:	1% level	-3.969755	
	5% level	-3.415536	
	10% level	-3.130002	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_US)
Method: Least Squares
Date: 01/20/15 Time: 14:29
Sample (adjusted): 1948M06 2013M12
Included observations: 787 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_US(-1)	-0.029834	0.011549	-2.583269	0.0100
D(LGGDP_US(-1))	0.342921	0.035953	9.538147	0.0000
D(LGGDP_US(-2))	0.159334	0.037999	4.193088	0.0000
D(LGGDP_US(-3))	0.201414	0.038416	5.243024	0.0000
D(LGGDP_US(-4))	-0.627620	0.038677	-16.22729	0.0000
D(LGGDP_US(-5))	-0.090027	0.043492	-2.069956	0.0388
D(LGGDP_US(-6))	-0.076414	0.043118	-1.772193	0.0768
D(LGGDP_US(-7))	0.385214	0.042240	9.119621	0.0000
D(LGGDP_US(-8))	-0.217533	0.042637	-5.101970	0.0000
D(LGGDP_US(-9))	-0.146541	0.043164	-3.394973	0.0007
D(LGGDP_US(-10))	-0.262177	0.043253	-6.061504	0.0000
D(LGGDP_US(-11))	0.196582	0.037320	5.267399	0.0000
D(LGGDP_US(-12))	0.002757	0.037494	0.073522	0.9414
D(LGGDP_US(-13))	1.83E-05	0.037217	0.000492	0.9996
D(LGGDP_US(-14))	-0.183919	0.035515	-5.178677	0.0000
C	0.995014	0.381349	2.609197	0.0093
@TREND(1947M01)	0.000170	6.80E-05	2.495051	0.0128

Augmented Dickey Fuller Unit root test variable lggdp_us (left: constant ; right: constant + trend)

Null Hypothesis: D(LGGDP_US) has a unit root
Exogenous: Constant
Lag Length: 13 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.38417	0.0000
Test critical values:	1% level	-3.438433	
	5% level	-2.864998	
	10% level	-2.568666	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:30
Sample (adjusted): 1948M06 2013M12
Included observations: 787 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_US(-1))	-1.531020	0.123627	-12.38417	0.0000
D(LGGDP_US(-1),2)	0.855086	0.115503	7.403161	0.0000
D(LGGDP_US(-2),2)	0.992775	0.109594	9.058647	0.0000
D(LGGDP_US(-3),2)	1.171380	0.105009	11.15503	0.0000
D(LGGDP_US(-4),2)	0.517336	0.099178	5.216229	0.0000
D(LGGDP_US(-5),2)	0.409612	0.090537	4.524270	0.0000
D(LGGDP_US(-6),2)	0.318169	0.083157	3.826130	0.0001
D(LGGDP_US(-7),2)	0.691669	0.078319	8.831485	0.0000
D(LGGDP_US(-8),2)	0.455177	0.069630	6.537109	0.0000
D(LGGDP_US(-9),2)	0.292755	0.059058	4.957043	0.0000
D(LGGDP_US(-10),2)	0.017280	0.047623	0.362856	0.7168
D(LGGDP_US(-11),2)	0.209901	0.045835	4.579484	0.0000
D(LGGDP_US(-12),2)	0.205107	0.042222	4.857813	0.0000
D(LGGDP_US(-13),2)	0.196180	0.035291	5.559001	0.0000
C	0.008106	0.002143	3.781583	0.0002

Null Hypothesis: D(LGGDP_US) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 13 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.38808	0.0000
Test critical values:	1% level	-3.969755	
	5% level	-3.415536	
	10% level	-3.130002	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:30
Sample (adjusted): 1948M06 2013M12
Included observations: 787 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_US(-1))	-1.533523	0.123790	-12.38808	0.0000
D(LGGDP_US(-1),2)	0.857333	0.115648	7.413310	0.0000
D(LGGDP_US(-2),2)	0.994869	0.109729	9.066618	0.0000
D(LGGDP_US(-3),2)	1.173366	0.105136	11.16041	0.0000
D(LGGDP_US(-4),2)	0.519210	0.099298	5.228786	0.0000
D(LGGDP_US(-5),2)	0.411257	0.090641	4.537187	0.0000
D(LGGDP_US(-6),2)	0.319598	0.083247	3.839136	0.0001
D(LGGDP_US(-7),2)	0.692926	0.078398	8.838601	0.0000
D(LGGDP_US(-8),2)	0.456258	0.069698	6.546238	0.0000
D(LGGDP_US(-9),2)	0.293620	0.059113	4.967111	0.0000
D(LGGDP_US(-10),2)	0.017914	0.047664	0.375835	0.7071
D(LGGDP_US(-11),2)	0.210422	0.045869	4.587414	0.0000
D(LGGDP_US(-12),2)	0.205517	0.042251	4.864232	0.0000
D(LGGDP_US(-13),2)	0.196438	0.035312	5.562980	0.0000
C	0.009949	0.004288	2.320077	0.0206
@TREND(1947M01)	-4.46E-06	8.99E-06	-0.496481	0.6197

Augmented Dickey Fuller Unit root test variable d_lggdp_us (left: constant ; right: constant + trend)

Null Hypothesis: LGGDP_US has a unit root
Exogenous: Constant
Bandwidth: 113 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.869682	0.7978
Test critical values:	1% level	-3.438288	
	5% level	-2.864934	
	10% level	-2.568632	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.005881
HAC corrected variance (Bartlett kernel)	0.001269

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_US)
Method: Least Squares
Date: 01/20/15 Time: 14:31
Sample (adjusted): 1947M04 2013M12
Included observations: 801 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_US(-1)	-0.002049	0.001992	-1.028855	0.3039
C	0.077879	0.070587	1.103302	0.2702

R-squared	0.001323	Mean dependent var	0.005309
Adjusted R-squared	0.000073	S.D. dependent var	0.076786
S.E. of regression	0.076783	Akaike info criterion	-2.293180
Sum squared resid	4.710574	Schwarz criterion	-2.281480
Log likelihood	920.4187	Hannan-Quinn criter.	-2.288686
F-statistic	1.058543	Durbin-Watson stat	1.171087
Prob(F-statistic)	0.303859		

Null Hypothesis: LGGDP_US has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 64 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.837340	0.0004
Test critical values:	1% level	-3.969549	
	5% level	-3.415436	
	10% level	-3.129943	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.005730
HAC corrected variance (Bartlett kernel)	0.006101

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_US)
Method: Least Squares
Date: 01/20/15 Time: 14:31
Sample (adjusted): 1947M04 2013M12
Included observations: 801 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_US(-1)	-0.055090	0.011753	-4.687278	0.0000
C	1.828301	0.388701	4.703617	0.0000
@TREND(1947M01)	0.000317	6.92E-05	4.577500	0.0000

R-squared	0.026875	Mean dependent var	0.005309
Adjusted R-squared	0.024436	S.D. dependent var	0.076786
S.E. of regression	0.075842	Akaike info criterion	-2.316602
Sum squared resid	4.590051	Schwarz criterion	-2.299052
Log likelihood	930.7991	Hannan-Quinn criter.	-2.309861
F-statistic	11.01924	Durbin-Watson stat	1.141075
Prob(F-statistic)	0.000019		

Philips Perron Unit root test variable lggdp_us (left: constant ; right: constant + trend).

Null Hypothesis: D(LGGDP_US) has a unit root
Exogenous: Constant
Bandwidth: 161 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-25.19948	0.0000
Test critical values:	1% level	-3.438299	
	5% level	-2.864938	
	10% level	-2.568634	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.004885
HAC corrected variance (Bartlett kernel)	0.000282

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:32
Sample (adjusted): 1947M05 2013M12
Included observations: 800 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_US(-1))	-0.585968	0.032223	-18.18480	0.0000
C	0.003111	0.002480	1.254276	0.2101

R-squared	0.292984	Mean dependent var	-1.37E-06
Adjusted R-squared	0.292098	S.D. dependent var	0.083177
S.E. of regression	0.069983	Akaike info criterion	-2.478646
Sum squared resid	3.908246	Schwarz criterion	-2.466935
Log likelihood	993.4584	Hannan-Quinn criter.	-2.474147
F-statistic	330.6868	Durbin-Watson stat	2.038292
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGGDP_US) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 160 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-25.79067	0.0000
Test critical values:	1% level	-3.969564	
	5% level	-3.415443	
	10% level	-3.129947	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.004885
HAC corrected variance (Bartlett kernel)	0.000264

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:33
Sample (adjusted): 1947M05 2013M12
Included observations: 800 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_US(-1))	-0.586017	0.032244	-18.17449	0.0000
C	0.003835	0.004989	0.768689	0.4423
@TREND(1947M01)	-1.79E-06	1.07E-05	-0.167257	0.8672

R-squared	0.293008	Mean dependent var	-1.37E-06
Adjusted R-squared	0.291234	S.D. dependent var	0.083177
S.E. of regression	0.070025	Akaike info criterion	-2.476181
Sum squared resid	3.908108	Schwarz criterion	-2.458614
Log likelihood	993.4725	Hannan-Quinn criter.	-2.469433
F-statistic	165.1560	Durbin-Watson stat	2.038261
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable d_lggdp_us (left: constant ; right: constant + trend).

