Currency risk management: the experience of a Russian company


ABSTRACT

Exchange rate fluctuation has a significant impact on the economic results of different economic agents. In this report are analyzed two exchange rate forecast models is based on macroeconomic factors, such as RiskMetrics Group Inc.(RMG) (NYSE: RISK) and Krugman-and-Obstfeld models and VaR Methodologies. The models are widely used in analysis and forecasting of USD/RUR exchange rates. Comparative analyses were done between currency risks minimization instruments existing in Russian business practice. The author emphasized the most efficient instruments for small and large-scale business.

Key words: Currency risks; exchange rate forecasting models; forecasting the dollar-ruble exchange rate; instruments for minimizing currency risk, hedging of the ruble, currency risk management in Russia.

JEL Classification: G32

The growth of currency risks in the global financial crisis

Financial crisis in Russia was caused by a number of reasons and processes. Falling prices for oil and metals caused a fall in foreign exchange inflows into the country. At the same time revenue growth in recent years led to an increase in imports thus it increased the outflow of currency. Reduction of currency supply and demand for it led to increased pressure on the ruble. Some banks sought to convert rubles received from the Central Bank to save money against inflation. It also increased the demand for USD and Euro. Slowdown in GDP growth and accelerating inflation in turn contributed to the ruble weakening.

In this paper we consider the currency risk management at one of the largest Russian companies OJSC “Magnitogorsk Iron & Steel Works” (OJSC “MMK”). Its practice and method for managing currency risk can in our view be widely applied directly or in a modified form by other Russian and foreign companies operating in Russia.

Almost every economic agent is influenced by exchange rate fluctuations on its financial results. Under these conditions an urgent task is to minimize foreign exchange risks for the enterprise. Effect of exchange rate risk to the company is reflected also in the work of a

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number of Russian scientists and economists. For example Polterovich V.M. and Popov V.V. investigated national and international experience of industry stimulating with the help of real exchange rate regulation by the government [21].

It’s difficult to overestimate the significance of currency risks. This subject became actual and urgent in business as floating exchange rates were introduced. The first survey conducted in 1978 showed highly significant risk of currency fluctuations for German firms [10].

So the demand for instruments to minimize currency risk was the answer to such requests from the business. However, considerable popularity hedging currency risk acquired after the Asian crisis of 1997 [3]. Since that time, multinational companies actively begin to use synthetic options in risk management. Effectiveness of use options contributes overthrow forwards. It was proved by Chan Kam Fong, Gan Christopher, McGraw Patricia for example in the case of New Zealand exporters [4]. The next burst for currency risk hedging was a terrorist act, 2001 in New York City. Speculative attack on the dollar after it has increased the demand for hedging instruments. One of the most popular instruments in this period was the currency swap [20].

The aim of our research has been the development of methods allowing minimize economic agent’s losses from the exchange rate changes based on determination the impact of currency risk on the business entities and summarizing companies experience of losses minimize from currency risks.

**Identification the influence of exchange rate changes on economic results of business entities**

The effects of currency risk on company's earnings, cash flow, and balance sheet stand for an actual problem around the world. This explains the wide geography of works on the subject. The expose of foreign exchange risk was proved by Chan Kam Fong, Gan Christopher, McGraw Patricia on the example of New Zealand exporters [4]. The impact of currency risk on company’s value was also investigated by Makar Stephen D, Huffman Stephen P. They examined the impact of exchange rates on US companies value and assessed the value of such exposure. The authors analyzed the dependence of the company’s size and the degree of foreign capital from changes in exchange rates. The authors developed special indicators to assess this dependence [26]. Johnson R. D., Worzala E. M., Lizieri C. M. in the article researched hotel holdings and proved the impact of currency risk on the value of foreign investments [14].

