

# The “Sudden” Transition to the Free Floating Exchange Rate Regime in Russia in 2014

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**Abstract:** The events of the fall of 2014 in the Russian currency market forced Bank of Russia to change the exchange rate regime in the national economy. In this study we show that in 2014 the regulator was trying to protect ruble (the Russian national currency) against a massive speculative attack, actively spending its international reserves, but the interventions proved quite ineffective. Moreover, the peculiarity of the structure of these reserves dictated a very limited range of maneuver for the central bank, forcing it to switch to the free floating exchange rate regime in the first half of November, 2014 – an important event, which, actually, could have been predicted by the lay experts on the basis of publically available information and application of simple econometric models. Noteworthy to say that, although not expected to the lay population, this switch of the exchange rate regime was done by Bank of Russia quite timely.

**Keywords:** International reserves, adequacy rules, currency interventions, econometric modeling and forecasting.

## 1. INTRODUCTION

Nowadays, the central banks in the emerging economies often have to achieve several objectives simultaneously, one of the main of these being stabilizing the national currency exchange rate. Completing this task is becoming more difficult in the contractive global economic environment after the global financial crisis (GFC) of 2008-2009. These ideas were brilliantly summarized in June 2016 by Zhou Xiaochuan, governor of the People's Bank of China, who also emphasized the importance of independence of central banks (Zhou 2016).

As it was officially stated by the Central Bank of the Russian Federation (Bank of Russia), since 1999 the regulator “carried out a consecutive exchange rate policy to form the necessary grounds for transition to the free floating exchange rate regime of ruble”<sup>1</sup>. One of the purposes of such policy was to “substantially decrease the intervention of Bank of Russia in the national currency exchange rate formation to be able to carry out independent monetary policy in order to target inflation” (Bank of Russia 2017a).

One of the important steps in this direction, as declared by Bank of Russia, was introduction of a special exchange rate policy tool in February 2005 – *the dual-currency basket* which has been a weighted average of the ruble exchange rates to two currencies – the US dollar (USD) and euro – combined in a

special proportion (0.55 for the USD and 0.45 for euro). This tool was actively used by Bank of Russia during the GFC and allegedly helped the Russian central bank to carry out an exchange rate policy which was easier to understand by the lay public. Monitoring to the dynamics of this dual-currency basket, the regulator gradually depreciated the ruble/USD and ruble/euro nominal exchange rates during the GFC – but, evidently, too gradually and slowly, which became a major point of the expert discussion and criticism towards the Russian central bank of that time.

But, right before the national currency crisis (NCC) in Russia in the late 2014 – early 2015, Bank of Russia suddenly adopted another strategy. According to its press-release “On the main parameters of the exchange rate policy of Bank of Russia”, issued on the 10<sup>th</sup> of November, 2014, since that date Bank of Russia “abolished the exchange rate policy mechanism through cancelling the permissible range of the dual-currency basket ruble values (operational band) and regular interventions on and outside the borders of this band” (Bank of Russia 2014b).

Thus, after almost 15 years of preparation and regular promises to switch to free floating exchange rate regime, this decision of Bank of Russia sprang up as a surprise to the Russian economy in quite a difficult time-period of the fall of 2014.

The current research has the main objective of studying the conditions under which such decision was taken in order to understand whether it was possible to anticipate this course of events. To this end, we analyze the two principle aspects which accompanied this decision in the fall of 2014 – (1) the dynamics of the Russian international reserves from the perspective

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<sup>1</sup>Ruble is the official currency of the Russian Federation.

of their actual adequacy, and (2) the efficacy of the currency interventions of Bank of Russia of that time.

To address these two issues, the rest of the paper is organized as follows. Section 2 reconstructs the principal events of the second half of 2014. In section 3 the methodology (experiment design) and sample description are provided. In Section 4, using basic econometric models, forecasts for a number of principal indicators of the currency market are built. Section 5 discusses the results of calculations from the perspectives of the level of adequacy of the Russian international reserves and the efficacy of currency interventions of Bank of Russia. Section 6 concludes.

## 2. A BRIEF OVERVIEW OF THE MACROECONOMIC EVENTS IN RUSSIA IN 2014

There were several major “unpleasant” surprises to the Russian economy in 2014. In the early 2014, the Western countries introduced economic sanctions against Russia as a reaction to Crimea’s re-association to the Russian Federation. In the middle of 2014, the price of oil, which Russian exports have been crucially depended on, in the world market started to fall dramatically. In October 2014, after witnessing the dramatic fall in the oil price, Bank of Russia started active interventions to the national currency market in

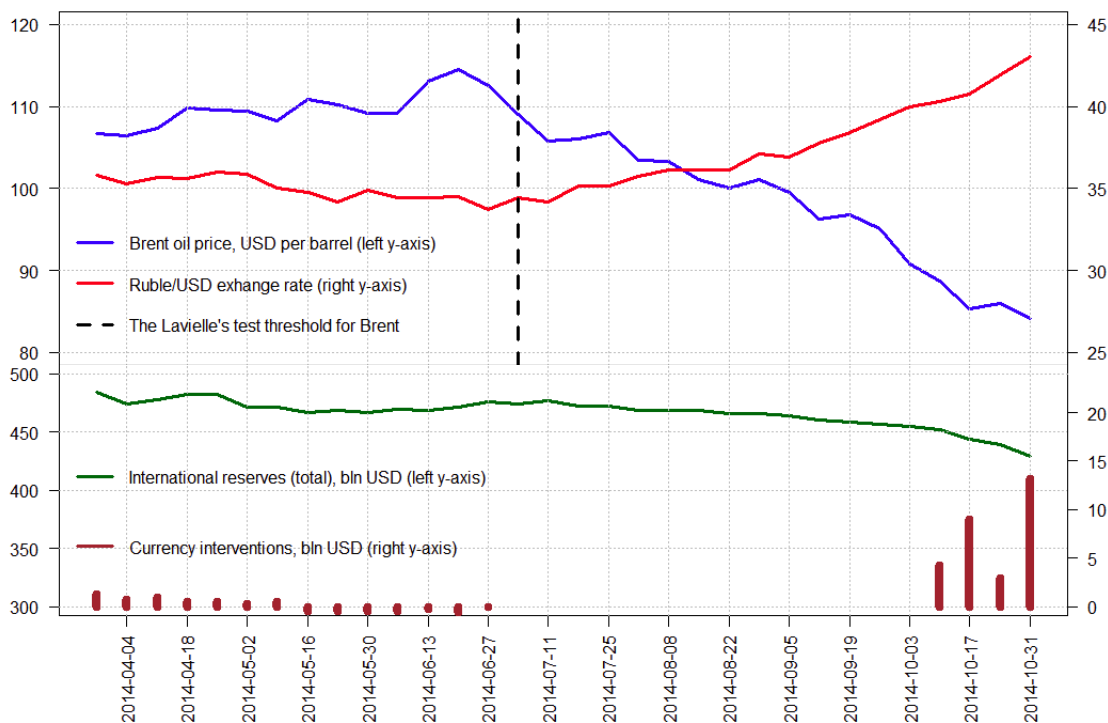
an attempt to support ruble (after several months of absence of such interventions).