Null Hypothesis: LGGDP_GER has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.197997	0.0000
Test critical values:	1% level	-3.454443	
	5% level	-2.872041	
	10% level	-2.572439	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_GER)
Method: Least Squares
Date: 01/20/15 Time: 15:16
Sample (adjusted): 1991M10 2014M03
Included observations: 270 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_GER(-1)	-0.297577	0.057248	-5.197997	0.0000
D(LGGDP_GER(-1))	0.162684	0.072087	2.256758	0.0248
D(LGGDP_GER(-2))	0.059909	0.068975	0.868567	0.3859
D(LGGDP_GER(-3))	-0.120794	0.064460	-1.873926	0.0621
D(LGGDP_GER(-4))	-0.043235	0.059185	-0.730505	0.4657
D(LGGDP_GER(-5))	-0.067307	0.057553	-1.169475	0.2433
D(LGGDP_GER(-6))	0.275644	0.058694	4.696287	0.0000
C	8.674571	1.667693	5.201539	0.0000

R-squared	0.309721	Mean dependent var	0.001118
Adjusted R-squared	0.291279	S.D. dependent var	0.397689
S.E. of regression	0.334797	Akaike info criterion	0.678595
Sum squared resid	29.36726	Schwarz criterion	0.785215
Log likelihood	-83.61030	Hannan-Quinn criter.	0.721409
F-statistic	16.79384	Durbin-Watson stat	1.913545
Prob(F-statistic)	0.000000		

Null Hypothesis: LGGDP_GER has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 6 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.391965	0.0000
Test critical values:	1% level	-3.992411	
	5% level	-3.426557	
	10% level	-3.136516	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_GER)
Method: Least Squares
Date: 01/20/15 Time: 15:16
Sample (adjusted): 1991M10 2014M03
Included observations: 270 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_GER(-1)	-0.319790	0.059309	-5.391965	0.0000
D(LGGDP_GER(-1))	0.181475	0.073199	2.479205	0.0138
D(LGGDP_GER(-2))	0.077413	0.069977	1.106270	0.2696
D(LGGDP_GER(-3))	-0.103981	0.065455	-1.588581	0.1134
D(LGGDP_GER(-4))	-0.031950	0.059625	-0.535844	0.5925
D(LGGDP_GER(-5))	-0.057974	0.057834	-1.002412	0.3171
D(LGGDP_GER(-6))	0.285498	0.059009	4.838214	0.0000
C	9.066528	1.688063	5.370966	0.0000
@TREND(1947M01)	0.000380	0.000271	1.399104	0.1630

R-squared	0.314860	Mean dependent var	0.001118
Adjusted R-squared	0.293859	S.D. dependent var	0.397689
S.E. of regression	0.334187	Akaike info criterion	0.678530
Sum squared resid	29.14865	Schwarz criterion	0.798478
Log likelihood	-82.60158	Hannan-Quinn criter.	0.726696
F-statistic	14.99300	Durbin-Watson stat	1.917917
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable lggdp_ger (left: constant ; right: constant + trend)

Null Hypothesis: D(LGGDP_GER) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.546808	0.0000
Test critical values:	1% level	-3.454534	
	5% level	-2.872081	
	10% level	-2.572460	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_GER,2)
Method: Least Squares
Date: 01/20/15 Time: 15:17
Sample (adjusted): 1991M11 2014M03
Included observations: 269 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_GER(-1))	-1.955844	0.228839	-8.546808	0.0000
D(LGGDP_GER(-1),2)	0.942394	0.209558	4.497046	0.0000
D(LGGDP_GER(-2),2)	0.763986	0.179167	4.264090	0.0000
D(LGGDP_GER(-3),2)	0.442293	0.148346	2.981496	0.0031
D(LGGDP_GER(-4),2)	0.212250	0.115146	1.843311	0.0664
D(LGGDP_GER(-5),2)	0.020490	0.087703	0.233626	0.8155
D(LGGDP_GER(-6),2)	0.213063	0.061136	3.485085	0.0006
C	0.007139	0.021003	0.339901	0.7342

R-squared	0.619812	Mean dependent var	0.001333
Adjusted R-squared	0.609615	S.D. dependent var	0.551090
S.E. of regression	0.344325	Akaike info criterion	0.734827
Sum squared resid	30.94407	Schwarz criterion	0.841733
Log likelihood	-90.83418	Hannan-Quinn criter.	0.777760
F-statistic	60.78609	Durbin-Watson stat	2.047349
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGGDP_GER) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 6 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.522735	0.0000
Test critical values:	1% level	-3.992540	
	5% level	-3.426619	
	10% level	-3.136553	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGDP_GER,2)
Method: Least Squares
Date: 01/20/15 Time: 15:17
Sample (adjusted): 1991M11 2014M03
Included observations: 269 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_GER(-1))	-1.959086	0.229866	-8.522735	0.0000
D(LGGDP_GER(-1),2)	0.945431	0.210525	4.490835	0.0000
D(LGGDP_GER(-2),2)	0.766653	0.180021	4.258696	0.0000
D(LGGDP_GER(-3),2)	0.444515	0.149058	2.982166	0.0031
D(LGGDP_GER(-4),2)	0.213785	0.115628	1.848905	0.0656
D(LGGDP_GER(-5),2)	0.021561	0.088037	0.244908	0.8067
D(LGGDP_GER(-6),2)	0.213461	0.061283	3.483212	0.0006
C	0.042693	0.183835	0.232235	0.8165
@TREND(1947M01)	-5.29E-05	0.000272	-0.194682	0.8458

R-squared	0.619868	Mean dependent var	0.001333
Adjusted R-squared	0.608171	S.D. dependent var	0.551090
S.E. of regression	0.344961	Akaike info criterion	0.742116
Sum squared resid	30.93956	Schwarz criterion	0.862385
Log likelihood	-90.81457	Hannan-Quinn criter.	0.790416
F-statistic	52.99651	Durbin-Watson stat	2.047402
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable d_lggdp_ger (left: constant ; right: constant + trend)

Null Hypothesis: LGGDP_GER has a unit root
Exogenous: Constant
Bandwidth: 25 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.977060	0.0000
Test critical values:	1% level	-3.453910	
	5% level	-2.871806	
	10% level	-2.572313	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.146038
HAC corrected variance (Bartlett kernel)	0.151951

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_GER)
Method: Least Squares
Date: 01/20/15 Time: 15:18
Sample (adjusted): 1991M04 2014M03
Included observations: 276 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_GER(-1)	-0.295209	0.042921	-6.877954	0.0000
C	8.597949	1.250133	6.877628	0.0000

R-squared	0.147231	Mean dependent var	0.001059
Adjusted R-squared	0.144119	S.D. dependent var	0.414578
S.E. of regression	0.383542	Akaike info criterion	0.928484
Sum squared resid	40.30658	Schwarz criterion	0.954718
Log likelihood	-126.1308	Hannan-Quinn criter.	0.939011
F-statistic	47.30625	Durbin-Watson stat	1.692973
Prob(F-statistic)	0.000000		

Null Hypothesis: LGGDP_GER has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 25 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.001104	0.0000
Test critical values:	1% level	-3.991656	
	5% level	-3.426191	
	10% level	-3.136301	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.144891
HAC corrected variance (Bartlett kernel)	0.142216

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_GER)
Method: Least Squares
Date: 01/20/15 Time: 15:19
Sample (adjusted): 1991M04 2014M03
Included observations: 276 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGDP_GER(-1)	-0.307609	0.043652	-7.046781	0.0000
C	8.669359	1.248434	6.944188	0.0000
@TREND(1947M01)	0.000433	0.000295	1.470568	0.1426

R-squared	0.153933	Mean dependent var	0.001059
Adjusted R-squared	0.147735	S.D. dependent var	0.414578
S.E. of regression	0.382731	Akaike info criterion	0.927840
Sum squared resid	39.98980	Schwarz criterion	0.967192
Log likelihood	-125.0419	Hannan-Quinn criter.	0.943631
F-statistic	24.83477	Durbin-Watson stat	1.686944
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable lggdp_ger (left: constant ; right: constant + trend).

Null Hypothesis: D(LGGDP_GER) has a unit root
Exogenous: Constant
Bandwidth: 40 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-29.40248	0.0000
Test critical values:	1% level	-3.453997	
	5% level	-2.871845	
	10% level	-2.572334	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.171188
HAC corrected variance (Bartlett kernel)	0.013835

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_GER,2)
Method: Least Squares
Date: 01/20/15 Time: 15:19
Sample (adjusted): 1991M05 2014M03
Included observations: 275 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_GER(-1))	-0.964308	0.060402	-15.96490	0.0000
C	0.002323	0.025041	0.092773	0.9262

R-squared	0.482835	Mean dependent var	0.001308
Adjusted R-squared	0.480941	S.D. dependent var	0.576386
S.E. of regression	0.415262	Akaike info criterion	1.087430
Sum squared resid	47.07674	Schwarz criterion	1.113734
Log likelihood	-147.5217	Hannan-Quinn criter.	1.097987
F-statistic	254.8780	Durbin-Watson stat	1.993267
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGGDP_GER) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 40 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-29.26530	0.0000
Test critical values:	1% level	-3.991780	
	5% level	-3.426251	
	10% level	-3.136336	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.171188
HAC corrected variance (Bartlett kernel)	0.013872

Phillips-Perron Test Equation
Dependent Variable: D(LGGDP_GER,2)
Method: Least Squares
Date: 01/20/15 Time: 15:20
Sample (adjusted): 1991M05 2014M03
Included observations: 275 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGDP_GER(-1))	-0.964311	0.060514	-15.93538	0.0000
C	0.000378	0.212904	0.001777	0.9986
@TREND(1947M01)	2.91E-06	0.000316	0.009199	0.9927

R-squared	0.482835	Mean dependent var	0.001308
Adjusted R-squared	0.479033	S.D. dependent var	0.576386
S.E. of regression	0.416024	Akaike info criterion	1.094703
Sum squared resid	47.07673	Schwarz criterion	1.134159
Log likelihood	-147.5216	Hannan-Quinn criter.	1.110538
F-statistic	126.9723	Durbin-Watson stat	1.993261
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable d_lggdp_ger (left: constant ; right: constant + trend).