To determine the effect of exchange rate changes on the business entity offered a method of analysis which is based on lessons learned diversified companies facing the influence of currency risk. The company is divided into so-called "clean" subjects:
- Exporter, 34% percent of company production is exported, it’s one of the largest exporters of the Urals and Siberia (2nd place in the ranking of "Major exports 2008" magazine "Expert")
- Borrower (the value of loans in U.S. dollars exceeds 550 million)
- Internal company with foreign competitors.
Tab. 1: Impact of exchange rate changes on the financial results of OJSC "MMK"

<table>
<thead>
<tr>
<th>№</th>
<th>Indicator</th>
<th>Actual value according to the company [19]</th>
<th>Calculated value at the rate 29.38 USD/RUB</th>
<th>Currency risk’s effect on the company (art.3-art.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Revenues from exports *, million RUB</td>
<td>15 595.35</td>
<td>13 996.2</td>
<td>1599.156</td>
</tr>
<tr>
<td>2</td>
<td>Ruble cost of borrowing in foreign currency, million RUB</td>
<td>17935.83</td>
<td>16096.68</td>
<td>1839.15</td>
</tr>
<tr>
<td>3</td>
<td>Company share in the domestic market, %</td>
<td>17%*</td>
<td>16%*</td>
<td>+1%</td>
</tr>
<tr>
<td>4</td>
<td>Cumulative effect (line 1-line 2), thousand RUB</td>
<td></td>
<td></td>
<td>-239,994</td>
</tr>
</tbody>
</table>

Note: The company’s share in the domestic market estimated by the authors is based on the company’s annual report for 2008 and 2009.

Currency risks OJSC "MMK" provide contradictory effects. The positive effect of external trade in the amount of $ 1.6 billion has been completely blocked by the growth of ruble value and credits in foreign currencies totaling some 1.84 billion rubles. The company received cumulative loss of $ 240 million. At the same time by the devaluation of the ruble and falling competitiveness of foreign producers OJSC "MMK" has increased its domestic market share in percentage terms, but in absolute terms, domestic sales decreased from 2.3 to 0.9 billion dollars. But without devaluation effect the company would lose more. The cumulative currency risk’s effect on the company can be described as positive.

The company has integrated risk management system, including currency risks. The company uses various tools: currency clauses, hedging and insurance. There is a system of criteria of tools application. At the same time, the company rapidly increased its loan portfolio in dollars at the end of 2008 and just before a significant devaluation of the ruble. This indicates a lack of forecasting in the currency risk management.

The ruble devaluation had a positive impact not only on the OJSC "MMK". Russian exporters and enterprises working on import substitution have thus increased their competitiveness. This effect is based on the government policy support for domestic producers. This confirmed the national and international experience gained from promoting the industry with the help of government regulation of the real exchange rate [21].

Generalized analysis results with definition on which groups businesses devaluation and revaluation of the ruble has a positive impact, and on what - the negative, are presented in Table 2.
Tab. 2: Positive and negative impact of exchange rate changes on economic results of business entities.

<table>
<thead>
<tr>
<th>RUB devaluation and USD revaluation *</th>
<th>RUB revaluation and USD devaluation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive impact</td>
<td>Negative impact</td>
</tr>
<tr>
<td>Positive impact</td>
<td>Negative impact</td>
</tr>
<tr>
<td>• exporters</td>
<td>• importers,</td>
</tr>
<tr>
<td>• businesses operating on the domestic market and have foreign competitors</td>
<td>• legal and physical persons - borrowers of loans in foreign currency,</td>
</tr>
<tr>
<td>• legal and physical persons, investors (creditors), carrying out investments (loans outstanding) in the currency</td>
<td>• consumers</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Note: Change in the exchange rate has no effect on companies operating in the domestic market and have no foreign competition.</td>
<td></td>
</tr>
</tbody>
</table>

As the table shows almost every economic entity is affected by exchange rate fluctuations on its financial results.

Currency risk management isn’t typical for Russian companies. Not many Russian companies are engaged in currency risk management at all. In favorable market conjuncture with sales of 100 million dollars per month losses of 4-5 million dollars is almost imperceptible.