Figure 1 gives the dynamics of several macroeconomic indicators important to the current research – the price of Brent oil; the ruble/USD nominal exchange rate; the total stock of international reserves and the volumes of currency interventions of Bank of Russia – for the period from April to October 2014.

As it can be seen from the graph, the currency interventions of Bank of Russia in October 2014 proved quite ineffective in supporting ruble, while the main driver for the ruble/USD exchange rate dynamics was the price of Brent oil. This idea will be elaborated below in Section 4.2.

By the end of October 2014, the situation in the Russian currency market was as follows:

- due to a sharp decrease in the Brent oil price (by about 20% since the early July 2014), ruble depreciated by about 22% as well;
- the currency interventions did not work the way they were supposed to work, forcing Bank of Russia to actively spend its limited international currency reserves following the Bank’s obligation to support the national currency;



**Figure 1:** The dynamics of macroeconomic indicators (end-of-week data).

Sources: Bank of Russia ([www.cbr.ru](http://www.cbr.ru)), The US Energy Information Administration ([www.eia.gov](http://www.eia.gov)).

- the *key interest rate*<sup>2</sup> of Bank of Russia remained 8%, which allowed for extensive currency carry-trade operations in the national currency market, putting substantial depreciative pressure on ruble.

It is not surprising then, that on the 31<sup>st</sup> of October, 2014, at the scheduled meeting of the Board of Directors of the Bank of Russia Board, it was decided to increase the key interest rate from 8% to 9.5% to support the national currency by contracting money supply (Bank of Russia 2014a).

Unfortunately, these measures – substantial currency interventions (which peaked 13.2 bln USD in the last week of October 2014) and the increase of the key interest rate – were of little help in supporting the national currency, thus, threatening the exhaustion of the international reserves of Bank of Russia. Then, on the 10<sup>th</sup> of November, 2014, Bank of Russia took the decision of switching to the free floating exchange rate of ruble, giving up on further obligatory support of the Russian currency. As a result, ruble depreciated by another 17% by the end of November 2014, during which Bank of Russia made no currency interventions at all.

But even this, quite radical step did not help to completely defeat massive currency carry-trade operations in the national currency market. Thus, on the 16<sup>th</sup> of December, 2014, Bank of Russia was again forced to dramatically increase the key interest rate up to 17%, making ruble sharply depreciate against USD by about 5% by the end of that day.

All these shocks hit the Russian economy quite severely. In the 1<sup>st</sup> quarter of 2015, the real GDP dropped by 2.8% year-on-year (YoY), while consumer inflation in March 2015 reached 16.9% YoY (Rosstat 2017).

But the primary interest of this study is in answering the question of whether the "sudden" decision of Bank of Russia to switch to the free floating exchange rate regime of the national currency *could have been anticipated* by the lay experts based on publicly available information on the basis of permanent monitoring and analysis of the contemporary status of the Russian economy.

Thus, we put forward the following two research hypotheses:

(RH1) Switching to the free floating exchange rate regime in November 2014 could have been anticipated on the basis of publicly available information.

(RH2) Bank of Russia fought against a speculative attack (a 'bubble') in the national currency market in October 2014, this is why its interventions were ineffective.

It should also be emphasized that, as to our knowledge, there has been no similar study in the literature on the Russian economy of the period of fall 2014.

### 3. RESEARCH METHODOLOGY

#### 3.1. Experiment Design

To test the above-stated research hypotheses, we propose the following "thought experiment".

Let's imagine, that it is now the very end of October 2014, virtually, the evening of Friday, the 31<sup>st</sup> of October. Bank of Russia had already intervened the national currency market by raising the key interest rate up to 9.5% in order to attempt to support ruble and to fight the speculative attack in the market.

What could have been further projections for ruble and, thus, for the monetary policy of Bank of Russia? Could the switch to the floating exchange rate of ruble have been predicted somehow? Could this switch have been the result of expected *insufficiency* of the international reserves of Bank of Russia?

In order to answer these questions, we use information publicly available by the 1<sup>st</sup> of November, 2014, and apply several quite basic econometric models to construct the necessary projections. Specifically, at the first step, we project the price of Brent oil for November 2014, since it has been well known that the ruble/USD exchange rate is very tightly correlated to that price due to the existing substantial dependence of the Russian economy on exports of natural resources, primarily, crude oil.

At the second step, we apply the constructed forecasts of Brent oil price to predict the ruble/USD exchange rate through November 2014. And then, at the third step, we employ the obtained ruble/USD exchange rate predicted values to estimate the

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<sup>2</sup>The key interest rate is the basic rate at which Bank of Russia borrows from/lends to commercial banks on a short-term basis.

dynamics of the amount of international reserves of Bank of Russia for the same period.

It should be emphasized that in this research econometric models merely play role of mathematical devices used for the purposes of forecasting, so, a thorough analysis of their statistical properties is not of primary interest. This is due to the fact that for forecasting purposes it is more crucial for the model to have the highest possible goodness-of-fit leaving purity of statistical properties aside. Although, it should be mentioned, that the latter properties of the estimated models are very adequate.