Null Hypothesis: LGEXCHANGE_US has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.356953	0.9805
Test critical values:	1% level	-3.468980	
	5% level	-2.878413	
	10% level	-2.575844	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGEXCHANGE_US)
Method: Least Squares
Date: 01/20/15 Time: 14:34
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGEXCHANGE_US(-1)	0.007029	0.019691	0.356953	0.7216
D(LGEXCHANGE_US(-1))	0.534206	0.074605	7.160419	0.0000
C	-0.021663	0.066722	-0.324677	0.7458

R-squared	0.288812	Mean dependent var	0.004140
Adjusted R-squared	0.280295	S.D. dependent var	0.029236
S.E. of regression	0.024802	Akaike info criterion	-4.538272
Sum squared resid	0.102731	Schwarz criterion	-4.482934
Log likelihood	388.7531	Hannan-Quinn criter.	-4.515817
F-statistic	33.90919	Durbin-Watson stat	1.884871
Prob(F-statistic)	0.000000		

Null Hypothesis: LGEXCHANGE_US has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.450390	0.9849
Test critical values:	1% level	-4.012944	
	5% level	-3.436475	
	10% level	-3.142358	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGEXCHANGE_US)
Method: Least Squares
Date: 01/20/15 Time: 14:35
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGEXCHANGE_US(-1)	-0.009859	0.021890	-0.450390	0.6530
D(LGEXCHANGE_US(-1))	0.537925	0.074200	7.249664	0.0000
C	-0.019185	0.066347	-0.289170	0.7728
@TREND(1947M01)	7.58E-05	4.39E-05	1.724091	0.0866

R-squared	0.301323	Mean dependent var	0.004140
Adjusted R-squared	0.288696	S.D. dependent var	0.029236
S.E. of regression	0.024657	Akaike info criterion	-4.544255
Sum squared resid	0.100923	Schwarz criterion	-4.470472
Log likelihood	390.2617	Hannan-Quinn criter.	-4.514315
F-statistic	23.86396	Durbin-Watson stat	1.890761
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable lgexchange_us (left: constant ; right: constant + trend)

Null Hypothesis: D(LGEXCHANGE_US) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.849466	0.0000
Test critical values:	1% level	-3.468980	
	5% level	-2.878413	
	10% level	-2.575844	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGEXCHANGE_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:35
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGEXCHANGE_US(-1))	-0.453656	0.066232	-6.849466	0.0000
C	0.002144	0.001913	1.120800	0.2640

R-squared	0.218296	Mean dependent var	0.000486
Adjusted R-squared	0.213643	S.D. dependent var	0.027897
S.E. of regression	0.024738	Akaike info criterion	-4.549274
Sum squared resid	0.102809	Schwarz criterion	-4.512382
Log likelihood	388.6883	Hannan-Quinn criter.	-4.534304
F-statistic	46.91518	Durbin-Watson stat	1.890626
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGEXCHANGE_US) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.089241	0.0000
Test critical values:	1% level	-4.012944	
	5% level	-3.436475	
	10% level	-3.142358	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGEXCHANGE_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:35
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGEXCHANGE_US(-1))	-0.476126	0.067162	-7.089241	0.0000
C	-0.046181	0.028380	-1.627222	0.1056
@TREND(1947M01)	6.69E-05	3.92E-05	1.706594	0.0898

R-squared	0.231695	Mean dependent var	0.000486
Adjusted R-squared	0.222494	S.D. dependent var	0.027897
S.E. of regression	0.024598	Akaike info criterion	-4.554799
Sum squared resid	0.101047	Schwarz criterion	-4.499461
Log likelihood	390.1579	Hannan-Quinn criter.	-4.532343
F-statistic	25.18086	Durbin-Watson stat	1.883661
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable d_lgexchange_us (left: constant ; right: constant + trend)

Null Hypothesis: LGEXCHANGE_US has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		1.342471	0.9988
Test critical values:	1% level	-3.468749	
	5% level	-2.878311	
	10% level	-2.575791	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000786
HAC corrected variance (Bartlett kernel)	0.001570

Phillips-Perron Test Equation
Dependent Variable: D(LGEXCHANGE_US)
Method: Least Squares
Date: 01/20/15 Time: 14:37
Sample (adjusted): 2000M03 2014M05
Included observations: 171 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGEXCHANGE_US(-1)	0.071461	0.019918	3.587734	0.0004
C	-0.238400	0.067618	-3.525699	0.0005

R-squared	0.070774	Mean dependent var	0.004071
Adjusted R-squared	0.065276	S.D. dependent var	0.029163
S.E. of regression	0.028195	Akaike info criterion	-4.287686
Sum squared resid	0.134352	Schwarz criterion	-4.250941
Log likelihood	368.5971	Hannan-Quinn criter.	-4.272777
F-statistic	12.87184	Durbin-Watson stat	1.051604
Prob(F-statistic)	0.000437		

Null Hypothesis: LGEXCHANGE_US has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.413742	0.9990
Test critical values:	1% level	-4.012618	
	5% level	-3.436318	
	10% level	-3.142266	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000777
HAC corrected variance (Bartlett kernel)	0.001556

Phillips-Perron Test Equation
Dependent Variable: D(LGEXCHANGE_US)
Method: Least Squares
Date: 01/20/15 Time: 14:37
Sample (adjusted): 2000M03 2014M05
Included observations: 171 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGEXCHANGE_US(-1)	0.056732	0.022634	2.506527	0.0131
C	-0.237180	0.067455	-3.516115	0.0006
@TREND(1947M01)	6.74E-05	4.96E-05	1.358655	0.1761

R-squared	0.080873	Mean dependent var	0.004071
Adjusted R-squared	0.069931	S.D. dependent var	0.029163
S.E. of regression	0.028125	Akaike info criterion	-4.286918
Sum squared resid	0.132892	Schwarz criterion	-4.231801
Log likelihood	369.5315	Hannan-Quinn criter.	-4.264554
F-statistic	7.391105	Durbin-Watson stat	1.047141
Prob(F-statistic)	0.000839		

Philips Perron Unit root test variable lgexchange_us (left: constant ; right: constant + trend).

Null Hypothesis: D(LGEXCHANGE_US) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.828075	0.0000
Test critical values:	1% level	-3.468980	
	5% level	-2.878413	
	10% level	-2.575844	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000605
HAC corrected variance (Bartlett kernel)	0.000599

Phillips-Perron Test Equation
Dependent Variable: D(LGEXCHANGE_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:37
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGEXCHANGE_US(-1))	-0.453656	0.066232	-6.849466	0.0000
C	0.002144	0.001913	1.120800	0.2640

R-squared	0.218296	Mean dependent var	0.000486
Adjusted R-squared	0.213643	S.D. dependent var	0.027897
S.E. of regression	0.024738	Akaike info criterion	-4.549274
Sum squared resid	0.102809	Schwarz criterion	-4.512382
Log likelihood	388.6883	Hannan-Quinn criter.	-4.534304
F-statistic	46.91518	Durbin-Watson stat	1.890626
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGEXCHANGE_US) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.207124	0.0000
Test critical values:	1% level	-4.012944	
	5% level	-3.436475	
	10% level	-3.142358	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000594
HAC corrected variance (Bartlett kernel)	0.000628

Phillips-Perron Test Equation
Dependent Variable: D(LGEXCHANGE_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:38
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGEXCHANGE_US(-1))	-0.476126	0.067162	-7.089241	0.0000
C	-0.046181	0.028380	-1.627222	0.1056
@TREND(1947M01)	6.69E-05	3.92E-05	1.706594	0.0898

R-squared	0.231695	Mean dependent var	0.000486
Adjusted R-squared	0.222494	S.D. dependent var	0.027897
S.E. of regression	0.024598	Akaike info criterion	-4.554799
Sum squared resid	0.101047	Schwarz criterion	-4.499461
Log likelihood	390.1579	Hannan-Quinn criter.	-4.532343
F-statistic	25.18086	Durbin-Watson stat	1.883661
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable d_lgexchange_us (left: constant ; right: constant + trend).

Null Hypothesis: LGEXCHANGE_EU has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.051165	0.9516
Test critical values:	1% level	-3.468980	
	5% level	-2.878413	
	10% level	-2.575844	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGEXCHANGE_EU)
Method: Least Squares
Date: 01/20/15 Time: 15:22
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGEXCHANGE_EU(-1)	-0.000596	0.011648	-0.051165	0.9593
D(LGEXCHANGE_EU(-1))	0.408044	0.072948	5.593639	0.0000
C	0.005502	0.041997	0.131001	0.8959

R-squared	0.165397	Mean dependent var	0.005455
Adjusted R-squared	0.155402	S.D. dependent var	0.028651
S.E. of regression	0.026331	Akaike info criterion	-4.418640
Sum squared resid	0.115786	Schwarz criterion	-4.363303
Log likelihood	378.5844	Hannan-Quinn criter.	-4.396185
F-statistic	16.54757	Durbin-Watson stat	1.868650
Prob(F-statistic)	0.000000		

Null Hypothesis: LGEXCHANGE_EU has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.053673	0.5674
Test critical values:	1% level	-4.012944	
	5% level	-3.436475	
	10% level	-3.142358	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGEXCHANGE_EU)
Method: Least Squares
Date: 01/20/15 Time: 15:23
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGEXCHANGE_EU(-1)	-0.051136	0.024900	-2.053673	0.0416
D(LGEXCHANGE_EU(-1))	0.444756	0.073804	6.026183	0.0000
C	0.041081	0.044292	0.927508	0.3550
@TREND(1947M01)	0.000203	8.86E-05	2.288600	0.0234

R-squared	0.190925	Mean dependent var	0.005455
Adjusted R-squared	0.176303	S.D. dependent var	0.028651
S.E. of regression	0.026003	Akaike info criterion	-4.437940
Sum squared resid	0.112244	Schwarz criterion	-4.364157
Log likelihood	381.2249	Hannan-Quinn criter.	-4.408000
F-statistic	13.05754	Durbin-Watson stat	1.885381
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable lgexchange_eu (left: constant ; right: constant + trend)

Null Hypothesis: D(LGEXCHANGE_EU) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.401692	0.0000
Test critical values:	1% level	-3.468980	
	5% level	-2.878413	
	10% level	-2.575844	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGEXCHANGE_EU,2)
Method: Least Squares
Date: 01/20/15 Time: 15:23
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGEXCHANGE_EU(-1))	-0.592860	0.070564	-8.401692	0.0000
C	0.003355	0.002046	1.639884	0.1029

