IMPACT OF 2007-2008 CRISIS ON OIL AND GAS COMPANIES’ STOCK RETURNS IN RUSSIA, EUROPE, USA

Natalia Lantsova

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Approved by

Advisory Committee

Edward Graham Robert Burrus

Clay Moffett
Chair

Accepted by

Dean, Graduate School
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ABSTRACT

This paper studies the impact of the global financial crisis of 2007-2008 on oil and gas companies’ stock returns in Russia, the European Union and the United States. The empirical investigation is conducted by means of the OLS regression applied to daily stock returns of the oil & gas sector for these three regions. The stock return behavior is analyzed over two periods – the crisis period and post-crisis period. Results indicate changes in the performance of stock returns in the crisis versus non-crisis periods. These noted changes are not uniform and depend upon the region. However, the effect of the 2007-2008 global financial crisis on the oil and gas companies’ stock returns is found to be the same and it appears to be significantly negative for Russia, Europe and the USA over the whole research period. The findings are important to investors, issuers, government institutions and financial intermediaries.
DEDICATION

This thesis is dedicated to my beloved parents, Nikolay Lantsov and Lyudmila
Lantsova, who did their best to give me the opportunity of getting good education and made
all of this possible. I express everlasting gratitude for their infinite love, endless support and
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INTRODUCTION

Stock returns are a unique measure of performance that is comparable across companies and countries. They are forward-looking, comprehensive in scope, and insensitive to differences in accounting rules. In normal times, a company’s stock returns reflect a combination of expected and residual returns that are associated with company-specific news. At times of significant economy-wide shocks, however, the cross-section of residual returns can be understood as reflecting the exposure of companies to unexpected shocks (Calomiris, Love and Peria, 2010). Consequently, events of global importance tend to have a significant impact on the world’s stock markets.

The financial crisis of 2007-2008 is one of historical dimensions. Although financial crises are not a new phenomenon, the current financial crisis differs from many of the crises previously occurred in the world. The distinction is that the 2007-2008 crisis is considered to be one of the broadest, deepest, and most complex crises since the Great Depression.¹ It was originated in the United States subprime mortgage market and banking system, which showed signs of trouble in the first half of 2007. The crisis led to the reduction of the credit supply, distressed sales of risky assets due to the fact bankers and investors hurried to strengthen their capital and liquidity ratios. This panic brought the global economy to a severe recession, when economic activity slowed down, and global trade collapsed. World exports fell by 9 percent between July 2007 and December 2008. Thereby, the crisis spread rapidly across institutions, markets, and borders. It drove down equity levels over the globe, affecting nearly every country, sector and industry.

It is not surprising that the financial crisis of 2007-2008 influenced significantly world oil and gas prices. The oil and gas sector remains the principal sector of the world economy,

playing the leading role in the formation of the state budget revenues and securing the positive trade balance of most developed and developing countries, including Russia, the European Union and the United States. That is why this study is concentrated on these particular three regions, which present different world economies.

This paper investigates the returns of major oil and gas companies in Russia, the European Union and the United States with regards to the global financial crisis of 2007-2008. According Lord Turner (2009), the chairman of the UK Financial Services Authority, one of the main distinguishing features of the global financial crisis was that severe financial problems emerged simultaneously in many countries and their various industries. Given that much of the existing literature focuses on the performance of local stock market returns and no circulating study considers return behavior in a specific sector, this paper’s contribution is in providing new international evidence on the impact of the recent crisis on oil and gas stock returns across the above-mentioned regions.