### 3.2. Sample Description

This research is majorly based on end-of-week data for the period from July to October 2014, which is used as the training sample to estimate econometric models. November 2014, thus, represents the test sample (when possible).

The choice of the end-of-week type of data is motivated by two facts. First, since we deal with (volatile) financial information, it is well known that it is by the end of trading period that the price of a financial asset includes all available information. Thus, this type of data is robust to potential intra-week fluctuation of the studied financial variables (especially, exchange rates).

Second, for the macroeconomic variables (such as international reserves) weekly data is the minimum available time-span. Since in this research we use a combination of different economic variables, weekly (end-of-week) data is an adequate choice to provide enough observations for the training sample as well.

Initially, the period from April to October 2014 was considered as the training sample. The final choice of a shorter time-period (from July to October 2014) was motivated by the fact that it is in July 2014 that the price of Brent oil started to sharply decrease in the world market. This fact is supported not only by the actual observations from the oil market (see Figure 1), but also by a modern formal test for structural breaks. As such test, we chose the penalized contrasts approach which was proposed by Lavielle (2005) for estimating the number of change-points and their locations in the time-series, and which is more powerful than the previously known algorithms (such as ICSS, for example).

The application of the Lavielle's test to the time-series of the Brent oil prices allowed to detect the only

change-point on the 4<sup>th</sup> of July, 2014 (see Figure 1). Thus, our final end-of-week training sample starts on the 11th of July, 2014, and ends on the 31st of October, 2014.

We did not formally run other sophisticated statistical tests (e.g., non-stationarity tests) on our variables, since, as it was mentioned above, the econometric models in this study were used merely for forecasting purposes, not for statistical inference.

## 4. RESULTS OF CALCULATIONS

According to the steps of the above-described experiment design, here we provide the results of necessary calculations.

### 4.1. Forecasting the Price of Brent Oil

In this section, our task is to forecast the price of Brent oil through November 2014. To this end, based on preliminary visual analysis of the Brent oil price dynamics (see Figure 1), we adopted and estimated by the OLS routine a basic model of the following type<sup>3</sup>:

$$Brent_t = 106.07_{(0.493)}^{***} - 0.07_{(0.003)}^{***} \cdot t^2. \quad (1)$$

where  $Brent_t$  is the current value of Brent oil price;  $t$  is the time index; standard errors are given in parentheses under the coefficients; \*\*\* denotes significance at the 1% level of significance (provided as additional information).

Surprisingly, but with respect to different goodness-of-fit metrics, Model (1) outperformed other models (even of the ARIMA-type) which we also estimated on the training sample. Specifically, multiple R-squared of Model (1) was 0.9735; root mean squared error (RMSE) was 1.20 (\$ per barrel); mean average percentage error (MAPE) was 1.12 (%).

Visual representation of the adequacy of Model (1) is given in Figure 2 (to save space, the results only for the fall of 2014 are presented in the graph). It can be seen that the model's forecasts for the training (white area) and the test (grey area) samples are, on average, quite close to the actual values of the price of Brent oil.

<sup>3</sup>Although the statistical properties of Model (1) are not of primary interest to us, here we provide results of the traditional tests for this model. The F-test statistic = 550.8 with p-value = 3.071e-13; the Shapiro-Wilk normality test statistic W = 0.95 with p-value = 0.419; the Durbin-Watson test statistic DW = 1.70 with p-value=0.176; the Breusch-Pagan heteroscedasticity test statistic BP = 0.82 with p-value = 0.365; the RESET test statistic = 0.98 with p-value = 0.403. Thus, the results of these tests indicate statistical adequacy of Model (1).

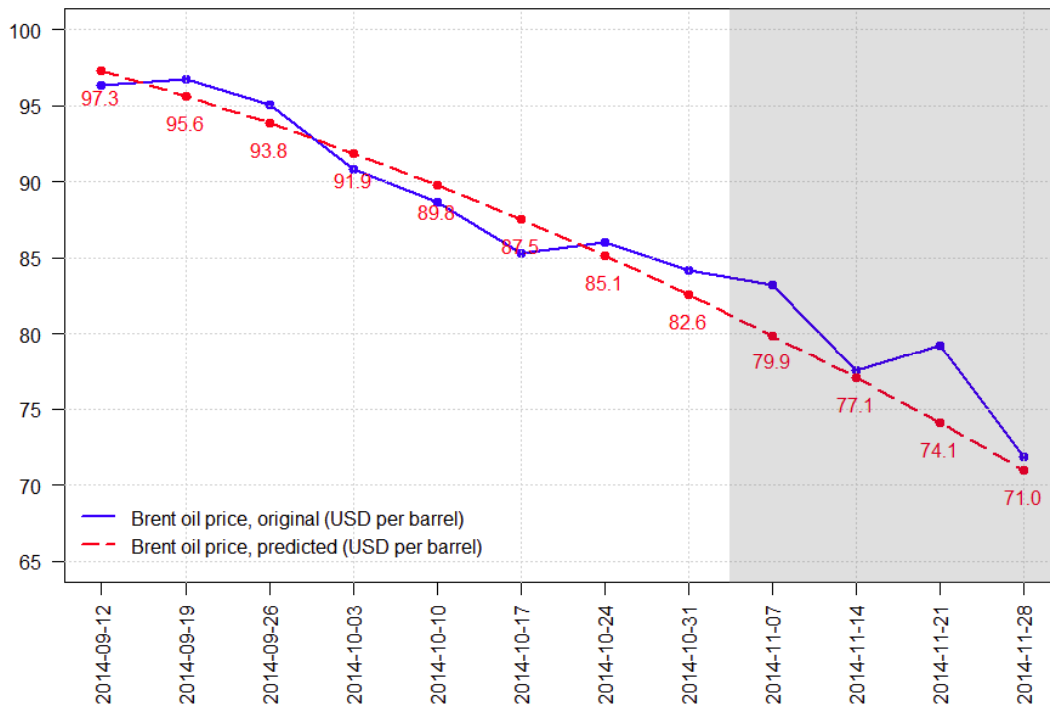


Figure 2: Performance of Model (1).