R-squared	0.295859	Mean dependent var	0.000297
Adjusted R-squared	0.291667	S.D. dependent var	0.031193
S.E. of regression	0.026253	Akaike info criterion	-4.430389
Sum squared resid	0.115788	Schwarz criterion	-4.393498
Log likelihood	378.5831	Hannan-Quinn criter.	-4.415419
F-statistic	70.58844	Durbin-Watson stat	1.868360
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGEXCHANGE_EU) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.461227	0.0000
Test critical values:	1% level	-4.012944	
	5% level	-3.436475	
	10% level	-3.142358	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGEXCHANGE_EU,2)
Method: Least Squares
Date: 01/20/15 Time: 15:23
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGEXCHANGE_EU(-1))	-0.601019	0.071032	-8.461227	0.0000
C	-0.026536	0.029910	-0.887203	0.3762
@TREND(1947M01)	4.14E-05	4.13E-05	1.001733	0.3179

R-squared	0.300064	Mean dependent var	0.000297
Adjusted R-squared	0.291682	S.D. dependent var	0.031193
S.E. of regression	0.026253	Akaike info criterion	-4.424615
Sum squared resid	0.115096	Schwarz criterion	-4.369278
Log likelihood	379.0923	Hannan-Quinn criter.	-4.402160
F-statistic	35.79668	Durbin-Watson stat	1.866324
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable d_lgexchange_us (left: constant ; right: constant + trend)

Null Hypothesis: LGEXCHANGE_EU has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.778905	0.9935
Test critical values:	1% level	-3.468749	
	5% level	-2.878311	
	10% level	-2.575791	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000806
HAC corrected variance (Bartlett kernel)	0.001121

Phillips-Perron Test Equation
Dependent Variable: D(LGEXCHANGE_EU)
Method: Least Squares
Date: 01/20/15 Time: 15:25
Sample (adjusted): 2000M03 2014M05
Included observations: 171 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGEXCHANGE_EU(-1)	0.016102	0.012168	1.323296	0.1875
C	-0.052760	0.043949	-1.200497	0.2316

R-squared	0.010255	Mean dependent var	0.005325
Adjusted R-squared	0.004399	S.D. dependent var	0.028618
S.E. of regression	0.028555	Akaike info criterion	-4.262359
Sum squared resid	0.137798	Schwarz criterion	-4.225615
Log likelihood	366.4317	Hannan-Quinn criter.	-4.247450
F-statistic	1.751111	Durbin-Watson stat	1.212820
Prob(F-statistic)	0.187525		

Null Hypothesis: LGEXCHANGE_EU has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.933851	0.9488
Test critical values:	1% level	-4.012618	
	5% level	-3.436318	
	10% level	-3.142266	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000802
HAC corrected variance (Bartlett kernel)	0.001123

Phillips-Perron Test Equation
Dependent Variable: D(LGEXCHANGE_EU)
Method: Least Squares
Date: 01/20/15 Time: 15:25
Sample (adjusted): 2000M03 2014M05
Included observations: 171 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGEXCHANGE_EU(-1)	-0.005743	0.026074	-0.220261	0.8259
C	-0.038885	0.046337	-0.839176	0.4026
@TREND(1947M01)	8.98E-05	9.48E-05	0.947396	0.3448

R-squared	0.015515	Mean dependent var	0.005325
Adjusted R-squared	0.003795	S.D. dependent var	0.028618
S.E. of regression	0.028563	Akaike info criterion	-4.255992
Sum squared resid	0.137066	Schwarz criterion	-4.200875
Log likelihood	366.8873	Hannan-Quinn criter.	-4.233628
F-statistic	1.323804	Durbin-Watson stat	1.192927
Prob(F-statistic)	0.268882		

Philips Perron Unit root test variable lgexchange_eu (left: constant ; right: constant + trend).

Null Hypothesis: D(LGEXCHANGE_EU) has a unit root
Exogenous: Constant
Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.044596	0.0000
Test critical values:	1% level	-3.468980	
	5% level	-2.878413	
	10% level	-2.575844	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000681
HAC corrected variance (Bartlett kernel)	0.000538

Phillips-Perron Test Equation
Dependent Variable: D(LGEXCHANGE_EU,2)
Method: Least Squares
Date: 01/20/15 Time: 15:26
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGEXCHANGE_EU(-1))	-0.592860	0.070564	-8.401692	0.0000
C	0.003355	0.002046	1.639884	0.1029

R-squared	0.295859	Mean dependent var	0.000297
Adjusted R-squared	0.291667	S.D. dependent var	0.031193
S.E. of regression	0.026253	Akaike info criterion	-4.430389
Sum squared resid	0.115788	Schwarz criterion	-4.393498
Log likelihood	378.5831	Hannan-Quinn criter.	-4.415419
F-statistic	70.58844	Durbin-Watson stat	1.868360
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGEXCHANGE_EU) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.122700	0.0000
Test critical values:	1% level	-4.012944	
	5% level	-3.436475	
	10% level	-3.142358	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000677
HAC corrected variance (Bartlett kernel)	0.000542

Phillips-Perron Test Equation
Dependent Variable: D(LGEXCHANGE_EU,2)
Method: Least Squares
Date: 01/20/15 Time: 15:26
Sample (adjusted): 2000M04 2014M05
Included observations: 170 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGEXCHANGE_EU(-1))	-0.601019	0.071032	-8.461227	0.0000
C	-0.026536	0.029910	-0.887203	0.3762
@TREND(1947M01)	4.14E-05	4.13E-05	1.001733	0.3179

R-squared	0.300064	Mean dependent var	0.000297
Adjusted R-squared	0.291682	S.D. dependent var	0.031193
S.E. of regression	0.026253	Akaike info criterion	-4.424615
Sum squared resid	0.115096	Schwarz criterion	-4.369278
Log likelihood	379.0923	Hannan-Quinn criter.	-4.402160
F-statistic	35.79668	Durbin-Watson stat	1.866324
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable d_lgexchange_eu (left: constant ; right: constant + trend).

Null Hypothesis: LGTRADE_BALANCE_US has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=14)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.819747	0.0031
Test critical values:	1% level	-3.457515	
	5% level	-2.873390	
	10% level	-2.573160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGTRADE_BALANCE_US)
Method: Least Squares
Date: 01/20/15 Time: 14:39
Sample (adjusted): 1994M04 2014M03
Included observations: 240 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGTRADE_BALANCE_US(-1)	-0.140729	0.036843	-3.819747	0.0002
D(LGTRADE_BALANCE_US(-1))	-0.404421	0.057267	-7.061986	0.0000
C	2.831108	0.734801	3.852891	0.0002

R-squared	0.276102	Mean dependent var	0.024588
Adjusted R-squared	0.269993	S.D. dependent var	0.870530
S.E. of regression	0.743784	Akaike info criterion	2.258290
Sum squared resid	131.1120	Schwarz criterion	2.301798
Log likelihood	-267.9948	Hannan-Quinn criter.	2.275821
F-statistic	45.19705	Durbin-Watson stat	2.050721
Prob(F-statistic)	0.000000		

Null Hypothesis: LGTRADE_BALANCE_US has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=14)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.726608	0.0000
Test critical values:	1% level	-3.996754	
	5% level	-3.428660	
	10% level	-3.137757	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGTRADE_BALANCE_US)
Method: Least Squares
Date: 01/20/15 Time: 14:39
Sample (adjusted): 1994M04 2014M03
Included observations: 240 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGTRADE_BALANCE_US(-1)	-0.452109	0.067212	-6.726608	0.0000
D(LGTRADE_BALANCE_US(-1))	-0.246019	0.061519	-3.999061	0.0001
C	4.327015	0.747362	5.789716	0.0000
@TREND(1947M01)	0.006848	0.001264	5.416290	0.0000

R-squared	0.356138	Mean dependent var	0.024588
Adjusted R-squared	0.347953	S.D. dependent var	0.870530
S.E. of regression	0.702948	Akaike info criterion	2.149458
Sum squared resid	116.6160	Schwarz criterion	2.207468
Log likelihood	-253.9349	Hannan-Quinn criter.	2.172832
F-statistic	43.51267	Durbin-Watson stat	1.954711
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable lgtrade_balance_us (left: constant ; right: constant + trend)

Null Hypothesis: D(LGTRADE_BALANCE_US) has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, maxlag=14)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.10633	0.0000
Test critical values:	1% level	-3.458104	
	5% level	-2.873648	
	10% level	-2.573298	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGTRADE_BALANCE_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:40
Sample (adjusted): 1994M09 2014M03
Included observations: 235 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGTRADE_BALANCE_US(-1))	-3.222988	0.290194	-11.10633	0.0000
D(LGTRADE_BALANCE_US(-1),2)	1.567346	0.258525	6.062634	0.0000
D(LGTRADE_BALANCE_US(-2),2)	1.184125	0.217237	5.450840	0.0000
D(LGTRADE_BALANCE_US(-3),2)	0.819604	0.169512	4.835066	0.0000
D(LGTRADE_BALANCE_US(-4),2)	0.560072	0.118205	4.738148	0.0000
D(LGTRADE_BALANCE_US(-5),2)	0.229208	0.062113	3.690181	0.0003
C	0.037658	0.045909	0.820268	0.4129

R-squared	0.777078	Mean dependent var	0.002252
Adjusted R-squared	0.771211	S.D. dependent var	1.466364
S.E. of regression	0.701389	Akaike info criterion	2.157827
Sum squared resid	112.1639	Schwarz criterion	2.260878
Log likelihood	-246.5447	Hannan-Quinn criter.	2.199373
F-statistic	132.4629	Durbin-Watson stat	2.029244
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGTRADE_BALANCE_US) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic - based on SIC, maxlag=14)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.09639	0.0000
Test critical values:	1% level	-3.997587	
	5% level	-3.429063	
	10% level	-3.137995	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGTRADE_BALANCE_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:40
Sample (adjusted): 1994M09 2014M03
Included observations: 235 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGTRADE_BALANCE_US(-1))	-3.232899	0.291347	-11.09639	0.0000
D(LGTRADE_BALANCE_US(-1),2)	1.576317	0.259572	6.072746	0.0000
D(LGTRADE_BALANCE_US(-2),2)	1.191536	0.218099	5.463272	0.0000
D(LGTRADE_BALANCE_US(-3),2)	0.825111	0.170149	4.849354	0.0000
D(LGTRADE_BALANCE_US(-4),2)	0.563562	0.118605	4.751582	0.0000
D(LGTRADE_BALANCE_US(-5),2)	0.230495	0.062269	3.701635	0.0003
C	0.271156	0.469160	0.577961	0.5639
@TREND(1947M01)	-0.000339	0.000677	-0.500102	0.6175