In difficult market conditions and conjuncture therefore companies have to optimize their costs, including the reduction of losses from currency risks.

Large international corporations pay great attention to minimizing currency risk. For example the company Volkswagen has in its structure division which deals exclusively with currency risk reduction [1]. The French car monopoly Peugeot created in 1981 a specialized company with the aim to manage currency risk within the Group and it implements all of its foreign exchange and monetary transactions.

In this work we have considered two options for managing foreign exchange risk. The first is based on the forecast exchange rate, the second – on Value at Risk (VaR) method.

**Exchange rate forecasting models and their application in Russia**

There are two main approaches in forecasting currency risk. Supporters of the first approach predict exchange rate changes based on macroeconomic factors: GDP, money supply, investment, interest rates. Supporters of the second approach use various statistical methods and econometric modeling. Among the supporters of the first approach, we could mention such scientists as Krugman, Nobel Prize 2008, Obstfeld and others. The worldwide economic literature presents different correlation models between exchange rate and macroeconomic factors.

The work of Chinese economists Zheng Qin, Lihua Cheng, Juan Du and Bo Tian has been devoted to the influence of the GDP and the money supply on the exchange rate. The economists identified the correlations between fluctuations in GDP, indices of money supply in China and the RMB exchange rate [5]. Chinese economist Bangyong Hu using VAR-method proved the impact of such macroeconomic factors as foreign direct investment on the exchange rate [13]. The same conclusion was also made by American economists Christian W. Schmidt, Udo Broll who investigated correlations between the U.S. dollar and the value of foreign direct investment in the U.S. using VaR method. [25].
In the course of our research we studied and tested two most famous models of calculations and prediction the exchange rate. The first model, developed by consulting company New York Risk Metrix Group [24], considers the impact of inflation and the risk-free rate of return. The second model was developed by Krugman (Nobel Prize in 2008) and Obstfeld at Princeton University US [6]. It’s based on monetary theory. It takes into account the influence of money supply and national income on the exchange rate.

All analysis and testing of models were made were carried out in respect of USD/RUB.

New York Risk Metrix Group model:

\[
e_t = \prod_{t} \prod_{r}^* (y_t^*(i_t^* - i_t^*))+u, \quad (1)
\]

- \(e_t\): the increment rate of nominal exchange rate in period \(t\)
- \(\prod_{t}\): Risk - free rate - refinancing rate in the country. In this example it is in Russia (marked with an asterisk refinancing rate in the country-issuer of foreign currency, in our case, USA)
- \(i_t\): coefficient of elasticity, which indicates the sensitivity of foreign exchange rates to changes in exchange rates

The model approbation was based on data for the period from 1999 to 2008. The data source for consumer price inflation in Russia is a publication of the Federal State Statistics Service of the Russian Federation [8], for inflation in the U.S.- US Bureau of Labour Statistics [27]. The inflation forecast for Russia and the US for the year 2009 was made by the World Bank [29]. The data source for refinancing rate in Russia in 1999-2008 is a publication of the Central Bank of Russia [2], the refinancing rate in the U.S. has been taken from data of the U.S. Federal Reserve [7], the predicted values for 2009 also from the U.S. Federal Reserve and the Ministry of Finance [15], the U.S. Treasury [28], the World Bank [29], the Russian Trade Statistic [23].

In the course approbation were found constant \(y\) and \(u\). As a result, the values of the constants are: \(u = -46,136; y = -1,615\). After substituting the values of \(y\) and \(u\) a non-equation (1) model for the calculation of the dollar against the ruble becomes as indicated [17]:

\[
e_t = \prod_{t} \prod_{r}^* (1,615 (i_t^* - i_t^*)) - 46,136 \quad (2)
\]

For approbation this equation, we compared the forecast data with the actual exchange rate during the time period between 2002 and 2008 and calculated the mean square error, which amounted to 1.91 rubles, or 7.59% [29].