Note: the shaded (grey) area in the graph represents November, 2014 (the test sample).

For the purposes of further discussion (see Section 5), it is worth noting that the obtained projections of the price of Brent oil for November 2014 were less optimistic than the actually observed values. This means that depreciation of ruble could have expected even stronger given the tight correlation between the ruble exchange rate and the price of Brent oil (see the following section).

4.2. The Ruble/USD Exchange Rate Dynamics Prediction

Having predicted the values of Brent oil price for November, 2014, we constructed a basic model and projected the potential dynamics of ruble for that same period, using the obtained forecast values of the oil prices.

Due to the well-known high degree of dependence of the Russian economy on exports of oil (and other natural resource), the value of ruble/USD nominal exchange rate has been strongly dependent on the Brent oil price dynamics since the early 2000s. Thus, for modeling purposes, it was natural to relate these two variables. As it can be seen from Figure 3, a straight-forward pair-wise econometric model can be applied to describe the relationship between the two variables.

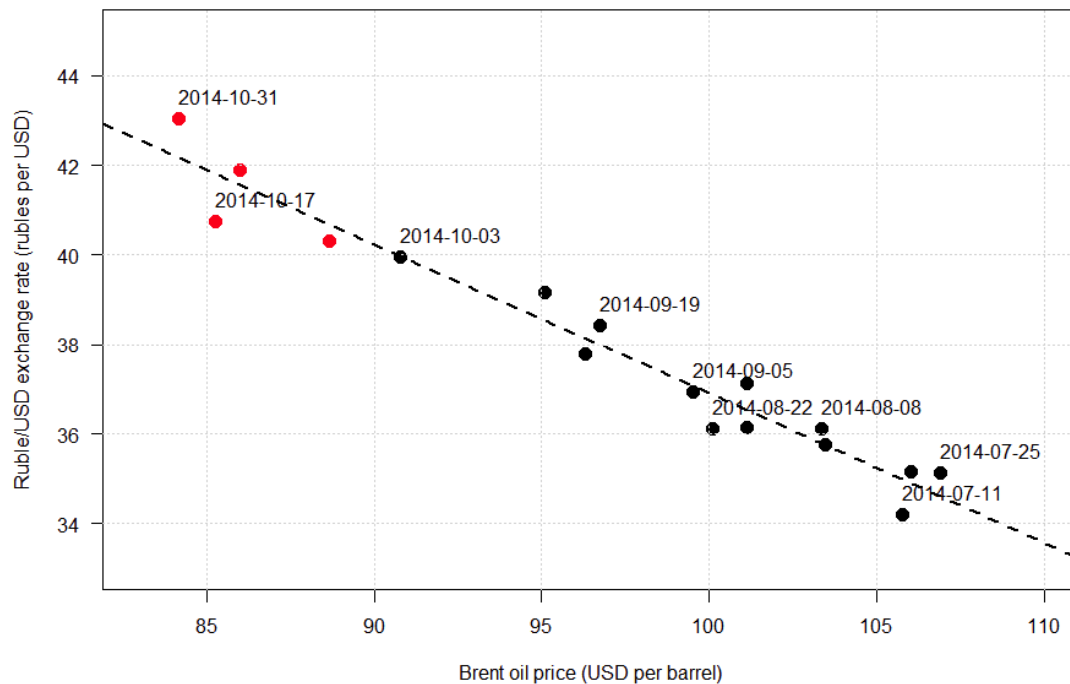
Preliminary, Figure 3 depicts one more peculiarity which concerns the fact that the Bank of Russia's interventions in the national currency market in October 2014 were virtually ineffective (under the superseding influence of the global oil market). We will get back to discussion of this fact later in Section 5.

Still, to formally reflect the idea of presence of these interventions in October 2014, we initially introduced a binary variable *bvInterv* (taking 1 for October 2014, and 0 – otherwise) in Model (2). Our calculations showed no statistically significant influence from the part of this binary variable, so, it was excluded from the final version of Model (2) presented as follows<sup>4</sup>:

$$RubleUSD_t = 70.18_{(1.844)}^{***} - 0.33_{(0.019)}^{***} \cdot Brent_t, \tag{2}$$

where *RubleUSD<sub>t</sub>* is the ruble/USD nominal exchange rate; *Brent<sub>t</sub>* is the price of Brent oil; standard errors are given in parentheses under the coefficients; \*\*\* denotes significance at the 1% level of significance (provided as additional information).

<sup>4</sup>The formal results of the traditional tests for Model (2) are as follows. The F-test statistic = 308.5 with p-value = 2.051e-11; the Shapiro-Wilk normality test statistic W = 0.96 with p-value = 0.59; the Durbin-Watson test statistic DW = 1.71 with p-value = 0.184; the Breusch-Pagan heteroscedasticity test statistic BP = 1.07 with p-value = 0.30; the RESET test statistic = 0.04 with p-value = 0.97. Thus, the results indicate statistical adequacy of Model (2).



**Figure 3:** Pair-wise relationship between Brent oil price and ruble/USD nominal exchange rate.

**Note:** The red dots in the graph designate October 2014, the period of active interventions of Bank of Russia in the national currency market.

The goodness-of-fit metrics demonstrated a high quality of Model (2). Specifically, multiple R-squared of the model was 0.9536; root mean squared error (RMSE) was 0.54 (ruble per USD); mean average percentage error (MAPE) was 1.21 (%).

Figure 4 illustrates the performance of Model (2), where the use of previously obtained Brent oil price forecasts was made. To save space, the results only for the fall of 2014 are presented in the graph. The shaded areas given in the graph are necessary to comment on. The dark-grey area represents the first week of November, 2014, when Bank of Russia did not yet introduce the free floating exchange rate regime. Thus, we can even compare the predicted value of the exchange rate (43.4 rubles per USD) with the actual one (46.6 rubles per USD). It can be seen that the former (predicted) value is quite optimistic.

The light-grey area in the graph reflects the period of ruble exchange rate fluctuations under now the free floating exchange rate regime introduced on the 10<sup>th</sup> of November, 2014. So, the actual values of the exchange rate cannot be compared with the predicted ones.