R-squared	0.777323	Mean dependent var	0.002252
Adjusted R-squared	0.770456	S.D. dependent var	1.466364
S.E. of regression	0.702546	Akaike info criterion	2.165236
Sum squared resid	112.0404	Schwarz criterion	2.283010
Log likelihood	-246.4153	Hannan-Quinn criter.	2.212717
F-statistic	113.2019	Durbin-Watson stat	2.029746
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable d_lgtrade_balance_us (left: constant ; right: constant + trend)

Null Hypothesis: LGTRADE_BALANCE_US has a unit root
Exogenous: Constant
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.108019	0.0000
Test critical values:	1% level	-3.457400	
	5% level	-2.873339	
	10% level	-2.573133	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.695380
HAC corrected variance (Bartlett kernel)	0.623599

Phillips-Perron Test Equation
Dependent Variable: D(LGTRADE_BALANCE_US)
Method: Least Squares
Date: 01/20/15 Time: 14:41
Sample (adjusted): 1994M03 2014M03
Included observations: 241 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGTRADE_BALANCE_US(...	-0.208479	0.039170	-5.322398	0.0000
C	4.162594	0.781300	5.327779	0.0000

R-squared	0.105967	Mean dependent var	0.014126
Adjusted R-squared	0.102226	S.D. dependent var	0.883766
S.E. of regression	0.837376	Akaike info criterion	2.491178
Sum squared resid	167.5866	Schwarz criterion	2.520097
Log likelihood	-298.1869	Hannan-Quinn criter.	2.502829
F-statistic	28.32792	Durbin-Watson stat	2.618034
Prob(F-statistic)	0.000000		

Null Hypothesis: LGTRADE_BALANCE_US has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.01610	0.0000
Test critical values:	1% level	-3.996592	
	5% level	-3.428581	
	10% level	-3.137711	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.546473
HAC corrected variance (Bartlett kernel)	0.798494

Phillips-Perron Test Equation
Dependent Variable: D(LGTRADE_BALANCE_US)
Method: Least Squares
Date: 01/20/15 Time: 14:41
Sample (adjusted): 1994M03 2014M03
Included observations: 241 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGTRADE_BALANCE_US(...	-0.596055	0.059389	-10.03641	0.0000
C	5.380620	0.710356	7.574540	0.0000
@TREND(1947M01)	0.009467	0.001176	8.053083	0.0000

R-squared	0.297413	Mean dependent var	0.014126
Adjusted R-squared	0.291509	S.D. dependent var	0.883766
S.E. of regression	0.743882	Akaike info criterion	2.258503
Sum squared resid	131.7000	Schwarz criterion	2.301882
Log likelihood	-269.1496	Hannan-Quinn criter.	2.275979
F-statistic	50.37413	Durbin-Watson stat	2.150966
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable lgtrade_balance_us (left: constant ; right: constant + trend).

Null Hypothesis: D(LGTRADE_BALANCE_US) has a unit root
Exogenous: Constant
Bandwidth: 21 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-46.95836	0.0001
Test critical values:	1% level	-3.457515	
	5% level	-2.873390	
	10% level	-2.573160	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.579932
HAC corrected variance (Bartlett kernel)	0.116213

Phillips-Perron Test Equation
Dependent Variable: D(LGTRADE_BALANCE_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:41
Sample (adjusted): 1994M04 2014M03
Included observations: 240 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGTRADE_BALANCE_US(-1))	-1.473263	0.055888	-26.36112	0.0000
C	0.030353	0.049368	0.614842	0.5392

R-squared	0.744884	Mean dependent var	0.012407
Adjusted R-squared	0.743812	S.D. dependent var	1.510867
S.E. of regression	0.764726	Akaike info criterion	2.309699
Sum squared resid	139.1837	Schwarz criterion	2.338705
Log likelihood	-275.1639	Hannan-Quinn criter.	2.321386
F-statistic	694.9088	Durbin-Watson stat	2.090788
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGTRADE_BALANCE_US) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 21 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-48.07059	0.0001
Test critical values:	1% level	-3.996754	
	5% level	-3.428660	
	10% level	-3.137757	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.579059
HAC corrected variance (Bartlett kernel)	0.109678

Phillips-Perron Test Equation
Dependent Variable: D(LGTRADE_BALANCE_US,2)
Method: Least Squares
Date: 01/20/15 Time: 14:42
Sample (adjusted): 1994M04 2014M03
Included observations: 240 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGTRADE_BALANCE_US(-1))	-1.473642	0.055967	-26.33058	0.0000
C	0.323102	0.492319	0.656286	0.5123
@TREND(1947M01)	-0.000426	0.000714	-0.597653	0.5506

R-squared	0.745268	Mean dependent var	0.012407
Adjusted R-squared	0.743118	S.D. dependent var	1.510867
S.E. of regression	0.765760	Akaike info criterion	2.316527
Sum squared resid	138.9742	Schwarz criterion	2.360035
Log likelihood	-274.9832	Hannan-Quinn criter.	2.334057
F-statistic	346.6946	Durbin-Watson stat	2.093349
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable d_lgtrade_balance_us (left: constant ; right: constant + trend).

Null Hypothesis: LGTRADE_BALANCE_GER has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.860825	0.0000
Test critical values:	1% level	-3.483312	
	5% level	-2.884665	
	10% level	-2.579180	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGTRADE_BALANCE_GER)
Method: Least Squares
Date: 01/20/15 Time: 15:27
Sample (adjusted): 2001M02 2014M10
Included observations: 125 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGTRADE_BALANCE_GER(-1)	-0.551972	0.080453	-6.860825	0.0000
C	10.78809	1.580365	6.826333	0.0000

R-squared	0.276772	Mean dependent var	-0.041449
Adjusted R-squared	0.270892	S.D. dependent var	1.015356
S.E. of regression	0.866991	Akaike info criterion	2.568293
Sum squared resid	92.45573	Schwarz criterion	2.613546
Log likelihood	-158.5183	Hannan-Quinn criter.	2.586677
F-statistic	47.07092	Durbin-Watson stat	2.175799
Prob(F-statistic)	0.000000		

Null Hypothesis: LGTRADE_BALANCE_GER has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.791770	0.0000
Test critical values:	1% level	-4.033108	
	5% level	-3.446168	
	10% level	-3.148049	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGTRADE_BALANCE_GER)
Method: Least Squares
Date: 01/20/15 Time: 15:28
Sample (adjusted): 2001M02 2014M10
Included observations: 125 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGTRADE_BALANCE_GER(-1)	-0.645670	0.082866	-7.791770	0.0000
C	8.810776	1.643223	5.361888	0.0000
@TREND(1947M01)	0.005226	0.001626	3.213368	0.0017

R-squared	0.333208	Mean dependent var	-0.041449
Adjusted R-squared	0.322277	S.D. dependent var	1.015356
S.E. of regression	0.835882	Akaike info criterion	2.503048
Sum squared resid	85.24116	Schwarz criterion	2.570927
Log likelihood	-153.4405	Hannan-Quinn criter.	2.530624
F-statistic	30.48276	Durbin-Watson stat	2.124857
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable lgtrade_balance_ger (left: constant ; right: constant + trend)

Null Hypothesis: D(LGTRADE_BALANCE_GER) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-16.77861	0.0000
Test critical values:	1% level	-3.489659	
	5% level	-2.887425	
	10% level	-2.580651	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGTRADE_BALANCE_GER,2)
Method: Least Squares
Date: 01/20/15 Time: 15:28
Sample (adjusted): 2001M03 2014M10
Included observations: 112 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGTRADE_BALANCE_GER(-1))	-1.417533	0.084484	-16.77861	0.0000
C	-0.058083	0.086944	-0.668051	0.5055

R-squared	0.719045	Mean dependent var	-0.006825
Adjusted R-squared	0.716491	S.D. dependent var	1.727023
S.E. of regression	0.919563	Akaike info criterion	2.687860
Sum squared resid	93.01563	Schwarz criterion	2.736405
Log likelihood	-148.5202	Hannan-Quinn criter.	2.707556
F-statistic	281.5219	Durbin-Watson stat	2.302372
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGTRADE_BALANCE_GER) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-16.69834	0.0000
Test critical values:	1% level	-4.042042	
	5% level	-3.450436	
	10% level	-3.150549	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGTRADE_BALANCE_GER,2)
Method: Least Squares
Date: 01/20/15 Time: 15:29
Sample (adjusted): 2001M03 2014M10
Included observations: 112 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGTRADE_BALANCE_GER(-1))	-1.418598	0.084954	-16.69834	0.0000
C	-0.384086	1.310313	-0.293125	0.7700
@TREND(1947M01)	0.000447	0.001791	0.249352	0.8036

R-squared	0.719205	Mean dependent var	-0.006825
Adjusted R-squared	0.714053	S.D. dependent var	1.727023
S.E. of regression	0.923508	Akaike info criterion	2.705147
Sum squared resid	92.96260	Schwarz criterion	2.777964
Log likelihood	-148.4882	Hannan-Quinn criter.	2.734691
F-statistic	139.5919	Durbin-Watson stat	2.301972
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable d_lgtrade_balance_ger (left: constant ; right: constant + trend)

Null Hypothesis: LGTRADE_BALANCE_GER has a unit root
Exogenous: Constant
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.609739	0.0000
Test critical values:	1% level	-3.483312	
	5% level	-2.884665	
	10% level	-2.579180	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.739646
HAC corrected variance (Bartlett kernel)	1.095719

