HEDGE EFFECTIVENESS OF THE RTS INDEX FUTURES

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ABSTRACT

This study focuses on the Russian derivatives market and the performance of the Russian stock index futures.

With the improvement of legal regulation, the derivatives market in Russia has a real growth potential. The undervaluation of the domestic enterprises and the high growth rates of the Russian economy have led the stock market to the constant rise and growth, and the Russian derivatives market to a considerable boost in activity during the last ten years. However, as the rapid development of the Russian stock market cannot go on for ever, many private investors and professional managers feel the need of derivatives for investment hedging and reaping extra financial gains in the absence of the shares and bonds price surge.

The present paper analyses hedge effectiveness of the Russian Trading System Index Futures from the first day of their trading on August 3, 2005 through July 29, 2011. The choice of the Russian market is justified on the grounds that it is relatively new and is among the leading global derivatives exchanges, which is actively developing.

To estimate hedge effectiveness the six year daily RTS Index and RTS Index Futures returns were divided into twelve equal semiannual periods. The coefficient of determination or the R-Squared was employed as the main measure of the effectiveness, calculated by an Ordinary Least Squares regression analysis. In addition, a Minimum Variance Hedge Ratio model was applied to the hedge coefficient or the hedge ratio calculation. Besides, the volatility of both variables was examined and compared to the hedging coefficient’s fluctuations. The results showed that the RTS Index Futures contract fully satisfies the hedge effectiveness terms and conditions, and strongly reflect the market behavior.
DEDICATION

This thesis is dedicated to my parents to whom I owe my deepest and most heartfelt gratitude, and who have made my studies at the University of North Carolina Wilmington possible. I genuinely appreciate their tender loving care and support over the whole study period and throughout my life. I am incredibly thankful for their empathy and patience and, also, for their gentle, warm and unfailing love that succor and encourage me.
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INTRODUCTION

As a general rule, most people support the view that decision making under uncertain and risky circumstances is exceptionally difficult. In the case of financial and stock markets where the vast sums of money and even the future and the destiny of huge corporations are often at stake, this decision is twice as hard. The present paper entitled “Hedge Effectiveness of the RTS Index Futures” has its target audience of investors, executives, analysts together with finance, risk and portfolio managers. It is intended to give an account of Russian derivatives market and the extent to which eliminating risks with the most popular instrument in Russia RTS Index futures is successful.

The present chapter of the paper introduces the framework and objectives of the study. This section also provides the interpretation of the hedging concept and the explanation for the Russian financial market preference. In addition, the fundamental characteristics and specific features of the hedging instrument are identified, as well as factors and indicators that influence and evaluate hedging performance.

Hedging

To begin with, it is important to define the notion of hedging. Hedging is one of the most essential features of the derivatives market. It is also the most attractive and convenient way to neutralize systematic risks. The hedging principle is to fix the acceptable price level of the future transactions with financial instruments, such as forwards, futures or options. The major objective, however, is not to gain profit, but to preserve transactions from market volatility. This can be realized by taking an offsetting or reverse position. There are two forms of hedging in terms of the transaction type. Long hedge or buying should be employed if the risk is that prices or rates will go up. Oppositely, if the risk is that prices or rates will
decrease, selling or short hedge should be applied. As a rule, a company is long on assets and receivables, and short on liabilities and payables.

As previously mentioned, futures is one of the derivatives instruments that is used for hedging. A futures contract is a standardized agreement on the future delivery of the underlying asset of standardized quantity and quality for a price agreed today. Futures are traded on the exchange, with the exchange acting as an intermediary. An underlying asset to a futures contract can be commodities, currencies, securities, other financial instruments, interest rates or such intangible asset as a stock index which is used in the current study.

Russian Derivatives Market

This study focuses on the Russian derivatives market and the performance of the Russian stock index futures. Such choice is justified on the grounds that Russian derivatives market is relatively new and there are not enough specialists in this area yet. Moreover, it is among the leading global derivatives exchanges and is actively developing.

Russian derivatives market has its origin in 1992. From the very beginning it has been highly volatile. That is why hedging was almost not employed. However, the necessity of hedging was proved by the economic crisis of 1998 that brought Russian derivatives market to its initial place. Thirteen years ago even banks, the largest players on the market did not commonly used hedging. Dramatic financial loses have initiated capital outflow, and the insolvency of an infinite number of banks including the major ones, reflected on the financial status of their clients. Eventually, it took more than a year in order to reach former results.

Still, Russian investors similarly to the investors in the developed countries are undoubtedly interested in minimizing their risks. This is vividly illustrated by the analysis of trading volume indices dynamics and the share of the derivatives market in the Russian stock market in general. In the first quarter of 2004 the trading volume was at the level of RUB
33.17 billion, in January 2006 it reached RUB 160.49 billion and in the middle of 2008 it was already RUB 3,241.728 billion. On August 5, 2011 the total trading volume went beyond RUB 445.592 billion (USD 16.003 billion), or 8,762,666 contracts (rts.ru).

In the year 2007 the Government of the Russian Federation adopted quite a few regulations that enabled the professional managers to use futures and options for hedging in the individual asset management as well as in the investment and pension fund management.

Therefore with the improvement of legal regulation, the derivatives market in Russia has a real growth potential. The direct evidence to this is the fact that during the last ten years the constant rise and growth of the Russian stock market could have been observed, and the Russian derivatives market has a considerable boost in activity. The securities’ market value elevation is related to the undervaluation of the domestic enterprises, and also to the high growth rates of the Russian economy. However, the market condition demonstrated that the rapid development of the Russian stock market cannot go on for ever. That is why many private investors and professional managers felt the need of derivatives for investment hedging and reaping extra financial gains in the absence of the shares and bonds price surge.

Taking into consideration such a positive trend, it can be assumed that besides actively trading speculators and arbitrageurs, hedgers are becoming more customary to the market, and hedging positions from price risks is getting more important due to instability of particular domestic economic segments and crisis situation on the global markets.

A derivative trading is done through the derivatives exchanges as well as on the over-the-counter markets. Currently, on the Russian market the derivatives trading volume is far beyond stocks trading volume, which is clearly illustrated in the Table 1. This can be explained by the fact that derivative transactions are traditionally considered to be more profitable than those on the spot market. The underlying reason is not only the financial leverage but also the lack of transaction costs related to trading on the spot market, such as
margining expenses, depositary and settlement fees. Furthermore, the commission fees for transactions with derivatives are significantly lower than those on the spot market.

There are two derivatives markets in Russia, the Moscow Interbank Currency Exchange or MICEX and FORTS (Futures & Options market on RTS) which is the part of the Russian Trading System (RTS) Exchange.