Still, the constructed projections (in the light-grey area) quite sufficiently underestimate the actual

depreciation of ruble in November, 2014. But, for the purposes of further discussion (see Section 5), this, actually, is even better. Because in this case the obtained forecasts reflect some sort of 'baseline' – not the worst case – scenario.

This means the following: If under this 'baseline' scenario we would be able to show that spending of international reserves by Bank of Russia would have resulted in their severe insufficiency and this fact had caused the switch to the free floating exchange rate regime, then this would be a consistent proof that the actual situation would have been even worse (if ruble had depreciated much deeper). This also would mean that the timely reaction of Bank of Russia to the situation in the national currency market was appropriate.

### 4.3. International Reserves Dynamics Prediction

The final step of our "thought experiment" related the dynamics of the ruble/USD exchange rate to the dynamics of the international reserves of Bank of Russia.

Changes in the global and local currency markets in the second half of 2014 expectedly led to changes in the amounts of the international reserves of Bank of

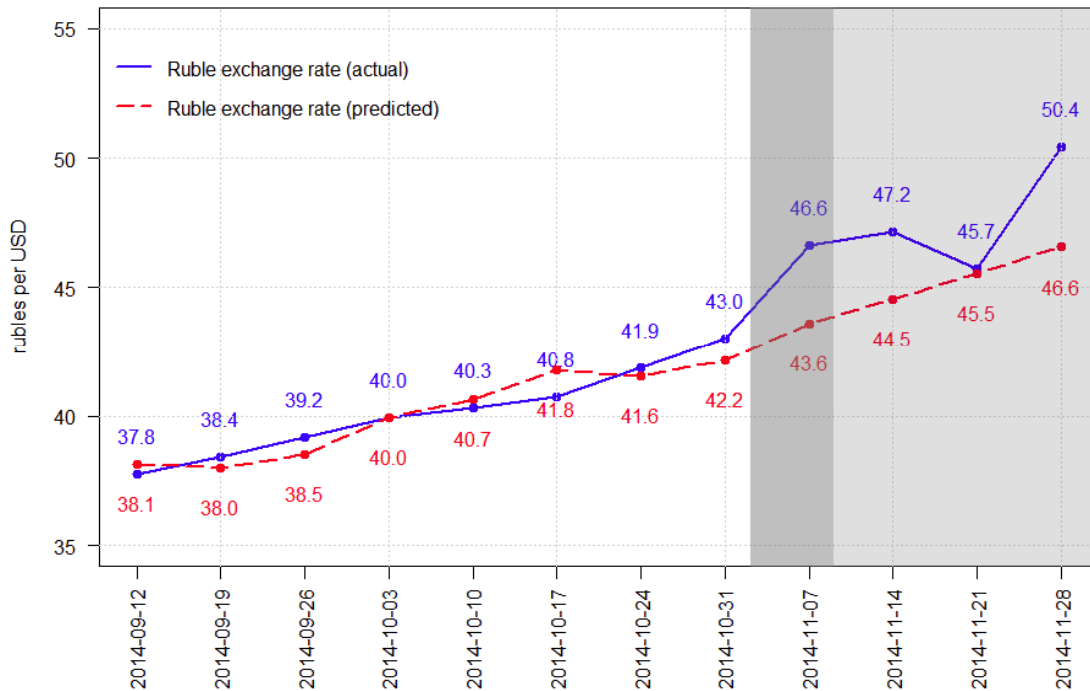


Figure 4: Performance of Model (2).

Note: The light and dark shaded areas are commented in the text.

Russia. Moreover, as we mentioned above, in October 2014, to support the national currency, Bank of Russia started to actively spend its international reserves, with their amount continuing to decrease exponentially (see Figure 1).

Figure 5 depicts the relationship between the ruble/USD exchange rate and the amount of international reserves of Bank of Russia in the second half of 2014. It can be seen from the graph that it is not only that there is a clear linear association between the

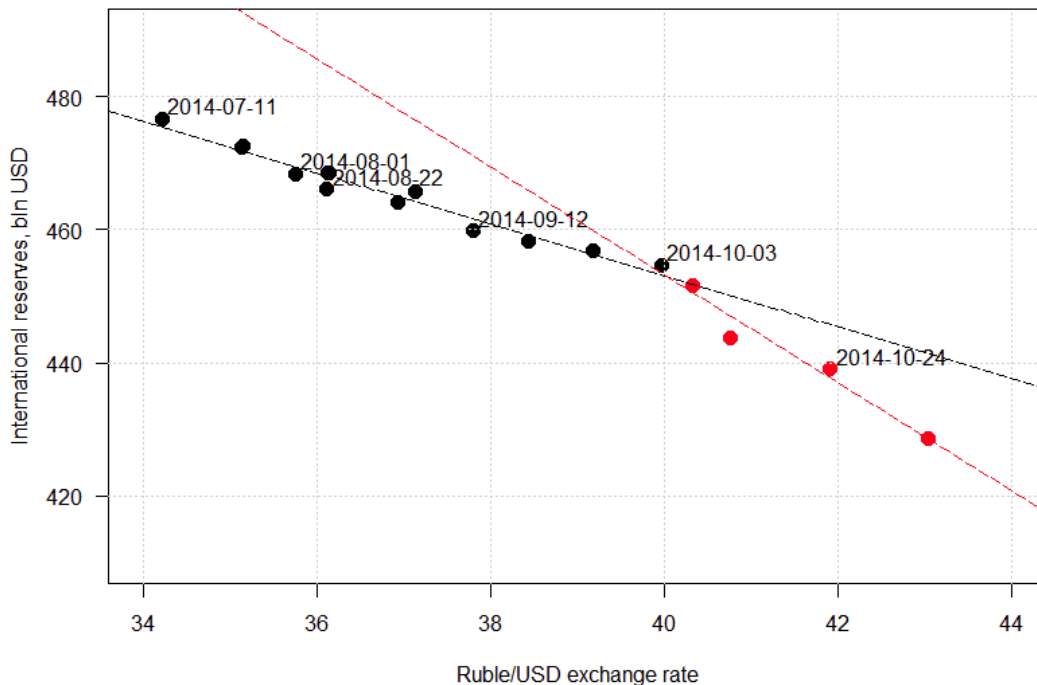


Figure 5: Relationship between the ruble exchange rate and the international reserves of Bank of Russia.