This study is of intense interest to investors, issuers, government institutions and financial intermediaries. Nowadays, participants in the financial market are more sensitive about any news and events around the world due to the high correlation between all markets. Generally, one of their main questions and concerns is about the return side of stock markets. An understanding of stock return performance is essential for assessing their investment and leverage decisions. Substantial changes in stock market returns are capable of having significant negative effects on investors. That is why they pay close attention to the evolution of stock returns with the time. Different players enter the financial markets with different intention and perspectives: some as investors, some as speculators and some with the aim of looking for arbitrage opportunity. For all of them, stock return behavior is one of the main factors to take into account.
The remainder of the paper is organized as follows. The next section presents a brief overview of the oil and gas sector in Russia, The European Union and the United States to demonstrate its important role to the national markets and world economy. Section III provides a review of the related literature regarding financial crises and its impact on stock return behavior. Section IV describes the data collection. Section V presents the econometric model and discusses the estimation techniques employed. Section VI analyzes the empirical results, while the summarized findings and conclusions are outlined in Section VII.

OIL AND GAS SECTOR OVERVIEW

Russia

It is difficult to overstate the importance of the Russian oil and gas sector, both to the Russian economy and to world hydrocarbon markets. Possessing the eighth largest proven oil reserves in the world, the Russian Federation is the world’s largest crude oil producer and the second largest oil exporter. According to official Russian statistics, roughly 4 million of total liquids production is crude oil. Over 70 percent of Russian crude oil production is exported, while the remaining 30 percent is refined locally. Russia is also the leading producer and exporter of natural gas due to having more proven natural gas reserves than any other country. It is expected to maintain its dominant position in the longer term, backed by abundant reserves (Kim, 2005).

The oil & natural gas industry brings in 30 percent of the country’s GDP and 65 percent of its export earnings (thomaswhite.com), which is portrayed in Figure 1.

A majority of the blue chip companies in the Russian stock exchanges are represented by the country’s oil & natural gas sector. The industry is dominated by government-owned firms. State-owned natural gas producer OAO “Gazprom” has been the fundamental company of Russia’s energy industry for years, being the undisputed leader among all other
Russian producers. Gazprom, the world’s largest natural gas company, accounts for 83 percent of Russia’s natural gas production and 17 percent of global gas production. A business priority of Gazprom is the development of the Yamal Peninsula, Arctic continental shelf, Eastern Siberia and the Far East. Despite the capitalization decrease in 2008, Gazprom during that period retained the leading position among European companies by market capitalization and was among the top ten largest energy companies of the world (gazprom.com).

![Russian Exports](image)

**Figure 1: Russian Exports**

With the exception of Gazprom, most other companies in the sector are predominantly oil producers, with natural gas comprising only a portion of their proved reserves. Most Russian oil companies have control over the entire production cycle ranging from exploration to transmission. Among them are JSOC "Bashneft", OAO "LUKOIL", JSC "NOVATEK", OJSC "OC "Rosneft", JSC "Gazprom Neft", "Surgutneftegas" OJSC, OAO "Tatneft", JSC "Transneft" and OAO "Ufaneftekhim". The market capitalization of these companies from 2007 to 2010 is outlined in Table 1.
The leader of Russia’s petroleum industry is Rosneft. It ranks among the world’s top publicly traded oil and gas companies. The company is primarily engaged in exploration and production of hydrocarbons, petroleum products and petrochemicals across all key hydrocarbon regions of Russia: Western and Eastern Siberia, Southern and Central Russia, Timan-Pechora and the Far East. In addition, the company participates in several exploration projects in Kazakhstan and Algeria. Not to mention the fact that it owns 50 percent of Ruhr Oel GmbH which holds stakes in four refineries in Germany. Unlike many of its competitors, Rosneft has a vast and high-quality reserve base, being second-to-none on an international scale in terms of total proved liquid hydrocarbon reserves. Rosneft has been included in the Russian Government’s List of Strategic Enterprises and Organizations. The state holds 75.16 percent in the company (rosneft.com).

LUKOIL is a major international vertically-integrated oil & gas company, accounting for 2.2 percent of global output of crude oil. It is the largest and third privately owned oil & gas company in the world by proved oil reserves and production, respectively. LUKOIL is implementing oil & gas exploration and production projects in 12 countries. Its most activity is concentrated in four federal districts of the Russian Federation: the North-West, the Volga, the Urals and the South (lukoil.com).