Moscow Interbank Currency Exchange

On the Russian derivatives market MICEX is a leading organizer of trading. The MICEX floor holds a dominant position in the market for currency futures, with the share in this segment of about 95%. The Exchange organizes trading in US dollar futures and Euro futures as well as EUR/USD futures. In 2010, the total volume of trades in the MICEX Derivatives Market Section has reached more than 2 million contracts. MICEX also organizes trading in futures on inter-bank money market interest rates (MosIBOR and MosPrimeRate), which are calculated by the National Foreign Exchange Association (NFEA) and are acknowledged by the International Swaps and Derivatives Association (ISDA) as the reference ruble interest rate. In 2007, developing the derivatives market, the MICEX Group launched the MICEX Index futures trading. It became its first instrument in the stock derivatives segment. To ensure that obligations on futures trades are fulfilled, MICEX has a reliable risk management system. 190 organizations are members of the Derivatives Market Section and 130 banks and financial companies trade in the derivatives market of the MICEX Stock Exchange. To further develop the derivatives market, MICEX is making efforts to widen the range of traded instruments, first of all, by launching options trading. MICEX also intends to further increase the range of derivatives on stock assets, interest rate assets, and currency assets. (micex.com)
Russian Trading System

The main and the leading derivative market in Russia and Eastern Europe is FORTS. The trading started in September 2001. According to the Futures Industry Association the derivatives market of RTS is among the top ten global derivatives exchanges based on the results of the first quarter of 2011. This fact is supported by Table 2 that demonstrates the tremendous increase in the trading volume of futures and options on the Russian Trading System from 2002 to 2011. Considering the total derivatives trading volume as 100%, the shares of the futures and options on the market are showed by Figure 1, which displays the popularity of futures oppositely to options.

With the development of FORTS, RTS pays close attention to risk management. FORTS combines the developed infrastructure and reliability. The Russian Trading System Stock Exchange guarantees high trading technologies conformed to more than ten years of successful market development. The essential part of any transaction in derivatives is the settlement of the contract on a certain date in the future under fixed conditions. Together with developing FORTS, Russian Trading System Stock Exchange pays special attention to keeping its guarantee systems up-to-date. While improving its own system of guarantees, the exchange constantly raises the demands to its clearing members. The FORTS participants are secure high-capitalized investment companies and banks. During the crisis of 2008-2009 the Russian market fell by 80% with daily index fluctuations of 15% on selected days and volatility in individual stocks was even higher. RTS’s risk management system has successfully managed through such extraordinary environment. There was not a single case of any delay or non-payment.

Another significant task facing RTS is the development and implementation of a wide range of financial instruments that allows market participants to hedge price-related risks at the stock market, foreign exchange market, debt and commodity markets. At present FORTS
has the widest range of instruments in Russia. There are 54 contracts (40 futures and 14 options) on shares and bonds issued by the leading Russian companies, RTS Index, RTS Standard Index, shares of Russian companies, short-term interest rates (average overnight MosPrime rate and three-month MosPrime rate), currencies, and commodities including Urals and Brent oil, gasoil, power, gold, silver, and sugar.

One of the distinctive features of FORTS is the ability of every participant to trade using either their own terminals via Internet trading systems or workstations provided by RTS. Market participants can efficiently transfer funds between the various RTS markets including FORTS using the “single cash position” technology. (rts.ru)

Thereby, one of the main differences between the Moscow Interbank Currency Exchange and the Russian Trading System is that there are bigger players on the MICEX. However, this brings the RTS to the leading position in terms of trading volume. This is described by Table 3 that provides the shares in the total trading volume of the two Russian derivatives markets with regard to the number of trades and contracts for April 2010. That is why for the purpose of this study the RTS Index futures have been chosen as the most actively traded Index futures contract on the Russian derivatives market.

Russian Trading System Index

The RTS Index was first calculated on September 1, 1995. Ever since it become the main benchmark for the Russian securities industry. RTSI is based on the Exchange’s 50 most liquid and capitalized shares. The list is reviewed every 3 months by the RTS Information Committee. The Index value is calculated daily in US dollars in real time during the whole period of trading session on RTS.
Russian Trading System Index Futures

The RTS Index serves as an underlying value for the one of the most liquid instruments on FORTS, RTS Index futures. Launched in June of 2005 it is the first stock index futures contract in Russia. It is quoted as the RTS Index value multiplied by 100. For instance, if the value of Index is 1952 points, then the Index futures will be quoted as 195200 points. In the first quarter of 2008 the RTSI futures trading volume gained 511% compared to the similar period of 2007. Thus it became the fastest growing derivatives contract in the world. In 2007 a professional magazine for the futures and options industries Swiss Derivatives Review released an article on RTS Index futures saying that “in less than two years of trading, the RTS Index futures contracts have become as accepted in Russia as the leading blue chip stocks”\(^1\). In 2008 the US Futures Industry magazine has put the futures contract on RTS Index in the 15\(^{th}\) place in the trading volume rating (measured in contracts) among other 20 stock derivative instruments most actively traded worldwide.

Futures contract on RTS Index provides market participants with a wide range of opportunities to hedge stock portfolio risks and take advantage of movements of the entire market and not just on the prices of certain stocks. These contracts are equally attractive to both small-scale investors and large market professionals. RTS Index futures provide advantages over creating a portfolio of stocks linked to the RTS Index structure. They allow RTS Index volatility trading and effective management of stock portfolios that don’t match the RTS Index structure. Furthermore, using RTS Index futures it is possible to develop different arbitrage and speculative strategies and create synthetic futures on the “second-tier” stock index. Since buying and selling futures are symmetrical and equally simple transactions, it enables to sell short the entire stock portfolio unlike short selling of the

underlying stock. Moreover, RTS Index futures contracts are cheap to work with. There are no depositary fees and the financial leverage is free, as keeping positions is free of charge and fees are charged only for a position opening and closing. Finally, as RTS Index is calculated in US dollars, it is very convenient to hedge portfolios that are in US dollars with index futures (rts.ru). The more detailed characteristics, specifications and various strategies that utilize RTS Index Futures are represented in the Appendix.

Effectiveness Measurement Methods

Considering the above-mentioned and described various features and peculiarities of the Russian derivatives market and index futures instrument, it is crucial to understand how this characteristics can be applied into a successful hedging strategy.

As a rule, the price changes of futures contracts are different from their underlying cash securities. Therefore, it is reasonable to evaluate possible hedge result beforehand. In this regard, to establish an effective hedging strategy, it is necessary to employ the proper hedge ratio or, in other words, to calculate the hedging coefficient. The hedge ratio represents the number of futures contracts held relative to the number of cash positions it covers. There are various methods for determining the hedge ratio. In this study the minimum variance hedge ratio (MVHR) is calculated, defining the investment portfolio in terms of two assets, namely a futures position and a cash position. In the case of this study the spot and futures historical daily prices from the RTS Index are used. One might think of the ratio as the slope coefficient or the beta of the portfolio with respect to the futures contract.