Note: The red dots in the graph designate October 2014, the period of active interventions of Bank of Russia in the national currency market.

two variables, but also this association is piece-wise linear with a distinct shift corresponding to October 2014.

Thus, on the one hand, again, a basic model can be adequately applied here, but, on the other hand, this model has to take into account this piece-wise linearity. To construct an adequate model, we used the binary variable  $bvInterv$  corresponding to the period of October 2014 (as it was described above in Section 4.2), and introduced it into the model for international reserves in the following manner<sup>5</sup>:

$$IntRes_t = 607.82^{***} - 3.87^{***} \cdot RubleUSD_t + 153.81^{***} \cdot bvInterv_t - 3.86^{***} \cdot [RubleUSD_t \cdot bvInterv_t], \quad (3)$$

(9.676)                      (0.263)                      (31.69)                      (0.773)

where  $IntRes_t$  is the amount of international reserves of Bank of Russia;  $RubleUSD_t$  is the ruble/USD nominal exchange rate;  $RubleUSD_t \cdot bvInterv_t$  represents the interaction term to capture piece-wise linearity in the data; standard errors are given in parentheses under the coefficients; \*\*\* denotes significance at the 1% level of significance (provided as additional information).

The goodness-of-fit metrics demonstrated high quality of Model (3) as well. Specifically, multiple R-squared of the model was 0.9886; root mean squared error (RMSE) was 1.34 (bln USD); mean average percentage error (MAPE) was 0.25 (%).

It is worth mentioning the following. As the estimation of Model (3) showed, it was not even necessary to include in the model the specific amounts of per week currency interventions of Bank of Russia in October 2014, which may have introduced problems because the interventions were of non-regular kind. This is to say that it would have been rather difficult to mathematically correctly describe the pattern of the October interventions, not to mention that for further prediction purposes it would have been really problematic to imagine which amounts of interventions Bank of Russia would have introduced to the national currency market in November 2014. The used binary variable  $bvInterv$ , on the one hand, allowed to effectively overcome this difficulty, and, on the other hand, proved to be of great help in further forecasting.

Using the previously obtained predicted values for the ruble/USD exchange rate for November 2014, as well as assuming continuation of Bank of Russia's currency interventions in November 2014 (meaning  $bvInterv=1$ ), we predicted the potential changes in the international reserves of Bank of Russia for that period. The results are given in Figure 6.

Again, the light-grey and dark-grey areas are specified in Figure 6. The dark-grey area represents the first week of November, 2014 (before the switch to the floating exchange rate regime). It can be seen that the predicted stock of international reserves (425 bln USD) is very close to the actual one (421 bln USD). The actual figures in the light-grey area are not comparable to the predicted ones (due to the switch to the floating exchange rate regime), but the projections clearly indicate the expected (or, to say, optimistic) amount of international reserves (402 bln USD), had Bank of Russia not made the switch and continued its currency interventions.

Having run the necessary calculations, we now get to the discussion of why the above-described findings are important, and how they help to support our research hypotheses.

## 5. DISCUSSION

### 5.1. The (in)Sufficiency of International Reserves of Bank of Russia in the Late 2014

As our calculations showed above, the projections of Brent oil price, ruble/USD nominal exchange rate, and the amounts of international reserves of Bank of Russia, obtained for November 2014, as compared to the actual November values of these indicators (of course, unknown in October 2014), constituted quite a "baseline" (not the worst case) scenario for Bank of Russia.

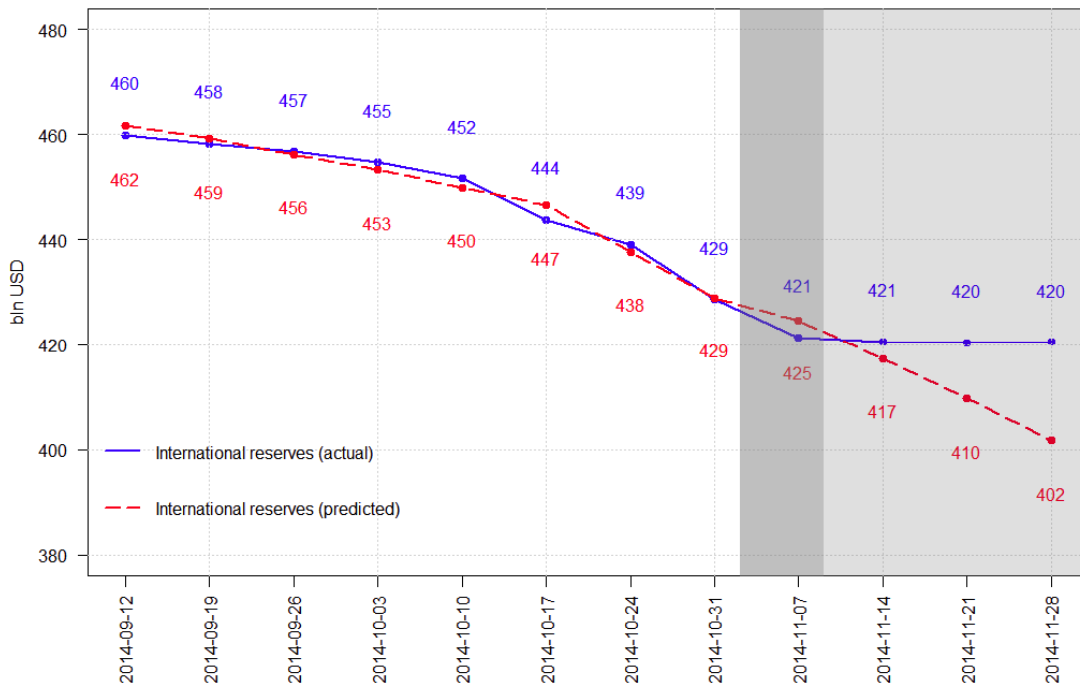
But even under this "baseline" scenario, had Bank of Russia continued its support of ruble in November 2014, the (projected) stock of international reserves would drop down to 402 bln USD. Actually, as the first week of November, 2014, showed (see Figure 4), the depreciation of ruble was deeper than predicted in the end of October, 2014, meaning that by the end of November, 2014, the stock of international reserves would have dropped much below 400 bln USD.