NOVATEK is the largest independent gas producer and second largest natural gas producer in Russia after Gazprom. Its exploration, development, production and processing of natural gas and liquid hydrocarbons are primarily conducted within the Russian Federation and its principal operating areas are concentrated in the YNAO in Western Siberia (novatek.ru/en/).

The European Union

Europe is the world’s fourth largest producer of oil and gas. The EU oil and gas industry is mostly located in North and North-West Europe. This is owing to the North Sea
basins containing the largest oil and gas reserves in Europe. The United Kingdom is the leading country for both crude oil and natural gas production. Denmark is the second-most prominent crude oil producer, but its output is a long way behind that of the UK. It followed by Italy, Romania and Germany. In the natural gas sector, the Netherlands is second to the UK, followed a long way behind by Germany, Romania, Italy and Denmark. It is important to note that Romania, entered the EU in January 2007, is in the top group of producers for both crude oil and natural gas. Although the European Union has an oil and gas industry, it falls far short of providing enough to cover EU consumption, meaning that imports are of critical importance.

Essential issues are being tackled regarding oil and gas in the European Union. To avoid undue dependence on major exporting countries, the EU oil and gas infrastructure is being developed through the construction of new pipelines and storage facilities. One of the objectives of this is to ensure that oil, and especially gas, from Russia have transit routes that avoid states between EU borders and Russia. For gas, liquefied natural gas (LNG) sources are being contracted from North/West Africa and Qatar, for example. In addition, LNG terminals are being built in Europe to receive gas from non-European sources.2

A major issue is the decline in output from the EU oil and gas industry, particularly the long-term decline in UK output. The more recent discoveries are small and difficult to develop into production sources. Imports of oil and gas are growing and becoming an increasingly important component in the UK’s energy requirements, especially for gas. Some major EU oil and gas companies, which market capitalization is represented in Table 2, are making an exit from the North Sea to work in other parts of the world with more economically recoverable oil and gas reserves. The European offshore oil and gas industry is quite well developed and is one of the largest in the world. With the North Sea and Black Sea

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2 European Oil & Gas Industry Market Assessment Report, 2007 (keynote.co.uk).
containing a massive amount of oil and gas resources, the European offshore oil and gas industry has been growing in importance over the recent years. However, investment continues in the North Sea, mainly by smaller specialist companies.³

The United States

The USA possesses the eleventh highest oil reserves in the world. At the end of 2007 its proved oil reserves totaled 2.37% of the world's reserves. These reserves are concentrated overwhelmingly (over 80%) in four states, namely Texas, Louisiana, Alaska and California. Texas and Alaska each account for large shares of U.S. crude oil production, but Federal offshore areas in the Gulf of Mexico and California together produce roughly one quarter of the U.S. total. Thereby, they exceed the individual shares of Texas and Alaska (mbendi.com).

The most active onshore unconventional oil play in North America is the Eagle Ford Shale in South Texas. Another play is the Bakken Shale formation located in Montana, North Dakota and part of Saskatchewan. It is estimated to be one of the biggest oil fields in the US (standardandpoors.com).

The USA is also the world’s second largest producer of natural gas. It has proved natural gas reserves of 3.37% of the world total. The vast proved reserves of natural gas are located in Texas. The State possesses about one-third of the USA’s total and more than twice as much as Wyoming. Wyoming holds the next highest amount of proved reserves.