Phillips-Perron Test Equation
Dependent Variable: D(LGTRADE_BALANCE_GER)
Method: Least Squares
Date: 01/20/15 Time: 15:31
Sample (adjusted): 2001M02 2014M10
Included observations: 125 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGTRADE_BALANCE_GER(-1)	-0.551972	0.080453	-6.860825	0.0000
C	10.78809	1.580365	6.826333	0.0000

R-squared	0.276772	Mean dependent var	-0.041449
Adjusted R-squared	0.270892	S.D. dependent var	1.015356
S.E. of regression	0.866991	Akaike info criterion	2.568293
Sum squared resid	92.45573	Schwarz criterion	2.613546
Log likelihood	-158.5183	Hannan-Quinn criter.	2.586677
F-statistic	47.07092	Durbin-Watson stat	2.175799
Prob(F-statistic)	0.000000		

Null Hypothesis: LGTRADE_BALANCE_GER has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.344920	0.0000
Test critical values:	1% level	-4.033108	
	5% level	-3.446168	
	10% level	-3.148049	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.681929
HAC corrected variance (Bartlett kernel)	0.969769

Phillips-Perron Test Equation
Dependent Variable: D(LGTRADE_BALANCE_GER)
Method: Least Squares
Date: 01/20/15 Time: 15:31
Sample (adjusted): 2001M02 2014M10
Included observations: 125 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGTRADE_BALANCE_GER(-1)	-0.645670	0.082866	-7.791770	0.0000
C	8.810776	1.643223	5.361888	0.0000
@TREND(1947M01)	0.005226	0.001626	3.213368	0.0017

R-squared	0.333208	Mean dependent var	-0.041449
Adjusted R-squared	0.322277	S.D. dependent var	1.015356
S.E. of regression	0.835882	Akaike info criterion	2.503048
Sum squared resid	85.24116	Schwarz criterion	2.570927
Log likelihood	-153.4405	Hannan-Quinn criter.	2.530624
F-statistic	30.48276	Durbin-Watson stat	2.124857
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable lgtrade_balance_ger (left: constant ; right: constant + trend).

Null Hypothesis: D(LGTRADE_BALANCE_GER) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-18.65362	0.0000
Test critical values:	1% level	-3.489659	
	5% level	-2.887425	
	10% level	-2.580651	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.830497
HAC corrected variance (Bartlett kernel)	0.551830

Phillips-Perron Test Equation
Dependent Variable: D(LGTRADE_BALANCE_GER,2)
Method: Least Squares
Date: 01/20/15 Time: 15:31
Sample (adjusted): 2001M03 2014M10
Included observations: 112 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGTRADE_BALANCE_GER(-1))	-1.417533	0.084484	-16.77861	0.0000
C	-0.058083	0.086944	-0.668051	0.5055

R-squared	0.719045	Mean dependent var	-0.006825
Adjusted R-squared	0.716491	S.D. dependent var	1.727023
S.E. of regression	0.919563	Akaike info criterion	2.687860
Sum squared resid	93.01563	Schwarz criterion	2.736405
Log likelihood	-148.5202	Hannan-Quinn criter.	2.707556
F-statistic	281.5219	Durbin-Watson stat	2.302372
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGTRADE_BALANCE_GER) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-18.56103	0.0000
Test critical values:	1% level	-4.042042	
	5% level	-3.450436	
	10% level	-3.150549	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.830023
HAC corrected variance (Bartlett kernel)	0.550728

Phillips-Perron Test Equation
Dependent Variable: D(LGTRADE_BALANCE_GER,2)
Method: Least Squares
Date: 01/20/15 Time: 15:32
Sample (adjusted): 2001M03 2014M10
Included observations: 112 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGTRADE_BALANCE_GER(-1))	-1.418598	0.084954	-16.69834	0.0000
C	-0.384086	1.310313	-0.293125	0.7700
@TREND(1947M01)	0.000447	0.001791	0.249352	0.8036

R-squared	0.719205	Mean dependent var	-0.006825
Adjusted R-squared	0.714053	S.D. dependent var	1.727023
S.E. of regression	0.923508	Akaike info criterion	2.705147
Sum squared resid	92.96260	Schwarz criterion	2.777964
Log likelihood	-148.4882	Hannan-Quinn criter.	2.734691
F-statistic	139.5919	Durbin-Watson stat	2.301972
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable d_lgtrade_balance_ger (left: constant ; right: constant + trend).

Null Hypothesis: LGOIL_PRICE has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=17)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.887881	0.3380
Test critical values:	1% level	-3.445481	
	5% level	-2.868105	
	10% level	-2.570332	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGOIL_PRICE)
Method: Least Squares
Date: 01/20/15 Time: 14:45
Sample (adjusted): 1979M07 2014M12
Included observations: 426 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGOIL_PRICE(-1)	-0.011450	0.006065	-1.887881	0.0597
D(LGOIL_PRICE(-1))	0.314075	0.046737	6.720110	0.0000
C	0.041662	0.021537	1.934459	0.0537

R-squared	0.100248	Mean dependent var	0.002659
Adjusted R-squared	0.095994	S.D. dependent var	0.081370
S.E. of regression	0.077366	Akaike info criterion	-2.273519
Sum squared resid	2.531871	Schwarz criterion	-2.244967
Log likelihood	487.2596	Hannan-Quinn criter.	-2.262240
F-statistic	23.56473	Durbin-Watson stat	1.977419
Prob(F-statistic)	0.000000		

Null Hypothesis: LGOIL_PRICE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=17)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.509717	0.3233
Test critical values:	1% level	-3.979747	
	5% level	-3.420406	
	10% level	-3.132884	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGOIL_PRICE)
Method: Least Squares
Date: 01/20/15 Time: 14:45
Sample (adjusted): 1979M07 2014M12
Included observations: 426 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGOIL_PRICE(-1)	-0.020456	0.008151	-2.509717	0.0125
D(LGOIL_PRICE(-1))	0.317914	0.046700	6.807621	0.0000
C	0.032437	0.022208	1.460575	0.1449
@TREND(1947M01)	6.76E-05	4.10E-05	1.649796	0.0997

R-squared	0.106014	Mean dependent var	0.002659
Adjusted R-squared	0.099659	S.D. dependent var	0.081370
S.E. of regression	0.077209	Akaike info criterion	-2.275253
Sum squared resid	2.515646	Schwarz criterion	-2.237183
Log likelihood	488.6290	Hannan-Quinn criter.	-2.260215
F-statistic	16.68104	Durbin-Watson stat	1.980029
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable lgoil_price (left: constant ; right: constant + trend)

Null Hypothesis: D(LGOIL_PRICE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=17)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.80809	0.0000
Test critical values:	1% level	-3.445481	
	5% level	-2.868105	
	10% level	-2.570332	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGOIL_PRICE,2)
Method: Least Squares
Date: 01/20/15 Time: 14:46
Sample (adjusted): 1979M07 2014M12
Included observations: 426 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGOIL_PRICE(-1))	-0.692335	0.046754	-14.80809	0.0000
C	0.001625	0.003763	0.431780	0.6661

R-squared	0.340878	Mean dependent var	-0.000703
Adjusted R-squared	0.339323	S.D. dependent var	0.095470
S.E. of regression	0.077600	Akaike info criterion	-2.269823
Sum squared resid	2.553204	Schwarz criterion	-2.250789
Log likelihood	485.4724	Hannan-Quinn criter.	-2.262304
F-statistic	219.2796	Durbin-Watson stat	1.970813
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGOIL_PRICE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=17)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.78917	0.0000
Test critical values:	1% level	-3.979747	
	5% level	-3.420406	
	10% level	-3.132884	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGOIL_PRICE,2)
Method: Least Squares
Date: 01/20/15 Time: 14:46
Sample (adjusted): 1979M07 2014M12
Included observations: 426 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGOIL_PRICE(-1))	-0.692312	0.046812	-14.78917	0.0000
C	0.002392	0.018822	0.127069	0.8989
@TREND(1947M01)	-1.27E-06	3.06E-05	-0.041588	0.9668

R-squared	0.340880	Mean dependent var	-0.000703
Adjusted R-squared	0.337764	S.D. dependent var	0.095470
S.E. of regression	0.077691	Akaike info criterion	-2.265133
Sum squared resid	2.553194	Schwarz criterion	-2.236580
Log likelihood	485.4733	Hannan-Quinn criter.	-2.253854
F-statistic	109.3825	Durbin-Watson stat	1.970865
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable d_lgoil_price (left: constant ; right: constant + trend)

Null Hypothesis: LGOIL_PRICE has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.685313	0.4380
Test critical values:	1% level	-3.445445	
	5% level	-2.868089	
	10% level	-2.570323	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006567
HAC corrected variance (Bartlett kernel)	0.010085

Phillips-Perron Test Equation
Dependent Variable: D(LGOIL_PRICE)
Method: Least Squares
Date: 01/20/15 Time: 14:48
Sample (adjusted): 1979M06 2014M12
Included observations: 427 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGOIL_PRICE(-1)	-0.008658	0.006344	-1.364729	0.1731
C	0.033057	0.022532	1.467125	0.1431

R-squared	0.004363	Mean dependent var	0.002779
Adjusted R-squared	0.002021	S.D. dependent var	0.081312
S.E. of regression	0.081230	Akaike info criterion	-2.178391
Sum squared resid	2.804283	Schwarz criterion	-2.159390
Log likelihood	467.0866	Hannan-Quinn criter.	-2.170886
F-statistic	1.862486	Durbin-Watson stat	1.369697
Prob(F-statistic)	0.173060		

Null Hypothesis: LGOIL_PRICE has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.199692	0.4881
Test critical values:	1% level	-3.979695	
	5% level	-3.420382	
	10% level	-3.132869	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006545
HAC corrected variance (Bartlett kernel)	0.009566

Phillips-Perron Test Equation
Dependent Variable: D(LGOIL_PRICE)
Method: Least Squares
Date: 01/20/15 Time: 14:48
Sample (adjusted): 1979M06 2014M12
Included observations: 427 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGOIL_PRICE(-1)	-0.015547	0.008537	-1.821013	0.0693
C	0.026016	0.023265	1.118234	0.2641
@TREND(1947M01)	5.17E-05	4.29E-05	1.204988	0.2289

R-squared	0.007761	Mean dependent var	0.002779
Adjusted R-squared	0.003081	S.D. dependent var	0.081312
S.E. of regression	0.081187	Akaike info criterion	-2.177126
Sum squared resid	2.794712	Schwarz criterion	-2.148624
Log likelihood	467.8165	Hannan-Quinn criter.	-2.165868
F-statistic	1.658232	Durbin-Watson stat	1.365155
Prob(F-statistic)	0.191708		

Philips Perron Unit root test variable lgoil_price (left: constant ; right: constant + trend).