But what would that situation have contradicted to?

To answer this principal question, we need to look at what is called *international reserves adequacy*

<sup>5</sup>The formal results of the traditional tests for Model (3) are as follows. The F-test statistic = 376.4 with p-value = 7.013e-13; the Shapiro-Wilk normality test statistic W = 0.93 with p-value = 0.207; the Durbin-Watson test statistic DW = 2.54 with p-value = 0.665; the Breusch-Pagan heteroscedasticity test statistic BP = 4.48 with p-value = 0.214; the RESET test statistic = 1.17 with p-value = 0.345. Thus, the results indicate statistical adequacy of Model (3).





**Figure 6:** The projected changes in the international reserves of Bank of Russia.

**Note:** Light and dark shaded areas are commented in the text.

*criteria (IRAC)* – the indicators, actively developed and improved, in particular, by the International Monetary Fund. As of now, there are several IRAC developed in the literature: both traditional criteria, such as the import coverage, the Greenspan-Guidotti, and the Reddy rules, and modern criteria, such as ARA EM optimal reserve model proposed by the International Monetary Fund in 2013. A comprehensive overview of different IRAC, as well as the description of the ARA EM model can be found in (International Monetary Fund 2013).

Bank of Russia routinely calculates the values of a number of these IRAC. These figures for the period under study are given in Table 1 (panel A). Direct comparison of the official international reserves of Bank of Russia (Table 1, line 8, columns (3)-(5)) to the values of these IRAC (Table 1, lines 1-4, columns (3)-(5)) *creates an illusion* that the international reserves were adequate and sufficient of that time. But this was not the actual situation.

An important thing to be kept in mind here is that according to the methodology of the Russian international reserves composition, the money of two Russian sovereign wealth funds (the National Wealth Fund and the Reserve Fund) has also been part of the Russian international reserves since 2008 (Bank of Russia 2017b). And, as it can be seen from Table 1,

these two sovereign wealth funds constituted a substantial part of the international reserves of Russia.

The two funds were created in 2008 to absorb the oil export incomes of Russia. The Reserve Fund has been aimed at supporting the Russian economy when oil and gas incomes fall, while the National Wealth Fund's main objective has been to support the Russian pension system. The two funds have been controlled by the Ministry of Finance of Russia.

In any case, the money from these funds *could not* be used by Bank of Russia to make interventions in order to support the national currency. This virtually means that in order to calculate the *disposable* amount of international reserves of Bank of Russia, we should subtract the money of these funds from the total international reserves. This is done in line 9 of Table 1. It can be seen that the disposable amount of international reserves in 2014 was stably lower than one of the IRAC – the Reddy's rule.

After discussing these considerations, we hopefully are ready to address the main question of this study – why Bank of Russia “suddenly” decided to introduce the free floating exchange rate regime?

To do so, we needed to use our projection of the amount of international reserves for November 2014,

**Table 1: International Reserves of Bank of Russia: Adequacy Criteria and Sufficiency, bln USD**

#	date	01.04.2014	01.07.2014	01.10.2014	01.12.2014
(1)	(2)	(3)	(4)	(5)	(6)*
<b>Panel A. International reserves adequacy criteria</b>					
1	The 3-month import coverage rule	116.5	115.6	113.4	111.9
2	The Greenspan-Guidotti's rule	227.5	231.4	205.2	187.7
3	The Reddy's rule	344.0	347.0	318.6	299.7
4	The IMF ARA EM model	277.5	291.7	259.4	237.9
<b>Panel B. Russian Sovereign Wealth Funds</b>					
5	The National Wealth Fund	87.5	87.9	83.2	80.1
6	The Reserve Fund	87.5	87.3	90.0	91.8
7	<b>Total (line 5 plus line 6)</b>	<b>175.0</b>	<b>175.2</b>	<b>173.2</b>	<b>171.9</b>
<b>Panel C. International reserves: official and disposable</b>					
8	Actual amount of international reserves	486.1	478.3	454.2	402.0
9	Disposable amount of international reserves* (line 8 minus line 7)	311.1	303.1	281.0	230.1

Note: \* figures in the corresponding column and row were calculated by the author.

Source: Bank of Russia ([www.cbr.ru](http://www.cbr.ru)), the Ministry of Finance of Russia ([www.minfin.ru](http://www.minfin.ru)), author's calculations.

as well as calculate some other figures in column (6) of Table 1. Unlike Bank of Russia and the Ministry of Finance, the lay experts (including us) cannot operatively calculate the necessary indicators. This is why here, to calculate the indicators in lines 1-7 for the 1<sup>st</sup> of December, 2014 (column (6)), we used simple linear extrapolations of the following kind:

$$X_{01.12.2014} = X_{01.10.2014} - \frac{2}{3} \cdot (X_{01.07.2014} - X_{01.10.2014}), \quad (4)$$

where X stands for the corresponding indicator (in lines 1-6) on the specified date, while factor  $\frac{2}{3}$  reflects the first two months (October and November) of the three months in the 4<sup>th</sup> quarter of 2014.

The information for line 8 of column (6) was taken from our projections in Figure 6. Line 9 of column (6) was calculated automatically, where as an estimate of the disposable international reserves by the 1<sup>st</sup> of December, 2014, we got **230.1 bln USD**. And this figure became very indicative, when we compared it to the value of ARA EM criterion which for the same date was 237.9 bln USD.