Another point is that the main objective of hedging is to reduce risk, so a rational investor will be interested in what share of the return dispersion of each stock is determined with the return dispersion of RTS Index futures. To find it out the indicator that describes the maximum risk reduction potential of a hedge can be used. The coefficient of determination or
R-squared of the ordinary least squares (OLS) regression is a popular measure of hedging effectiveness when the minimum variance hedge ratio is used. It is the coefficient of determination of futures price changes or the independent variable against cash price changes, the dependant variable. With strong correlations of the stock returns and index futures, the R-squared will be slightly lower than 1, meaning that the hedge will be effective. However, if the variance is low, the R-squared will be low, implying that the hedge will not be successful.

Therefore, taking everything into account, the author of this study makes the hypothesis that hedging with the RTS Index futures is effective. In order to proceed with the research, the following structure outline of the paper is provided. The second section, the literature review, analyzes prior empirical and theoretical studies on the similar topic. The results and conclusions have been taken as a basis for the present research. The third chapter, methodology defines and tests the research hypothesis, and highlights the unique approach. Also, the sample data is presented and described. Using statistical analysis, the relations are evaluated and hedging effectiveness is measured. Finally, the results of the study are interpreted in chapter 4 and conclusions along with the suggestions for the further research are provided in chapter 5.

LITERATURE REVIEW

With futures’ creation and introduction to the world financial market, a lot of research has been done; many approaches and methods have been developed and implemented to investigate instrument’s hedge effectiveness. Many models use spot and futures data and their price relations to find out and explain hedgers’ behavior.

The theory of hedging can be divided into the three main schools of thought, the traditional hedging theory, Working’s hypothesis and the portfolio theory. In 1979
Ederington in his work entitled “The hedging performance of the new futures markets” provided a brief description of these theories. He uses Government National Mortgage Association Bills (GNMA) and 90 day Treasury Bills as the examples of the hedged items. He asserts that the traditional theory highlights futures’ ability to minimize risk. Hedgers hold positions that are opposite to spot, but that are of the same quantity. When the spot positions are liquidated, the futures positions are closing simultaneously. The traditional theory proposes that spot and futures prices usually tend to change together, that is why the dispersion of the hedged position should be less than the unhedged position’s dispersion. This issue is often explored within the context of the spot price and the basis changes comparison. The basis is defined as the difference between the futures and spot prices. The hedge is considered to be perfect if the basis changes equal zero. It is commonly stated that the value and the change of the basis are rather small, as there is an opportunity to make and accept the delivery of the futures contract’s underlying asset.2

Criticizing the traditional theory, Ederington singles out the spot and futures prices ability to change differently. For example, he says “the theory of adaptive expectations implies that if futures prices reflect market expectations they should not normally match changes in cash prices.”3 He also stresses that Working has pointed out this fact as well. “A major source of mistaken notions of hedging is the conventional practice of illustrating hedging with a hypothetical example in which the price of the future bought or sold as a hedge is supposed to rise or fall by the same amount that the spot price rises or falls.”4

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3 Ibid, 160.

4 Ibid.
The opponent of Keynes’s backwardation theory of futures prices Holbrook Working in his studies questions the risk minimizing goal of hedging. Instead he focuses on the profit maximizing hedging aspect. In other words, he believes that hedgers act more like speculators. Because they hold both, futures and spot positions, the relative change between the prices on the spot and futures markets are of the greater interest to them than the absolute change value. That is why, according to Working “most hedging is done in expectation of a change in spot-futures price relations”. In his view those who hold long positions will hedge if the basis is expected to fall and will not hedge if expected otherwise.

Examining the portfolio approach, Ederington follows Johnson and Stein who have examined hedging in terms of the portfolio theory fundamentals’ application. This enabled them to unite Working’s profit maximization hypothesis with the risk avoidance of the traditional theory. Johnson and Stein state that futures, similarly to the other assets, are bought and sold for the risk-return reasons.

Ederington notes that the traditional theory points out that hedgers will always hold hedged positions, whereas the Working’s hypothesis clarifies that hedgers will hold either fully hedged or fully unhedged positions. Thus, employing the portfolio theory allows Johnson and Stein to explain why hedgers will hold fully hedged as well as fully unhedged positions simultaneously.

Applying the portfolio theory to hedging has one peculiarity in comparison with the common portfolio approach. This is that the spot and futures markets are not regarded as being interchangeable. The spot position is considered to be fixed, and the decision is made upon which of its part should be hedged. So, as opposed to the traditional theory, the portfolio approach assumes that the spot position can be fully or partially hedged.

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The decision making under the portfolio theory is graphically described by Figure 2. Within the portfolio theory framework an investor aspires to maximize the expected return. In this connection, among the various portfolio options that are portrayed with the ABCD curve, an investor should choose a portfolio that is in the “risk-return” point of the highest plotted indifference curve. Such portfolio is represented by the point B, with the hedging coefficient of zero.

Hence, Ederington claims that the hedging decision on the spot or forward positions on the futures market does not differ from any other investment decision. Investors hedge to receive the best risk-return combination. In order to develop the measurement of hedging performance and estimate the potential of futures markets to reduce risk, Ederington considers that risk reduction depends only on the part of the hedged spot position. He compares the risk of an unhedged portfolio with the minimum risk of a portfolio that contains spot and forward securities. Also, he views interest as an irrelevant aspect of the hedging decision. He found out that this minimum risk matches the variance of the portfolio return where the part of the hedged spot position equals the risk minimizing part of the hedged spot position. Therefore, the measure of hedging effectiveness which Ederington uses in the study is the percent reduction in variability. Furthermore, he employed an ordinary least squares (OLS) model, and considered the hedge to be effective when the R-squared or the coefficient of determination of the regression was rather high. To put it another way, when high percent of the variation in one variable was explained by variation in another variable. What is more, Ederington developed and successfully applied what is known today as the minimum variance hedge ratio (MVHR).

Cecchetti, Cumby and Figlewski (1988) in the study named “Estimation of the optimal futures hedge” provide an example of the U.S. Treasury bond hedging coefficient determination with T-bond futures on the basis of the expected utility maximization. As the
function of the expected utility the authors use the logarithmic function. The authors state that risk minimization cannot be viewed as an optimal hedge without its impact on the expected return. “In equilibrium, the risky securities are priced to earn an expected premium over the riskless rate.”

Eliminating risk via hedging should also eliminate the expected return to bearing that risk. “This is the cost of hedging, and the reward to risk bearing in the futures market.” Only an investor that does not want to take risk can make an optimal hedging decision without considering its effect on the risk and return simultaneously. An optimal futures hedge is the hedge that maximizes the expected utility.

As follows from Figure 2, and as noted by Cecchetti, Cumby and Figlewski (1988) “… the optimal hedge ratio is a function of both the risk-return possibility curve that is available in the market and the investor’s utility function. Implementation of this hedging strategy involves two steps: first, estimation of the joint distribution of returns, and then optimization, by finding the hedge ratio that maximizes the investor’s expected utility.”