Major shale gas places in the US include Barnett (Texas), Fayetteville (Arkansas), Haynesville (Louisiana, Texas, and Arkansas), Marcellus (Ohio, West Virginia, Pennsylvania, and New York), and Woodford (Oklahoma). The Barnett is the most

established shale play in the US, and the Haynesville and Marcellus are large, but the least
developed.⁴

The leading companies in the US oil and gas industry are Apache Corporation, Anadarko Petroleum Corporation, Devon Energy Corporation, Halliburton Company, National Oilwell Varco, Inc., Occidental Petroleum Corporation, Schlumberger N.V., ConocoPhillips, Chevron Corporation and Exxon Mobil Corporation. The last three companies are the main players in the sector. Among the above-mentioned oil and gas producers they have the largest market capitalization, which is shown in Table 3.

One of the largest integrated energy companies in the world is considered to be Chevron Corporation. It is engaged in every aspect of the oil and natural gas industry, including exploration and production, refining, marketing and transportation, chemicals manufacturing and sales, geothermal, mining operations, and power generation. The company conducts business activities in the US and approximately 100 other countries (chevron.com).

ConocoPhillips is the third-largest integrated energy company in the US and the second-largest refiner in the country. The company is engaged in the exploration and production of petroleum, natural gas, chemicals, and polymers businesses. It has operations in over 40 countries. It operates through six segments: exploration and production, midstream, refining and marketing, LUKOIL Investment, chemicals, and emerging businesses. The LUKOIL Investment segment consists of ConocoPhillips' equity investment in the ordinary shares of LUKOIL. As on December 31, 2008, ConocoPhillips' ownership interest in LUKOIL was about 20% based on estimated shares outstanding. The chemical segment consists of ConocoPhillips' 50% equity investment in Chevron Phillips Chemical Company, a joint venture with Chevron Corporation (conocophillips.com).

⁴ Standard & Poor’s Database.
Exxon Mobil Corporation is the world’s largest publicly traded international oil and gas company. It is involved in exploration and production, refining, and marketing of oil and natural gas. In addition, the company deals with the production of chemicals, commodity petrochemicals, and electricity generation. Exxon Mobil Corporation operates across the globe (exxonmobil.com).

LITERATURE REVIEW

Studies about the impact of financial crises on stock return behavior are large and expanding. Among the first researchers, Schwert (1989) examines stock return volatility in the United States in the period from 1834 to 1987. He uses two different methods of modeling stock volatility: the linear autoregressive model and the nonlinear regime switching model. The author finds that volatility increases during recessions and financial crises; thus, showing that stock prices are an important business cycle indicator. He also demonstrates that stock volatility reacts to major financial crises, where it increases after the major crisis. Furthermore, stock prices rise and stock volatility drops before the Fed increases margin requirements.

Schwert (1990) extends his research in this field and analyzes daily stock returns and volatility behavior from 1885 to 1987, placing an emphasis on the October 1987 stock market crash. He shows that stock volatility went up greatly during and after the crash, however it returned to lower, more normal levels quickly.

Choudhry (1996) studies risk premia and the persistence of volatility in emerging markets before and after the stock market crash of 1987. He uses a generalised autoregressive conditional heteroskedasticity (GARCH) in the mean model and monthly data from six emerging stock markets between 1976 and 1994. The author concludes that stock return volatility persistence around the 1987 crash changes. However, these “changes are not
uniform” across markets and can be influenced not only by the 1987 crash, but also other factors.

Fang (2001) affirms that stock market volatility over the turmoil period can be predicted with the help of expected depreciation. He uses Taiwan daily data and ARCH (3)-M model to ascertain a considerably “negative depreciation effect with no heteroscedasticity in the stock return process”, suggesting that the expected depreciation is a cause of the changing variance. The author’s idea was corroborated during the Asian financial crisis 1997-1998 when stock volatility increased, however the corresponding time-varying risk premium remained unchanged.