This means that by the 1<sup>st</sup> of December, 2014, the stock of international reserves of Bank of Russia may easily not have met the ARA EM and some other criteria. Needless to say, that the ARA EM rule has been one of the most powerful tools for international

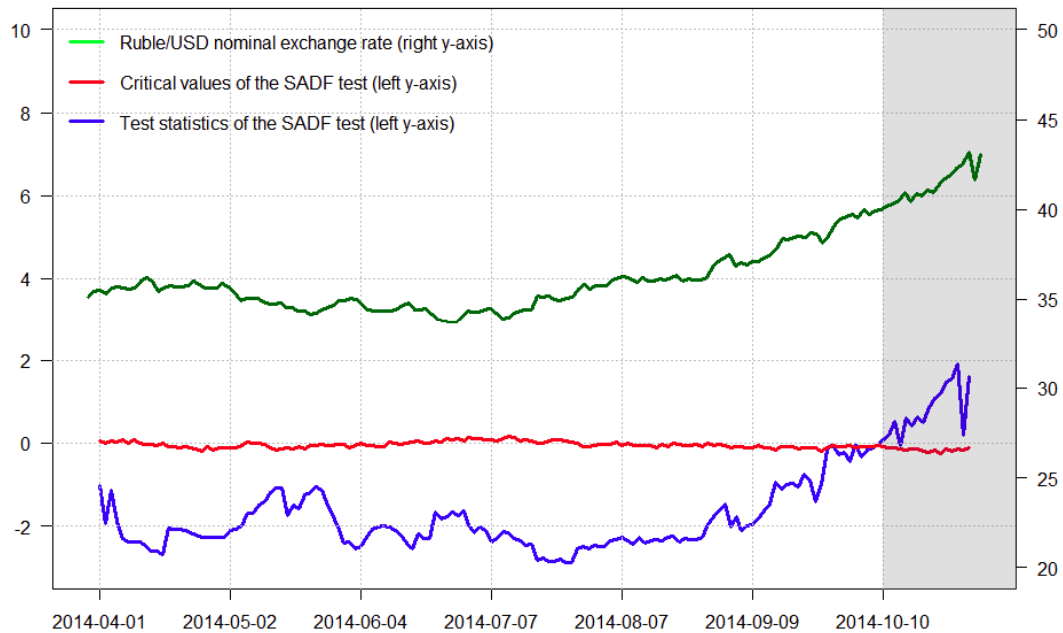
reserves adequacy assessment of nowadays, while our estimate of 402.0 bln USD of the Russian international reserves was quite optimistic since it corresponded to the “baseline” scenario (as discussed above).

So, it may very well be the case that after making projections within a similar “thought experiment” and seeing a prominent threat to its reserves, Bank of Russia took the *timely* decision of switching to the free floating exchange rate regime – the decision which was supported by the events of the first week of November, 2014, when ruble depreciated even more than could have been expected.

And, in this sense, the above described course of events (with the introduction of the free floating exchange rate regime) could have been predicted by the lay experts to happen in the middle of November 2014, based on publicly available information and on basic econometric projections. This finding supports our first research hypothesis.

## 5.2. The Inefficacy of the Currency Interventions of Bank of Russia

The fact that the currency interventions of Bank of Russia in October, 2014, were ineffective casts almost no doubts now. This can be indirectly supported by the fact that on the 31<sup>st</sup> of October, 2014, Bank of Russia was forced to increase the key interest rate from 8% to 9.5% (see also Section 2). Also, as it was mentioned in



**Figure 7:** The Phillips-Wu-Yu SADF test results for ruble/USD exchange rate (daily data).

Section 3.4, our own calculations showed that the interventions had no significant influence on supporting ruble. But why?

One of the answers to that question may be found in the fact that Bank of Russia was fighting against a “bubble” in the national currency market, caused by a tremendous speculative attack via currency carry-trade operations. Such speculative attacks, if successful, “traditionally” lead to a severe national currency crisis. The well-known example here is a number of currency crises in the 1990s: the European Exchange Rate Mechanism (ERM) crises of 1992-1993, the Latin crisis of 1994-1995, the Asian crisis of 1997-1998; the Russian crisis of 1998.

To support this idea, we collected end-of-day market values of the ruble/USD nominal exchange rate for the period from April to October, 2014, and applied one of the modern test for ‘bubble’ detection – the Phillips-Wu-Yu SADF test (Phillips, Wu, and Yu 2011) to detect ‘bubbles’ in financial markets.

The results of the SADF test application are given in Figure 7. According to this test, the values of the SADF test statistic (the blue line) above the simulated critical values (given in red) speak in favor of a ‘bubble’ presence. It can be seen in Figure 7 that it is exactly in October, 2014, the test indicates the presence of a ‘bubble’ – a speculative appreciation of the US dollar against ruble (and, correspondingly, sharp depreciation of ruble).

This means that it was very difficult to expect the currency interventions of Bank of Russia in October 2014 to be efficient against such speculative attack.

This finding is, actually, in line with the existing literature which doubts the usefulness of interventions, especially, during currency crises. Specifically, currency crisis models point at the ineffectiveness of interventions when the exchange rate is inconsistent with other macroeconomic policies, with intervention even possibly increasing the degree of a speculative attack (Sarno and Taylor 2001). For example, Dominguez (2003) used high frequency intra-day data for the USA, Japan, and Germany and showed that the efficacy of interventions depends on the characteristics of the currency market. Adler and Tovar (2011) found that for emerging markets during the episodes of pressure on the national currency, interventions cannot significantly affect the level of the exchange rate. In a survey on the effectiveness of currency interventions in emerging markets, Ostry, Ghosh, and Chamon (2012) found that the evidence on the efficacy of interventions in emerging market economies is mixed.

## 6. CONCLUSION

Summing up the discussion in this paper, it should be emphasized that the events of the fall of 2014 in the Russian currency market forced Bank of Russia to change the exchange rate regime in the national economy.

In this study we showed that in 2014 the regulator was trying to protect ruble against a massive speculative attack, actively spending its international reserves, but the interventions proved quite ineffective. Moreover, the peculiarity of the structure of these reserves dictated a very limited range of maneuver for the central bank, forcing it to switch to the free floating exchange rate regime in the first half of November, 2014 – an important event, which, actually, could have been predicted by the lay experts on the basis of publically available information and application of simple econometric models.

Noteworthy to say that, although not expectedly to the lay population, this switch of the exchange rate regime was done by Bank of Russia quite timely. And it is partially due to this measure that head of Bank of Russia Elvira Nabiullina was named “Central Bank Governor of the Year” by Euromoney magazine in 2015 (Euromoney 2015).

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