Among the numerous studies there are some that focus specifically on hedge effectiveness of index futures. One of the first studies in this field was conducted and described by Figlewski. In 1984 he explored the effectiveness of the US S&P 500 stock index futures contracts. For stock index futures basis risk which is associated with imperfect hedging and that equals spot price of a hedged asset minus futures price of a contract, is a more serious problem, compared to Treasury bills and bonds. As the firm-specific component of the return on the cash stock position is the clearest cause for the basis risk and since index futures are tightly bounded to the performance of an underlying stock market index, nonmarket or unsystematic risk cannot be hedged.

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7 Ibid.

8 Ibid.
Like Ederington, Figlewski also excludes dividends from the returns, considering dividend risk to be not an important factor. The risk minimizing hedge ratio that he uses is also the minimum variance hedge ratio (MVHR). The results of the study show that it is the best for such analysis. Figlewski established that risk can be entirely eliminated by hedging only with perfect correlation. What is more, using the US stock data, he proved that one week hedges performed better than overnight hedges but that little or even no positive effect at all was revealed by prolonging the hedge period to 4 weeks. It was also found that the futures’ timing of the expiration is not a significant component. Figlewski came to the conclusion that risk reduction can be achieved by approximately 20% to 30% of the unhedged portfolio’s standard deviation and that the basis risk increases as the duration of the hedging horizon decreases.

Finally, most recent papers use liner regression analysis as well. According to Kawaller (2002) employing linear regression analysis to measure effectiveness requires thorough knowledge and understanding of statistical components. He draws conclusions about his study considering the Statement of Financial Accounting Standards No. 133, Accounting for Derivative Instruments and Hedging Activities (SFAS 133). Kawaller proposes that the major measurement of hedging performance is the coefficient of determination or the R-squared. He suggests that as the R-squared is determined by squaring the correlation coefficient, the possible range of the R-squared statistic is from zero to one. However, to be particularly effective R-squared should have the value of at least 0.80. Another suggestion is that linear regression should be used as a prospective test and the dollar offset method retrospectively for several reasons. Firstly, the dollar offset method is simple and easy to calculate, though it is hard to achieve high effectiveness from period to period. Secondly, the Derivative Implementation Group (DIG) Issue E7, Methodology to Assess
Effectiveness of Fair Value and Cash Flow Hedges, allows a company to continue hedge if the retrospective test fails as long as the new prospective test meets 80% effectiveness.

In 2002 Finnerty and Grant worked on the accuracy of the regression methods, attempting to develop and improve them. They found out that for an effective regression besides the R-squared of 80%, the intercepts should be close to zero and slope coefficients close to 1. To estimate the hedging effectiveness measurement, Finnerty and Grant substituted the three components of the regression efficiency into a prospective Regression Variability-Reduction method formula, RVR, which they considered to be more reliable than R-squared. The RVR is suggested to be a more accurate measure of effectiveness because it accounts for changes in the intercept coefficient and the regression slope coefficient. Also, this formula easily allows retrospective testing by simply replacing the estimated slope coefficient with actual hedge ratio used.

In practice and theory not only the absolute values of futures and spot prices changes are used in order to compute hedging coefficients, the percentage change and the logarithmic changes are as well utilized. In the article called “Minimum-variance futures hedging under alternative return specifications” Terry (2005) describes the company that is long one unit of a particular asset, and is hedging this position using a specified futures contract. The author’s objective is to find the hedging coefficients for the situations when the payoff variance, the return variance and the hedged position returns’ variance are minimized. Moreover, he wonders whether the values of the coefficients that comprise different variables are the same or not.

He derives the hedging coefficients of minimal dispersion for the three cases in which returns are measured as the absolute changes of spot and futures prices or in percentage terms, as the simple returns or in dollar terms, as the continuously compounded returns of the spot instrument and futures contract or in log terms. Analyzing the first two situations, the
author notes that the results are not dependent on any specific form for the joint spot and futures return process. There were no assumptions made about this process except that they have well-defined dispersion and mathematical expectation or average of distribution.

Based on the results of the study, Terry comes to the following conclusions. Firstly, if the absolute changes of the spot and futures prices are used in the calculations, the coefficients minimize the dispersion of the hedger’s position. Secondly, if the simple or continuously compounded returns are utilized, the coefficients’ values have errors. The difference between the three cases is subtle if hedging is done for the nearest maturity futures contract. Terry notes that the articles on the same research problem reviewed the equivalent situations. So, it is evident that the authors achieved favorable results for the three alternatives.

The hedging coefficients that are calculated with the simple and logarithmic returns for cross-hedging can markedly abate the hedging results. Additionally, Terry highlights that the hedging coefficients can be computed with each of the above defined variables. The selection of the variable depends upon the features of its statistical array. For instance, the majority of the market participants prefer to work not with the absolute values but with percent changes.

The outcome of the three cases shows that they provide the same results, i.e. the hedging coefficients’ values do not depend upon the different target setting for the variance minimization. Moreover, it follows that the minimum variance hedge ratio (MVHR) is approximately equal to the results of the three cases.

The current study investigates hedging performance of the RTS index futures. In this regard, Russian financial literature and Internet academic sources have been reviewed. The research showed that very few similar studies have been conducted for the Russian financial market. The reason for the lack of such analysis is the relative novelty of futures contracts
and Russian derivative market in general. In addition, since derivatives appeared in other
countries before they became commonly used in Russia, Russian financial specialists adopt
and apply rich foreign experience and knowledge.

The first and one of the most experienced authors who undertakes research and
investigates futures hedging on the Russian derivatives market is Burenin. Burenin (2009) in
his book “Hedging with the RTS futures contracts” accurately and in detail describes various
hedging strategies and provides examples that are based on historical data of the Russian
Trading System. In addition, he gives an account of the hedging spot positions of stocks of
the certain Russian companies, investment portfolios and the United States dollar with the
RTS futures. The author carefully analyzes the issues of stock portfolio hedging particularly
with the RTS Index Futures. For example purposes Burenin uses the portfolio of the six most
significant companies that are included in the RTS Index, which are Gazprom – energy
company, Lukoil – oil and gas company, Norilsk Nickel – nonferrous metal producer,
Rosneft – petroleum company, Rostelecom – telecommunications, Sberbank – banking. First
of all, Burenin calculates the theoretical hedging coefficient relative to the RTS Index and
RTS Index Futures. He states that employing stock betas, which are based on the RTS Index
Futures, improves hedging results compared to utilizing the RTS Index betas. The hedging
coefficient Secondly, as the main measures of hedge effectiveness the author estimates the
coefficient of determination and the unhedged portfolio risk value. The author uses daily
prices of the six companies from July 2, 2008 till August 12, 2008, and September 2008 RTS
Index Futures. Burenin finds out that the beta coefficient equals 0.89. Moreover, 47.68% of
the portfolio returns’ variation is explained by the RTS Index Futures contract returns’
variation. Correspondingly, 52.32% of the portfolio returns’ variance does not depend upon
the futures contracts’ returns, which brings in risk to the hedger’s position.
Therefore, summarizing all the above reviewed and described various literature sources, it is crucial to notice that as Cecchetti, Cumby and Figlewski (1988) pointed out “the return on a hedged position will normally be exposed to risk caused by unanticipated changes in the relative price between the position being hedged and the futures contract. Because of this “basis risk”, no hedge ratio can completely eliminate risk.”\(^9\) Besides, the hedge coefficient calculations are performed on the basis of historical data. That is why such data cannot aptly characterize the future time period of the hedging objective.