The economic and financial literature harbor pretty much of the work concerning the financial crisis of 2007-2008 and its impact on stock returns. In recent work, Calomiris, Love and Peria (2010) have a close look at stock returns during the 2007-2008 market crash and they identify three crisis “shock factors”. They are the collapse of global demand (1), the contraction of credit supply (2), and selling pressure on firms’ equity (3). These “shock factors” are related to unique features of the crisis and shown in large and statistically significant influences on “residual equity returns” over the period of the current crisis. Upon a month-by-month analysis, the researchers conclude that “the time variation of the importance of each of the “shock factors” tracks related changes in the global economic environment.”
Olowe (2009) conducts a research into the interplay between stock returns and volatility in Nigeria over the period 2004 to 2009 using E-GARCH-M model. Olowe (2009) uses daily returns in order to examine volatility persistence, asymmetric properties and risk-return relationship for the Nigerian stock market. As a result, he finds that “volatility is persistent, there is leverage effect … and the relationship between stock returns and risk as measured by its own volatility” is insignificant, but positive. In addition, the author figures out that the stock market crash of 2008 had a negative influence on stock return; it accounted for the sudden change in variance and contributed to the high persistence of volatility in the Nigerian stock market.

Similar findings are portrayed by Angabini and Wasiuzzaman (2010); they concentrate their study on the financial crisis of 2007-2008 and its impact on the Malaysian stock market. They use GARCH models to determine the effect of the crisis on the Kuala Lumpur Composite Index (KLCI), first testing the efficiency of the market with ARIMA models. The authors report that the financial crisis impacted stock volatility behavior – it increased – however, the persistence of the conditional variance dropped in this period.

Karunanayake, Valadkhani and O’Brien (2010) investigates the relation between stock market returns and their volatility, focusing on the Asian and global financial crises of 1997-1998 and 2008-2009 for Australia, Singapore, the UK, and the US. They use a multivariate GARCH model and weekly data from 1992 to June 2009. The authors note that there is insignificant impact on returns arising from the recent global financial crisis across these four stock markets. However, the crisis dramatically increased the stock return volatilities across all of the four markets. Furthermore, Karunanayake, Valadkhani and O’Brien (2010) find that the US stock market is the most crucial market influencing the volatilities of smaller economies such as Australia. They also suggest “the existence of
significant volatility and cross volatility spillovers across all four markets”, taking into account own and cross ARCH and GARCH effects among all four markets.

Each of these studies helps to describe stock return behavior over the period of financial crisis, including stock market crash of 2008, in various countries. However, no particular study I found that is focused on the impact of the recent global financial crisis on return performance in a specific sector and across Russia, Europe and the USA at the same time. Thus, in this paper I describe how the financial crisis of 2007-2008 influenced oil and gas companies' stock returns in above-mentioned 3 regions.

DATA

The data used in this study primarily consist of the daily closing index prices for the oil & gas sector for three regions of the world – Russia, Europe and the United States of America. These observations are presented by MICEX Index (Russia), Dow Jones Index for Europe and the United States.

MICEX (Moscow Interbank Currency Exchange) is one of the largest stock exchanges in the Russian Federation, CIS, Eastern and Central Europe. MICEX is the leading Russian stock exchange with its proportion on the Russian on-exchange share market of over 80 percent. It is among the world’s top 30 stock exchanges, and its proportion in the volume of on-exchange trading in Russian assets, including depositary receipts for shares in Russian companies, is about 70 percent. The MICEX Stock Exchange is the center of the formation of liquidity for Russian securities and the main market for international investments in shares and bonds of Russian companies. The main indicator of the Russian stock market is the MICEX Index. It is comprised of 30 most liquid stocks of the largest and most rapidly developing Russian companies, representing the main sectors of the country’s economy. The
family of the MICEX SE’s stock market indices comprises a number of sectoral indices, including power index - MICEX O&G (micex.com).

Dow Jones Indexes is a leading full-service index provider owned 90 percent by the CME Group Inc. It produces, maintains, licenses and markets indexes for use as benchmarks and as the basis of investment products. Dow Jones Indexes employs clear, unbiased and systematic methodologies that are fully integrated within index families, which maintain Dow Jones Sector Indexes. Dow Jones Sector Indexes include a wide range of broad-market and blue-chip indexes (Dow Jones Oil & Gas, in particular), available at the country, regional and global levels (djindexes.com).