The second studied model - a model of Krugman - Obstfeld was developed at Princeton University, USA by the Nobel Prize Laureate 2008 Krugman and Obstfeld [2]. The model is based on the monetary theory of exchange rates pricing. The adapted model to the Russian market is as follows [29]

\[
E_{t}=m_{r} \cdot m_{i}^*+0.00181 (y^*_t - y^*_r) - 3.507867985 \quad (3)
\]

Comparing calculated values with actual values the standard deviation (the error) was 1220.37% [12]. Thus, the model of Krugman-Obstfeld cannot be applied for the USD / RUB prediction.

For exchange rate forecasting the authors proposed the following model [17]:
A*K = C – const

For the approbation of the author’s model we analyzed the period from 1999 to 2009. The constant C was calculated for each year based on the known data on M0 and Russia's GDP, M0 and the US GDP and the actual exchange rate for the period prior to the forecasted. The resulting standard deviation of the model (error value) amounted to 4.93 rubles, or 18.7%.

Each of the models we have examined has its own specific features and takes into account specific economic phenomena. The differences determine the advantages and disadvantages of models. Author’s model can be used for prediction of the course in sharp fluctuations of the trend, but it has a larger error than the model of New York Risk Metrix Group. Therefore, in our view, these models must be applied both for predicting currency risks.

So we proposed a method to minimize the risks of an economic entity from the exchange rate which includes 5 stages:

1. Forecast of currency risk
2. Identify currency risk impact on the results of business entities
3. Make management solutions to minimize costs and optimization
4. Decision about special tools for insurance losses of foreign exchange (currency clause, hedging, currency arbitrage)
5. Analysis results of decisions about minimize losses from exchange rate changes

**Methods of minimization currency risks based on Value at Risk (VaR)**

An alternative to method discussed above can be considered the method of minimization losses based on VaR (variation).

VaR method is widely used by supporters of approach that involves the use of statistical and economic modeling tools to manage currency risks. The economic literature considers the application of the method for the macroeconomic analysis as well as for micro levels analysis. S. Y. Novak, V. Dalla, L. Giraitis use VaR method to estimate currency risks at the State level. The authors mentioned here analyze currency risks in developing countries by the example of Mexico [18]. Marcel Fratzscher using VaR method investigates currency risks in the countries of Asia and Latin America [9]. Seung H. Han, Young Lee and Jong H. Ock use the VaR method for analyzing currency risks at the corporate level. As a result they offer the accounting treatment of currency risks in international contracts [11].

OJSC «MMK» uses economic modeling approaches, in particular the VaR method for currency risks estimation.

For the purpose of organization an efficient currency risk management there is a currency risk estimate which is based on the Value at Risk (VaR) method. VaR is calculated on the exchange rate dynamics of the previous period (see Graph 1 and Table 3)
Image No. 1: The official USD / RUB from 1999 to 2010