**METHODOLOGY**

Taking into consideration the key finding from the previous theoretical and empirical studies, the preliminary analysis for the present research can be carried out.

**Sample**

It is necessary to identify the research data to be going on with. The sample data consists of historical end-of-day RTS Index and RTS Index Futures prices. The information is taken from the RTS web-site. For the starting date August 3, 2005 is taken as the first day of the RTS Index Futures trading. The end date is July 29, 2011. The closing prices for the futures were used for the nearest maturity contract. Besides, the prices for the both variables were afterwards applied for the returns (R) calculation as the log price differences between the daily closes, using the following formula \( R = \ln(p_t) - \ln(p_{t-1}). \) Continuously compounded RTS Index returns are calculated as \( R_S = \ln(S_t/S_0) \), and the returns of the RTS Index Futures (\( R_F \)) equal \( \ln(F_t/F_0) \), where \( S_t \) and \( F_t \) are the spot and futures prices, respectively, at period \( t \). \( S_0 \) and \( F_0 \) are initial spot and futures prices.

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The data also includes the RTSI Futures trading volume, in order to receive the statistical evidence that the contract has been of the strong and increasing interest since its appearance on the market and to forecast or estimate the change in the main indicators of successful hedging.

The summary data of the RTS Index Futures trading volume, computed in contracts, is conveyed in Figure 3. It provides the exponential smoothed trend line that illustrates the instrument’s tremendously increasing popularity.

The data shows that the number of contracts has flown up from significantly less than one hundred to more than 3 million in six years. Such buoyant demand for the contract and the huge upsurge of its trading volume have a substantial beneficial influence on the major indicators of the hedge effectiveness, allowing to make a prediction for their gradual and positive changes that will be described later in this section.

Statistical Methods

To test the hypothesis that hedging risks with the RTS Index futures is effective, the ordinary least squares (OLS) regression model is used. In other words, the regression examines the causation between the Index and the Index Futures returns and the influence of Futures on the Index, and it also helps to quantify the magnitude of a relationship between two variables. It is calculated with the following formula: \( Y = \alpha + \beta X \), where \( Y \) is the dependent variable or spot positions, \( X \) is the independent variable or Index Futures, \( \alpha \) is the intercept or the value of \( Y \) when \( X \) is equal to zero, \( \beta \) is the slope of the line or the slope coefficient, which measures the change in \( Y \) with respect to \( X \). However, the beta coefficient of the OLS regression is not always constant, therefore running only one regression for the whole sample is not sufficient. That is why the examined six year period is divided into twelve separate but equal semiannual periods. Thus, to indicate the successful hedge in the
present study, the twelve intercepts ($\alpha$) should equal zero and slope coefficients ($\beta$) should be approximately 1.

Measures

One might think of the slope coefficient or the beta of the portfolio with respect to the futures contract as the hedging coefficient or the hedge ratio. According to Cecchetti, Cumby and Figlewski (1988) there are many models of the ratio and risk-return strategies, which are illustrated by Figure 2. The vertical axis corresponds to the expected return and the horizontal axis is the standard deviation. The hyperbola (ABCD curve) represents the “risk-return frontier” of the portfolio which comprises the hedged asset and futures contracts. The present model does not include riskless asset, such as a government bond, because it is also a hedged item. Figure 2 depicts four lines ascending from left to right. They are the indifference curves, which characterize investor’s expected utility function. The higher is the indifference curve, the greater utility level it corresponds with. At the point A investor’s spot position is not hedged, that is why the hedging coefficient $h$ equals zero. The “risk-return” point of the highest plotted indifference curve represents the portfolio at the point B, with the hedging coefficient of zero. The point C is the portfolio with the minimum risk, therefore the hedging coefficient $h^*$ is the coefficient of the minimal dispersion. At the point D the futures contracts number equals the quantity of the spot asset as $h$=1. This situation is typical for the traditional theory.

As described by Figure 2, there are various hedging strategies that lead to different hedge ratios. However, this study employs the minimum variance hedge ratio (MVHR), defining the investment portfolio in terms of two assets, futures and cash positions. In order to devise the MVHR’s formula, first it is necessary to find out the expected return of the whole hedged portfolio. Following Ederington (1979) the expected single period gross returns $E(U)$, earned on the RTS Index holding ($X_S$) are defined as

$$E(U) = X_S \{E(S_S) - S_t\},$$
where $E(S_{2})$ is the spot price expected after one period and $S_{1}$ is the current spot price. The variance of the unhedged position is then simply $Var(U) = X_{S}^{2} \sigma_{S}^{2}$, where $\sigma_{S}^{2}$ is the variance of the change in the spot price over time. The expected return of a hedged portfolio ($R$) which includes both the RTS Index spot position ($X_{S}$) and RTS Index Futures holding ($X_{f}$) can be expressed through the following formula:

$$E(R) = X_{S} \{E(S_{2}) - S_{1}\} + X_{f} \{E(F_{2}) - F_{1}\} - K(X_{f}),$$

where $E(F_{2})$ is the expected futures price one period hence and $F_{1}$ is the current futures contract price. $K(X_{f})$ is the brokerage and other costs of futures transactions.

The variance of the portfolio return is then determined as

$$Var(R) = X_{S}^{2} \sigma_{S}^{2} + X_{f}^{2} \sigma_{f}^{2} + 2X_{S}X_{f} \sigma_{Sf},$$

where $\sigma_{S}$, $\sigma_{f}$, $\sigma_{Sf}$ represent the subjective variances and the covariance of the possible price changes from time 1 to time 2. It is important to note that a portfolio can be hedged completely or partially, in other words futures market holdings may not equal negative spot market holdings. Indeed, they both can have the same sign. That is why, the part of the hedged spot position is $b = -X_{f}/X_{S}$. Since in a hedge $X_{S}$ and $X_{f}$ have opposite signs, $b$ is usually positive. Therefore, the variance of the portfolio returns is

$$Var(R) = X_{S}^{2} (\sigma_{S}^{2} + b^{2} \sigma_{f}^{2} - 2b \sigma_{Sf})$$

By setting the partial derivative of $Var(R)$ with respect to $b$ to zero, with the assumption that $X_{S}$ is exogenously determined or fixed, the resulting expression for the risk minimizing part of the hedged spot position ($b^{*}$) is as follows:

$$b^{*} = \frac{\sigma_{Sf}}{\sigma_{f}^{2}} = \frac{\rho (\sigma_{S}/\sigma_{f})}{Cov(Rs,Rf)/Var(Rf)},$$

where $\rho$ is the correlation coefficient between the RTS Index Futures prices ($Rf$) and the RTS Index spot prices ($Rs$). $\sigma_{S}$, $\sigma_{f}$ are the standard deviations of $Rs$ and $Rf$ respectively. To put it
another way, the hedge ratio compares the prices of the RTS Index futures to the prices of the RTS Index spot positions it covers.