Null Hypothesis: D(LGOIL_PRICE) has a unit root
Exogenous: Constant
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-14.34052	0.0000
Test critical values:	1% level	-3.445481	
	5% level	-2.868105	
	10% level	-2.570332	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.005993
HAC corrected variance (Bartlett kernel)	0.004812

Phillips-Perron Test Equation
Dependent Variable: D(LGOIL_PRICE,2)
Method: Least Squares
Date: 01/20/15 Time: 14:49
Sample (adjusted): 1979M07 2014M12
Included observations: 426 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGOIL_PRICE(-1))	-0.692335	0.046754	-14.80809	0.0000
C	0.001625	0.003763	0.431780	0.6661

R-squared	0.340878	Mean dependent var	-0.000703
Adjusted R-squared	0.339323	S.D. dependent var	0.095470
S.E. of regression	0.077600	Akaike info criterion	-2.269823
Sum squared resid	2.553204	Schwarz criterion	-2.250789
Log likelihood	485.4724	Hannan-Quinn criter.	-2.262304
F-statistic	219.2796	Durbin-Watson stat	1.970813
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGOIL_PRICE) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-14.32024	0.0000
Test critical values:	1% level	-3.979747	
	5% level	-3.420406	
	10% level	-3.132884	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.005993
HAC corrected variance (Bartlett kernel)	0.004815

Phillips-Perron Test Equation
Dependent Variable: D(LGOIL_PRICE,2)
Method: Least Squares
Date: 01/20/15 Time: 14:49
Sample (adjusted): 1979M07 2014M12
Included observations: 426 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGOIL_PRICE(-1))	-0.692312	0.046812	-14.78917	0.0000
C	0.002392	0.018822	0.127069	0.8989
@TREND(1947M01)	-1.27E-06	3.06E-05	-0.041588	0.9668

R-squared	0.340880	Mean dependent var	-0.000703
Adjusted R-squared	0.337764	S.D. dependent var	0.095470
S.E. of regression	0.077691	Akaike info criterion	-2.265133
Sum squared resid	2.553194	Schwarz criterion	-2.236580
Log likelihood	485.4733	Hannan-Quinn criter.	-2.253854
F-statistic	109.3825	Durbin-Watson stat	1.970865
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable d_lgoil_price (left: constant ; right: constant + trend).

Null Hypothesis: LGGAS_PRICE has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.250848	0.6528
Test critical values:	1% level	-3.452831	
	5% level	-2.871332	
	10% level	-2.572060	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGAS_PRICE)
Method: Least Squares
Date: 01/20/15 Time: 14:50
Sample (adjusted): 1990M12 2014M12
Included observations: 289 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGAS_PRICE(-1)	-0.007848	0.006274	-1.250848	0.2120
D(LGGAS_PRICE(-1))	0.582364	0.056850	10.24382	0.0000
D(LGGAS_PRICE(-2))	-0.284936	0.057325	-4.970548	0.0000
C	0.006087	0.004600	1.323184	0.1868

R-squared	0.272225	Mean dependent var	0.002258
Adjusted R-squared	0.264564	S.D. dependent var	0.057505
S.E. of regression	0.049315	Akaike info criterion	-3.167444
Sum squared resid	0.693103	Schwarz criterion	-3.116698
Log likelihood	461.6957	Hannan-Quinn criter.	-3.147110
F-statistic	35.53482	Durbin-Watson stat	1.949513
Prob(F-statistic)	0.000000		

Null Hypothesis: LGGAS_PRICE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.604290	0.0311
Test critical values:	1% level	-3.990131	
	5% level	-3.425451	
	10% level	-3.135864	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGAS_PRICE)
Method: Least Squares
Date: 01/20/15 Time: 14:50
Sample (adjusted): 1990M12 2014M12
Included observations: 289 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGAS_PRICE(-1)	-0.061486	0.017059	-3.604290	0.0004
D(LGGAS_PRICE(-1))	0.583998	0.055845	10.45740	0.0000
D(LGGAS_PRICE(-2))	-0.240867	0.057806	-4.166792	0.0000
C	-0.177378	0.054596	-3.248924	0.0013
@TREND(1947M01)	0.000319	9.46E-05	3.371989	0.0008

R-squared	0.300241	Mean dependent var	0.002258
Adjusted R-squared	0.290385	S.D. dependent var	0.057505
S.E. of regression	0.048441	Akaike info criterion	-3.199779
Sum squared resid	0.666422	Schwarz criterion	-3.136346
Log likelihood	467.3681	Hannan-Quinn criter.	-3.174362
F-statistic	30.46345	Durbin-Watson stat	1.930285
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable lggas_price (left: constant ; right: constant + trend)

Null Hypothesis: D(LGGAS_PRICE) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.80350	0.0000
Test critical values:	1% level	-3.452831	
	5% level	-2.871332	
	10% level	-2.572060	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGAS_PRICE,2)
Method: Least Squares
Date: 01/20/15 Time: 14:51
Sample (adjusted): 1990M12 2014M12
Included observations: 289 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGAS_PRICE(-1))	-0.711598	0.060287	-11.80350	0.0000
D(LGGAS_PRICE(-1),2)	0.292763	0.057039	5.132728	0.0000
C	0.001627	0.002909	0.559121	0.5765

R-squared	0.330381	Mean dependent var	-0.000440
Adjusted R-squared	0.325698	S.D. dependent var	0.060114
S.E. of regression	0.049363	Akaike info criterion	-3.168890
Sum squared resid	0.696908	Schwarz criterion	-3.130830
Log likelihood	460.9046	Hannan-Quinn criter.	-3.153639
F-statistic	70.55423	Durbin-Watson stat	1.951067
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGGAS_PRICE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=15)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.77881	0.0000
Test critical values:	1% level	-3.990131	
	5% level	-3.425451	
	10% level	-3.135864	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGGAS_PRICE,2)
Method: Least Squares
Date: 01/20/15 Time: 14:51
Sample (adjusted): 1990M12 2014M12
Included observations: 289 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGAS_PRICE(-1))	-0.711650	0.060418	-11.77881	0.0000
D(LGGAS_PRICE(-1),2)	0.292794	0.057148	5.123466	0.0000
C	0.000920	0.023581	0.038998	0.9689
@TREND(1947M01)	1.05E-06	3.49E-05	0.030214	0.9759

R-squared	0.330383	Mean dependent var	-0.000440
Adjusted R-squared	0.323334	S.D. dependent var	0.060114
S.E. of regression	0.049450	Akaike info criterion	-3.161972
Sum squared resid	0.696906	Schwarz criterion	-3.111226
Log likelihood	460.9050	Hannan-Quinn criter.	-3.141639
F-statistic	46.87215	Durbin-Watson stat	1.951028
Prob(F-statistic)	0.000000		

Augmented Dickey Fuller Unit root test variable d_lggas_price (left: constant ; right: constant + trend)

Null Hypothesis: LGGAS_PRICE has a unit root
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.017446	0.7477
Test critical values:	1% level	-3.452674	
	5% level	-2.871263	
	10% level	-2.572023	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.003272
HAC corrected variance (Bartlett kernel)	0.003181

Phillips-Perron Test Equation
Dependent Variable: D(LGGAS_PRICE)
Method: Least Squares
Date: 01/20/15 Time: 14:53
Sample (adjusted): 1990M10 2014M12
Included observations: 291 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGAS_PRICE(-1)	-0.007464	0.007229	-1.032399	0.3027
C	0.006671	0.005319	1.254269	0.2108

R-squared	0.003675	Mean dependent var	0.002419
Adjusted R-squared	0.000227	S.D. dependent var	0.057407
S.E. of regression	0.057401	Akaike info criterion	-2.870663
Sum squared resid	0.952217	Schwarz criterion	-2.845417
Log likelihood	419.6815	Hannan-Quinn criter.	-2.860549
F-statistic	1.065848	Durbin-Watson stat	1.089826
Prob(F-statistic)	0.302748		

Null Hypothesis: LGGAS_PRICE has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.981787	0.1392
Test critical values:	1% level	-3.989908	
	5% level	-3.425343	
	10% level	-3.135800	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.003195
HAC corrected variance (Bartlett kernel)	0.003578

Phillips-Perron Test Equation
Dependent Variable: D(LGGAS_PRICE)
Method: Least Squares
Date: 01/20/15 Time: 14:53
Sample (adjusted): 1990M10 2014M12
Included observations: 291 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGGAS_PRICE(-1)	-0.053176	0.018794	-2.829353	0.0050
C	-0.150807	0.060100	-2.509270	0.0126
@TREND(1947M01)	0.000274	0.000104	2.630390	0.0090

R-squared	0.027049	Mean dependent var	0.002419
Adjusted R-squared	0.020292	S.D. dependent var	0.057407
S.E. of regression	0.056822	Akaike info criterion	-2.887530
Sum squared resid	0.929877	Schwarz criterion	-2.849661
Log likelihood	423.1356	Hannan-Quinn criter.	-2.872360
F-statistic	4.003314	Durbin-Watson stat	1.068258
Prob(F-statistic)	0.019280		

Philips Perron Unit root test variable lggas_price (left: constant ; right: constant + trend).