Table 3: The official USD/RUB and the dynamics of its changes from 1999 to 2010

<table>
<thead>
<tr>
<th>Date</th>
<th>USD/RUB</th>
<th>Ln of USD/RUB change</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.01.1999</td>
<td>20,6500</td>
<td></td>
</tr>
<tr>
<td>06.01.1999</td>
<td>20,6500</td>
<td>0,0000</td>
</tr>
<tr>
<td>07.01.1999</td>
<td>21,9100</td>
<td>0,0592</td>
</tr>
<tr>
<td>11.01.1999</td>
<td>22,4000</td>
<td>0,0221</td>
</tr>
<tr>
<td>12.01.1999</td>
<td>23,0600</td>
<td>0,0290</td>
</tr>
<tr>
<td>13.01.1999</td>
<td>22,5800</td>
<td>-0,0210</td>
</tr>
<tr>
<td>14.01.1999</td>
<td>21,8000</td>
<td>-0,0352</td>
</tr>
<tr>
<td>15.01.1999</td>
<td>21,4500</td>
<td>-0,0162</td>
</tr>
<tr>
<td>16.01.1999</td>
<td>21,8800</td>
<td>0,0198</td>
</tr>
<tr>
<td>19.01.1999</td>
<td>22,3700</td>
<td>0,0221</td>
</tr>
<tr>
<td>20.01.1999</td>
<td>22,9800</td>
<td>0,0269</td>
</tr>
<tr>
<td>21.01.1999</td>
<td>22,3900</td>
<td>-0,0260</td>
</tr>
<tr>
<td>22.01.1999</td>
<td>22,7300</td>
<td>0,0151</td>
</tr>
<tr>
<td>23.01.1999</td>
<td>22,7500</td>
<td>0,0009</td>
</tr>
<tr>
<td>26.01.1999</td>
<td>22,9500</td>
<td>0,0088</td>
</tr>
<tr>
<td>27.01.1999</td>
<td>22,8200</td>
<td>-0,0057</td>
</tr>
</tbody>
</table>

Source: Author
The calculation in table 3 shows that from 1999 to 2010 the maximum daily change USD / RUB (with 95% probability) does not exceed 23.67 kopeks. This may change during one trading day not more than 23.67 kopecks in either direction.

This method is not intended to predict the course, but allows us to estimate the value on which the current rate deviates from with a given probability. This gives us the understanding of how (in money terms) exchange rate fluctuations can affect company’s results including fluctuations in the billing period.

Management structure is one of the most important factors for high effective currency risk management. Therefore, for developing the organizational structure of risk management we widely analyzed foreign experience. Currency risk management in companies is on top of world scientific discussions. Andreas Röthig offers and provides a comparative analysis of different models of corporate currency risk management depending on the chosen hedging strategy. Author gets a lot of attention to risk-management models in the economic crisis [22]. Stefan Hloch, Ulrich Hommel, Karoline Jung-Senssfelder research currency risk management in worldwide operating companies. The most interesting, in our view is the authors’ proposal based on the experience of the bankrupt corporation E.ON [12].

Forecasting the exchange rate can be made on the basis of a model New York Risk Metrix Group in a stable trend and based on the author's model, in both stable and unstable trend conditions. Both models can also be used jointly.

In this work we propose a mechanism of minimization companies losses, which consists of following steps: 1) forecast the exchange rate, 2) analyze the impact of exchange rate changes on company’s economic results, 3) based on the results of steps 1 and 2, the company makes decision about cost reduction, change in policy sales, etc., 4) taking into account results of 2 and 3 steps, the company makes a decision about the application tools for minimization of losses related to changes in exchange rates, 5) analysis results of previous stages.
The development of the institutional framework for currency risk management at the largest metallurgical company in Russia, OJSC “Magnitogorsk iron & Steel Works” was conducted by the authors on the basis of different approaches to the management of foreign exchange risk, including macroeconomic modeling and VaR methodology. We have considered the work of leading international experts in the field as mentioned individually and specifically in the work. The practical results of the implementation of the mechanism for minimizing currency risks obtained at OJSC “Magnitogorsk Iron & Steel Works” allow suggest that the use of the gained experience in management of currency risks in Russian markets can bring positive effects not only for Russian but also for foreign companies operating in Russia.

The globalization of activities increases the importance of risk management including the management of currency exchange risks. The relevance of the subject offers a significant opportunity for further research not only in this area. A definition and selection of optimal currency basket for calculations on the basis of risk analysis of major currencies may be just such a one opportunity and challenge.

An application of developed methodology for minimization company’s losses from changes in exchange rates allows companies to extract following benefits:

- Reduce costs;
- Increase revenues;
- Reduce risks of international trade and as a result increase the trading volume.

These benefits allow get positive effects for businesses and for the State as a whole. For example keeping corporate profits to minimize losses from income taxes reduction in the the treasury of federal, state and local budgets.

References

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