According to Cecchetti, Cumby and Figlewski (1988), and taking into account Figure 2, it can be deduced that if the futures price is characterized by the same or higher volatility than of the spot price, which is a typical case, the hedging coefficient of the minimum dispersion cannot be greater than their correlation coefficient that will be less than one. Therefore, the hedging coefficient of the minimal dispersion is usually less than one.

Moreover, as it is reasonable to evaluate possible hedge effectiveness beforehand and to estimate the potential for risk reduction in the price changes of the RTS Index spot positions and the RTS Index futures, the coefficient of determination or the R-squared of the ordinary least squares (OLS) regression is used. The R-squared determines the strength of the correlation of a dependent variable, the spot positions and an independent variable, the index futures. To put it another way, it shows a rational investor the percentage of the RTS Index Futures performance that is explainable by the performance of the benchmark RTS Index. Also, the R-squared is used as a measure of how reliable, predictable, and valid the alpha and the beta are, or of how well the regression line represents the data.

The coefficient of determination of a variable equals the square of its correlations with another variable. In the case of this study, one variable is the RTS Index returns and another is the returns of RTS Index futures. The correlation coefficient can be determined as $\beta \left( \sigma_F / \sigma_S \right)$, where $\beta$ is the market Index hedge coefficient, $\sigma_F$ is the standard deviation of RTS Index futures return and $\sigma_S$ is the standard deviation of the spot returns.

The R-squared is always a positive number, which may vary from zero to one. If the regression line passes exactly through every point on the scatter plot, it would be able to explain all of the variation, signifying the perfect correlation. The coefficient of determination would therefore equal 1. Though, in practice, this special case of the R-squared
that equals one is not possible over any but the shortest time interval. On the contrary, the further the line is away from the points, the less it is able to explain the variation. The R-squared will then be low, implying that the hedge would not be successful.

Generally, the R-squared greater or equal 0.80 is accepted as an effective hedge indicator. Consequently, supposing that hedging with the RTS Index futures is effective, the R-squared should be slightly lower than 1, also the R-squared will reflect the growth in the RTSI Futures trading volume in its value lift.

To investigate even further, the volatility changes of the RTSI and the RTSI Futures contract are measured. Prices and returns volatility tell investors about the “risk” associated with their investments. Measuring and forecasting volatility of financial asset returns is important for portfolio and risk management. Markowitz (1952) and Tobin (1958) were first who measured risk by means of the statistical variance and standard deviation in the value of a portfolio. Markowitz introduced Modern Portfolio Theory, in which he suggested that alternative investments should be evaluated in terms of both expected return and associated risk. Investors can obtain greater return by bearing greater risk, or reduce the risk of the portfolio by means of giving up expected return. The main measure that he employed is the variance that is the determinant of the average of the squared deviation of the actual return from its expected value. Tobin (1958) developed Markowitz's work by adding a risk-free asset to the Portfolio analysis theory. In his paper, he states that in order to assess the risk of the portfolio, the standard deviation should be used. Standard deviation is calculated as the square root of the variance.

At present, standard deviation is the most common measure of volatility in portfolio analysis. Hypothetically, standard deviation is an efficient and unbiased estimator for volatility. Though in fact “returns at very high frequencies are distorted such that the realized
variance could become inconsistent”.10 In this study the volatility is basically the standard deviation of each of the variables, which is calculated as $S = \sqrt{\frac{\sum_{i=1}^{N}(X_i - \bar{X})^2}{N-1}}$. In this formula, $\bar{X}$ is the value of the mean, $N$ is the sample size, and $X_i$ represents each data value from $i=1$ to $i=N$. Again, using semiannual sub-periods of the historical prices data, the values can be calculated and the trend can be observed. Additionally, to reckon with the RTSI Futures trading volume escalation, the volatility change is supposed to reveal a declining tendency.

Preliminary Tendencies

All things considered, the author of this study regard the R-squared greater or equal 80%, the intercept equal 0, the slope coefficient close to 1 and decreasing volatility changes, as the main indicators of an effective hedge. Moreover, the OLS regression, which is calculated for several semiannual periods, distinguishes this study from many others. Also, this approach demonstrates how the R-squared and the beta coefficient change through time.

The R-squared and the beta fluctuations throughout the six-year period will most likely be affected by the global financial crisis of 2008. The economic crisis exhibited the lag of the main economic indicators in almost every country. Its direct catalyst was the United States subprime mortgage crisis. Rather fast the reliable borrowers experienced troubles with getting a bank loan. The breakdown progressively transformed from the mortgage juncture to the financial crisis, and started to affect not only the United States. By the beginning of the year 2008 the crisis expanded to a global scope, and became gradually conspicuous in the production cutback, damping of the raw materials prices and demand, and growth of unemployment.

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Moreover, in view that RTSI Futures’ trading volume has been growing over time, the R-squared values will demonstrate the rise over the twelve semiannual periods of the regression. Besides, running only one regression for the whole sample means assuming that the beta coefficient is constant, which may not be true.

RESULTS

The descriptive statistics on the RTS Index and RTS Index Futures returns for the whole research period is represented in Table 4. The descriptive statistics analysis describes the data in terms of central tendency, variability and distribution normality. One of the most pertinent values for the current research is the simple measure of the central tendency that is the mean or an arithmetic average. As the sample data comprises rather low figures, the mean is small as well and equals 0.00062 and 0.00060 for the RTSI and RTSI Futures returns respectively. One of the variability measures reported in the descriptive statistics is the standard deviation that shows the spread of the values around the central tendency, which are 0.025 and 0.031 for RTSI and RTSIF respectively. Concerning, the distribution normality indicators, the skewness measures the asymmetry of the probability distribution. In other words, the historical pattern of returns does not resemble a normal, i.e. bell-curve distribution. In the present research both variables have the negative skewness, so this distribution has a “tail” which is pulled in the negative direction. This means that there are fewer values that are less than the mean, and they are farther from the mean than are higher values. The peakedness of the data is measured and illustrated by the kurtosis figure. Noticeably, both variables have very high kurtosis values, which demonstrate that the exceptional values occur more frequently than in a normal distribution. These values form the “fat tails” that suggest a higher percentage of very low and very high returns than would be expected with a normal distribution.
The hedging effectiveness for the six-year research period as well as for the twelve semiannual sub-periods is outlined in Table 5. It is measured with the coefficient of determination or R-squared, the Minimum Variance Hedge Ratio, the alpha or the intercept of the regression, the t-statistics and the P-value. Regressing the twelve sub-periods produced the R-squared increasing values from 0.82175 to 0.96116, signifying that more than 82% of the variation in the RTS Index spot returns is explained by the variations in the RTS Index Futures returns. The R-squared figure for the whole six-year period is 0.87841, which means that more than 87% of the deviation intercept is described by this model. These figures are rather high and show that the model is stable.