Null Hypothesis: D(LGGAS_PRICE) has a unit root
Exogenous: Constant
Bandwidth: 16 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.129152	0.0000
Test critical values:	1% level	-3.452753	
	5% level	-2.871298	
	10% level	-2.572041	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.002629
HAC corrected variance (Bartlett kernel)	0.001218

Phillips-Perron Test Equation
Dependent Variable: D(LGGAS_PRICE,2)
Method: Least Squares
Date: 01/20/15 Time: 14:54
Sample (adjusted): 1990M11 2014M12
Included observations: 290 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGAS_PRICE(-1))	-0.549533	0.053163	-10.33675	0.0000
C	0.000918	0.003025	0.303571	0.7617

R-squared	0.270606	Mean dependent var	-0.000672
Adjusted R-squared	0.268074	S.D. dependent var	0.060140
S.E. of regression	0.051451	Akaike info criterion	-3.089487
Sum squared resid	0.762406	Schwarz criterion	-3.064178
Log likelihood	449.9756	Hannan-Quinn criter.	-3.079347
F-statistic	106.8484	Durbin-Watson stat	1.722259
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LGGAS_PRICE) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 16 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.099916	0.0000
Test critical values:	1% level	-3.990019	
	5% level	-3.425397	
	10% level	-3.135832	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.002629
HAC corrected variance (Bartlett kernel)	0.001218

Phillips-Perron Test Equation
Dependent Variable: D(LGGAS_PRICE,2)
Method: Least Squares
Date: 01/20/15 Time: 14:54
Sample (adjusted): 1990M11 2014M12
Included observations: 290 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGGAS_PRICE(-1))	-0.549544	0.053263	-10.31755	0.0000
C	0.000615	0.024430	0.025180	0.9799
@TREND(1947M01)	4.52E-07	3.62E-05	0.012508	0.9900

R-squared	0.270607	Mean dependent var	-0.000672
Adjusted R-squared	0.265524	S.D. dependent var	0.060140
S.E. of regression	0.051541	Akaike info criterion	-3.082591
Sum squared resid	0.762405	Schwarz criterion	-3.044627
Log likelihood	449.9757	Hannan-Quinn criter.	-3.067381
F-statistic	53.23880	Durbin-Watson stat	1.722244
Prob(F-statistic)	0.000000		

Philips Perron Unit root test variable d_lggas_price (left: constant ; right: constant + trend).

Appendix Q: Tables

	constant	D_trade_balance_us (-1)	D_exchange_us (-1)	D_gdp_russia (-1)	D_oil_price (-1)	D_gas_price (-1)	R^2
AR	0.6779	0.0000					0.1509
DL1	0.9016		0.6472				0.0013
DL2	0.9085		0.8785	0.8677			0.0003
DL3	0.9179		0.9149	0.9065	0.0027		0.0701
DL4	0.9131		0.9080	0.8520	0.0680	0.5982	0.0721
ARDL1	0.8697	0.0000	0.5648				0.1542
ARDL2	0.9160	0.0000	0.8171	0.6510			0.1496
ARDL3	0.8166	0.0000	0.8848	0.9212	0.0000		0.2743
ARDL4	0.7879	0.0000	0.8551	0.8807	0.0345	0.0537	0.2960

Table 1. Estimation of the coefficients of Russia's forecasting models. Also including the $R2$.

	constant	D_trade_balance_ger (-1)	D_exchange_eu (-1)	D_gdp_russia (-1)	D_oil_price (-1)	D_gas_price (-1)	R^2
AR	0.9667	0.0000					0.2629
DL1	0.9006		0.7054				0.0009
DL2	0.8938		0.3740	0.4958			0.0083
DL3	0.9208		0.4322	0.5389	0.5839		0.0106
DL4	0.9056		0.4570	0.4541	0.2402	0.2558	0.0209
ARDL1	0.9582	0.0000	0.9996				0.2611
ARDL2	0.7846	0.0000	0.5171	0.3590			0.2789
ARDL3	0.8664	0.0000	0.7422	0.4700	0.0758		0.2970
ARDL4	0.8442	0.0000	0.7897	0.3596	0.0171	0.1096	0.3116

Table 2. Estimation of the coefficients of Russia's forecasting models. Also including the $R2$.

	coefficient	t-value	P-value
C	43.36815	2.903209	0.0623 [1]
DLGGDP_RUSSIA	-0.403572	-1.418930	0.2510
DLGGDP_US	-0.271563	-0.473400	0.6682
DLGOIL_PRICE	0.017614	0.094739	0.9305
DLGGAS_PRICE	0.035239	0.092946	0.9318
DLG_exchange_US	-0.929540	-1.216822	0.3107
[1] = 10% ; [2] = 5% ; [3] = 1% significance level			

Table 3. OLS

Variable	ADF test		PP test		KPSS test
	No trend	Trend	No trend	Trend	
Lggdp_russia	0.0035 [3]	0.0009 [3]	0.0035 [3]	0.0009 [3]	
D(Lggdp_russia)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0001 [3]	
Lggdp_US	0.8091	0.2882	0.7978	0.0004 [3]	Unit root
D(lggdp_US)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgexchange_us	0.9805	0.9849	0.9988	0.9990	
D(lgexchange_us)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgtrade_balance_us	0.0031 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
D(lgtrade_balance_us)	0.0000 [3]	0.0000 [3]	0.0001 [3]	0.0001 [3]	
Lgoil_price	0.3380	0.3233	0.4380	0.4881	
D(Lgoil_price)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lggas_price	0.6528	0.0311 [2]	0.7477	0.1392	
D(Lggas_price)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
[1] = 10% ; [2] = 5% ; [3] = 1% significance level					

Table 4. ADF & PP (USA)

Variable	ADF test		PP test		KPSS test
	No trend	Trend	No trend	Trend	
Lggdp_russia	0.0035 [3]	0.0009 [3]	0.0035 [3]	0.0009 [3]	
D(Lggdp_russia)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0001 [3]	
Lggdp_ger	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
D(lggdp_ger)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgexchange_eu	0.9516	0.5674	0.9935	0.9488	
D(lgexchange_eu)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgtrade_balance_ger	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
D(lgtrade_balance_ger)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lgoil_price	0.3380	0.3233	0.4380	0.4881	
D(Lgoil_price)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
Lggas_price	0.6528	0.0311 [2]	0.7477	0.1392	
D(Lggas_price)	0.0000 [3]	0.0000 [3]	0.0000 [3]	0.0000 [3]	
[1] = 10% ; [2] = 5% ; [3] = 1% significance level					

Table 5. ADF & PP (Germany)

Variable	t-value	p-value
RESIDUAL1	-9.565347	0.0000
USE MCKINNON CRITICAL VALUE	-4.43	

Table 6. ADF Engle-Granger approach (USA)

Variable	t-value	p-value
RESIDUAL1	-1.161536	0.6764
USE MCKINNON CRITICAL VALUE	-4.43	

Table 7. ADF Engle-Granger approach (Germany)

	Trace statistic	Max-eigen statistic
	P-value	p-value
None	0.0092 [3]	0.1021
At most 1	0.0688 [2]	0.2702
At most 2	0.1785	0.1224
At most 3	0.6430	0.6839
At most 4	0.6568	0.5742
At most 5	0.8850	0.8850
[1] = 10% ; [2] = 5% ; [3] = 1% significance level		

Table 8. Johansen cointegration (USA)

	Trace statistic	Max-eigen statistic
	P-value	p-value
None	0.1141	0.0299 [2]
At most 1	0.7159	0.4545
At most 2	0.9397	0.7440
At most 3	0.9908	0.9773
At most 4	0.9743	0.9897
At most 5	0.3775	0.3775
[1] = 10% ; [2] = 5% ; [3] = 1% significance level		

Table 9. Johansen cointegration (Germany)

	D(LGTRADE_BALANCE)	p-value
COINTEq1	-0.549950	
COINTEq2	-1.104187	
D(LGTRADE_BALANCE_US(-1))	-0.314543	0.0000 [3]
D(LGTRADE_BALANCE_US(-2))	-0.043125	0.0000 [3]
D(LGEXCHANGE_US(-1))	-0.550748	0.0035 [3]
D(LGEXCHANGE_US (-2))	1.1811917	0.6026
D(LGGAS_PRICE(-1))	0.856399	0.7249
D(LGGAS_PRICE(-2))	-0.999308	0.2201
D(LGGDP_RUSSIA(-1))	0.124807	0.3026
D(LGGDP_RUSSIA(-2))	0.080271	0.2599
D(LGGDP_US(-1))	-6.054411	0.0401 [2]
D(LGGDP_US(-2))	-36.58325	0.1773
D(LGOIL_PRICE(-1))	1.431574	0.8431
D(LGOIL_PRICE(-2))	1.508229	0.2145
C	0.113650	0.0305 [2]
[1] = 10% ; [2] = 5% ; [3] = 1% significance level		

Table 10. VECM (USA)

	D(LGTRADE_BALANCE)	p-value
COINTEq1	-0.630306	
COINTEq2	-3.846402	
D(LGTRADE_BALANCE_GER(-1))	-0.290451	0.0195 [2]
D(LGTRADE_BALANCE_GER(-2))	0.023796	0.0190 [2]
D(LGEXCHANGE_EU(-1))	-1.577548	0.1927
D(LGEXCHANGE_EU (-2))	5.837226	0.6362
D(LGOIL_PRICE(-1))	0.720245	0.8899
D(LGOIL_PRICE(-2))	3.021480	0.2719
D(LGGDP_RUSSIA(-1))	-0.200157	0.6905
D(LGGDP_RUSSIA(-2))	0.160047	0.0887 [1]
D(LGGDP_GER(-1))	0.281699	0.3238
D(LGGDP_GER(-2))	0.773686	0.3115
D(LGGAS_PRICE(-1))	-1.653874	0.1944
D(LGGAS_PRICE(-2))	-3.375262	0.0019 [3]
C	-0.064763	0.4514
[1] = 10% ; [2] = 5% ; [3] = 1% significance level		

Table 11. VECM (Germany)