The beta or the slope coefficient values for the whole research period and all the sub-periods vary from 0.68 to 0.90, representing that the RTS Index Futures bear less systematic risk than the market. Besides, it estimates how the spot price will change on average with the futures price changes. Positive beta values show that the Futures and Index returns change in the same direction. That is to say that with the market Index returns increase or decrease by 1%, the RTS Index Futures will respectively grow or drop by the value of its beta coefficient, which is less than 1%.

Furthermore, the alphas or the intercept coefficients are approximately equal to zero, which is also a positive sign of the RTSI Futures efficient hedge ability.

The t-statistics for the RTSI Futures of the same regressions have appeared to be extremely high, the values range from 23.42 to 55.17, and the P-value is less than 0.01 and is almost zero. Therefore, a conclusion can be made that this variable is significant at 1% level, and the null or void hypothesis is rejected with 99% confidence. Thus, supported by rejecting the null hypothesis, the research hypothesis that the RTSI Futures are hedge effective is accepted. The P-values for the intercept are more than 0.1, which is a rather high number, and
the t-statistics are low. Therefore, the null hypothesis is accepted, which means that there is no evidence of the statistically significant relationship between the two variables.

It should be noted that the hedge effectiveness measures have considerably weakened in 2008. What is more, the beta coefficient fluctuations, portrayed in Figure 4, and the volatility analysis of the RTSI and RTSI Futures returns, which is conveyed in Figure 5, reveal that the two variables have become fairly riskier during this period. This situation is easily explained by the global financial crisis and reflects the depressive condition of the markets at that time.

Hence, all the values fully satisfy the hedge effectiveness terms and conditions that were laid down in the methodology section, implying that hedging with the RTS Index Futures is effective.

CONCLUSION

Today, hedging plays an important role in the global economic stability. Though, in Russia hedging is still an emerging field, in the developed countries it has become common long time ago. After Russian economic crisis of 1998 the fact that the unhedged risks lead to losses has appeared to be self-evident. Those who do not hedge will lose if the same risks are hedged by the competitors. None the less, the hedging decision must have a solid basis and be thoroughly thought out. A lot of factors have to be taken into account, and the hedge effectiveness is one of them. This subject is sufficiently challenging, as its aim is not only additional profit earning, which is undoubtedly its supplementary benefit if the hedge is successful, but to make the operations more efficient considering risk minimization at a defined rate of the return.
Using Russian Trading System Index and RTS Index Futures returns it has been hypothesized that the RTS Index Futures are hedge effective. Efficiency was measured for the six-year period from August 3, 2005 until July 29, 2011. As the criteria for the effectiveness the R-squared, the t-statistics, as well as the slope and the intercept coefficients were chosen.

This study provides the effectiveness levels for the twelve semiannual intervals during the whole research period. All the obtained figures demonstrate the perfect ability of the RTS Index Futures to efficiently hedge. Moreover, the volatility analysis and the observation of the beta coefficients’ fluctuations convey that the RTS Index Futures strongly reflect the market behavior.
BIBLIOGRAPHY


### Table 1: Russian Trading System Total Trading Volume

<table>
<thead>
<tr>
<th></th>
<th>RTS Trading Volume in July 2011, USD</th>
<th>RTS Trading Volume in July 2011, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derivatives</td>
<td>154 415 033 772.00</td>
<td>93</td>
</tr>
<tr>
<td>Stocks</td>
<td>10 805 463 046.00</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>165 220 496 818.00</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

### Table 2: FORTS Trading Volume

<table>
<thead>
<tr>
<th></th>
<th>Trading Volume, RUR</th>
<th>Trading Volume, Contracts</th>
<th>Number of Trades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Futures</td>
<td>247 079 733.00</td>
<td>192 627 210 269.00</td>
<td>75 838</td>
</tr>
<tr>
<td>Options</td>
<td>3 170 000.00</td>
<td>14 586 855 829.00</td>
<td>984</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>250 249 733.00</strong></td>
<td><strong>207 214 066 098.00</strong></td>
<td><strong>76 822</strong></td>
</tr>
</tbody>
</table>

### Table 3: FORTS and MICEX Shares in the Total Derivatives Trading Volume

<table>
<thead>
<tr>
<th></th>
<th>Trading Volume, Contracts*</th>
<th>Trading Volume, %</th>
<th>Number of Trades*</th>
<th>Number of Trades, %</th>
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</thead>
<tbody>
<tr>
<td>FORTS</td>
<td>43 754 389</td>
<td>96</td>
<td>8 699 104</td>
<td>95</td>
</tr>
<tr>
<td>MICEX</td>
<td>2 022 691</td>
<td>4</td>
<td>497 358</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>45 777 080</strong></td>
<td><strong>100</strong></td>
<td><strong>9 196 462</strong></td>
<td><strong>100</strong></td>
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</table>

* The data for April 2010
Table 4: Descriptive Statistics for the Returns

<table>
<thead>
<tr>
<th></th>
<th>RTSI Returns</th>
<th>RTSIF Returns</th>
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<tr>
<td>Mean</td>
<td>0.000621387</td>
<td>0.000603566</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.00064433</td>
<td>0.000805455</td>
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<tr>
<td>Median</td>
<td>0.002352467</td>
<td>0.001212712</td>
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<tr>
<td>Mode</td>
<td>N/A</td>
<td>-0.005249356</td>
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<tr>
<td>Standard Deviation</td>
<td>0.02482972</td>
<td>0.031038781</td>
</tr>
<tr>
<td>Sample Variance</td>
<td>0.000616515</td>
<td>0.000963406</td>
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<tr>
<td>Kurtosis</td>
<td>11.45448141</td>
<td>23.17944571</td>
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<tr>
<td>Skewness</td>
<td>-0.458176861</td>
<td>-0.424538088</td>
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<tr>
<td>Range</td>
<td>0.414033424</td>
<td>0.62807296</td>
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<tr>
<td>Minimum</td>
<td>-0.211994243</td>
<td>-0.275742852</td>
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<td>Maximum</td>
<td>0.202039182</td>
<td>0.352330109</td>
</tr>
<tr>
<td>Sum</td>
<td>0.92275938</td>
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</tr>
<tr>
<td>Count</td>
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<td>1485</td>
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<tr>
<td>Confidence Level (99%)</td>
<td>0.001661822</td>
<td>0.002077387</td>
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Table 5: Hedge Effectiveness

<table>
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<tr>
<td><strong>The Intercept (α)</strong></td>
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<tr>
<td>Coefficient</td>
<td>0.00104</td>
<td>0.00002</td>
<td>0.00032</td>
<td>0.00015</td>
<td>-0.00010</td>
<td>0.00013</td>
<td>-0.00348</td>
<td>0.00099</td>
<td>0.00051</td>
<td>0.00005</td>
<td>0.00027</td>
<td>0.00007</td>
<td><strong>0.0017</strong></td>
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<tr>
<td>t-Statistics</td>
<td>1.63004</td>
<td>0.02512</td>
<td>0.74205</td>
<td>0.35502</td>
<td>-0.21553</td>
<td>0.27704</td>
<td>-1.72517</td>
<td>1.31578</td>
<td>0.97227</td>
<td>0.13914</td>
<td>1.09408</td>
<td>0.19769</td>
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<tr>
<td>P-value</td>
<td>0.10574</td>
<td>0.98000</td>
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<td>0.72319</td>
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<td>0.78222</td>
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<td>0.33286</td>
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<td>0.27609</td>
<td>0.84362</td>
<td><strong>0.45266</strong></td>
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<tr>
<td><strong>The Slope (β)</strong></td>
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<td></td>
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<td></td>
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<tr>
<td>Coefficient</td>
<td>0.84885</td>
<td>0.75779</td>
<td>0.76309</td>
<td>0.78718</td>
<td>0.89699</td>
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<td>0.88119</td>
<td>0.78691</td>
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<td>R-Squared</td>
<td>0.82176</td>
<td>0.87177</td>
<td>0.88422</td>
<td>0.88902</td>
<td>0.90016</td>
<td>0.89231</td>
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<td>0.96116</td>
<td>0.94296</td>
<td>0.91053</td>
<td><strong>0.87841</strong></td>
</tr>
</tbody>
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FIGURES

Figure 1: FORTS Instruments Trading Volume

* as of September 2, 2011

Figure 2: Hedging Coefficient Determination in Various Hedge Strategies

Figure 3: RTS Index Futures Trading Volume, contracts

Figure 4: RTSI Futures Returns Beta Coefficient
Figure 5: RTS Index and RTS Index Futures Returns Volatility
APPENDIX

RUSSIAN TRADING SYSTEM MATERIALS.
INSTRUMENTS AND TECHNIQUES OF THE RTS DERIVATIVES MARKET.

Specifications of the Futures Contract on the RTS Index

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract’s volume</td>
<td>2.0 USD x RTS Index value</td>
</tr>
<tr>
<td>The Contract price</td>
<td>In basic points of the RTS Index (Index value x 100)</td>
</tr>
<tr>
<td>The value of one basic point of the RTS Index (lot)</td>
<td>0.02 USD</td>
</tr>
<tr>
<td>The minimum movement of the Contract price (the tick)</td>
<td>5 basic points (0.1 USD at the USD/RUB exchange rate)</td>
</tr>
<tr>
<td>The Contract’s settlement methods</td>
<td>Financial arrangements</td>
</tr>
<tr>
<td>The Contract’s settlement months</td>
<td>March, June, September, December</td>
</tr>
<tr>
<td>The Contract’s last trading day</td>
<td>The 15\textsuperscript{th} day of the settlement month of the settlement year. If the 15\textsuperscript{th} day is not a Trading day, then the contract’s last trading day shall be the Trading day, following the 15\textsuperscript{th} day of the Contract’s settlement month of the settlement year.</td>
</tr>
<tr>
<td>Spread date</td>
<td>One following the nearest futures settlement date</td>
</tr>
<tr>
<td>Minimum basic sizes of the initial margin</td>
<td>7.5% from the value of the contract</td>
</tr>
<tr>
<td>Trading Time</td>
<td>10:30 – 23:50 (Moscow time)</td>
</tr>
<tr>
<td>Full code of the underlying asset</td>
<td>RTS-&lt;settlement month&gt;, &lt;settlement year&gt;</td>
</tr>
<tr>
<td>The settlement month and year specified in the Contract’s code shall be indicated in Arabic numerals and shall be used for determination of the last trading day of the Contract and the settlement day of the Contract.</td>
<td></td>
</tr>
<tr>
<td>Short code of the underlying asset</td>
<td>RI</td>
</tr>
<tr>
<td>Reuters Contract code</td>
<td>RIRTSc1</td>
</tr>
<tr>
<td>Bloomberg Contract code</td>
<td>VEA Index</td>
</tr>
</tbody>
</table>
### RTS Index Futures: Possible Strategies

<table>
<thead>
<tr>
<th><strong>Strategy Type</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hedging Stock Portfolio From Price Decrease</td>
<td>To avoid losses associated with downward market movements, portfolio holders can sell futures contracts. As a result, losses on the spot market will be compensated by gains on FORTS. Using the RTS Index futures contracts, traders can hedge risks associated with the entire Russian securities market, not just stock-specific risks.</td>
</tr>
<tr>
<td>Hedging Cash Inflow From Price Increase</td>
<td>Companies planning to invest in the stock market can hedge their risks arising from potential upward market movement by buying RTS Index futures.</td>
</tr>
<tr>
<td>Playing the Entire Securities Market Moves</td>
<td>RTS Index futures can be attractive in terms of playing the entire securities market moves, not just single stocks price changes. Long or short positions in futures will depend on market situation in general. Leverage size for RTS Index futures operations equals 1:10 (the minimal size of a guarantee payment for each open position equals 10% of the contract value).</td>
</tr>
<tr>
<td>Buying/Selling of Stock Portfolios That Match the RTS Index Structure</td>
<td>Buying an RTS Index futures contract is similar to creating a portfolio of 50 stocks – RTS Index constituents. Transaction fees in this case will be significantly lower than those on the spot market because of lower tariffs and absence of depositary and leverage fees. RTS Index futures give market participants an opportunity to sell a portfolio identical in structure to the RTS Index.</td>
</tr>
<tr>
<td>Management of Portfolios That Differ in Composition From the RTS Index</td>
<td>RTS Index futures allow participants to hedge risks not only for portfolios identical in composition to the RTS Index constituents. Traders can hedge whole market risks of any portfolio using beta coefficients.</td>
</tr>
<tr>
<td>Creating Synthetic Futures on the &quot;Second-Tier Stock Index&quot;</td>
<td>Opening opposite positions in RTS Index futures and futures on the Russian blue chips allows creating synthetic futures on the “second-tier stock index”. Such operations allow to hedge portfolios consisting of second-tier stocks. Furthermore these synthetic futures are an attractive alternative to buying/selling second-tier stock portfolios on the spot market.</td>
</tr>
<tr>
<td>Calendar Spread</td>
<td>Holding a number of futures contracts with different settlement periods allows participants to take advantage of price spreads between the contracts.</td>
</tr>
<tr>
<td>Futures and Options Combinations</td>
<td>By combining RTS Index futures, different single stock futures and options, as well as the underlying assets traders can create complicated speculative and arbitrage strategies with different ”risk/profitability” ratios.</td>
</tr>
</tbody>
</table>