All indices are expressed in US Dollars. The total number of observation for each index is approximately 774. The series may have some missing observations at different points of time as the holiday days differ among countries.

In addition, I have collected data on brent oil prices that come from the Finam Investment Holding’s website (www.finam.ru). FINAM is one of the first companies in Russia to offer services to stock-market investors. Brent oil crude is taken as a commodity. Brent has served as a leading global benchmark for Atlantic Basin crude oils in general, and low-sulfur crude oils in particular. It is used to price two thirds of the world’s internationally traded crude oil supplies. The brent oil prices for three regions are in US Dollars.

The oil and gas sector of each country is presented by top ten companies in the industry. The market capitalization of these companies is computed at the year’s end for the period of 2007 – 2010 inclusive: on December 31 (30) – for Europe and the USA, on December 28 (26) in 2008) – for Russia. It is expressed in US Dollars and obtained from the following websites: www.rts.ru, www.finance.yahoo.com and www.money.msn.com.
The sample period is August 9, 2007 – August 31, 2010. The sample is fractioned into two subsamples: the crisis period and post-crisis period. The crisis period returns are measured from August 9, 2007 through October 27, 2008. The after crisis period includes returns over the time October 28, 2008 to August 31, 2010. The dating of the crisis period is based on the dates suggested by Baba and Packer (2009).

ECONOMETRIC METHODOLOGY

To determine the impact of the global financial crisis of 2007-2008 on stock returns in the oil & gas sector across observable countries, I estimate the cross-section model of returns represented by the following regression equation:

\[ r_{i,c,t} = \beta_1 + \beta_2 r_{i,us,t} + \beta_3 (Brent_{i,t}) + \beta_4 (MCAP_{i,c,t}) + \varepsilon_{i,c,t}, \]

where \( i \) stands for the oil & gas sector, \( c \) – for a country/region where oil & gas companies operate and \( t \) - for time.

It follows from the OLS regression above that there are several principal variables within the context of this research. These are the dependent and independent variables, also known as “regressands” and “regressors”, respectively. The dependent variable in this study, \( r_{i,c,t} \), is the stock return, in the oil & gas sector \( i \), in a particular country/region \( c \), and at time \( t \). Meanwhile, the regressors are the oil and gas indices in Russia, Europe and the United States that were influenced by the 2007-2008 financial crisis. In turn, these prices have had a considerable impact on oil and gas companies’ profits across three regions during and after the stock market crash. Oil and gas companies’ stock returns in the US, Russia and the European Union are illustrated in Figure 2, Figure 3 and Figure 4, respectively. They are calculated as \( r_{i,c,t} = \ln(P_t/P_{t-1}) \), where \( P_t \) is the daily oil and gas index prices at period \( t \).

I decide to express stock market returns in the countries observed as a function of
returns in the US market. This is due to the fact that the USA is considered to be the epicenter of the 2007-2008 financial crisis. The stock return on the US oil & gas index at time $t$ is represented by $r_{i,us,t}$.

Another independent variable included in the model is $\text{Brent}_{i,t}$, which refers to the brent oil prices at time $t$. The prices are computed daily.

The market capitalization of oil and gas companies of each region is one more factor that carries the descriptive value in this research. It is calculated by multiplying the company’s shares outstanding by the market price per share. The average of the market capitalization for each region is taken and afterwards logarithm transformed. This variable can be identified in the regression equation as $\text{MCAP}_{i,c,t}$.

The coefficients that show the effect a one-unit change in the independent variable has on the dependent variable are $\beta_1, \beta_2, \beta_3$ and $\beta_4$.

Taking into account the fact that returns may be correlated over time in a country, I estimate the model with clustered standard errors ($\epsilon_{i,c,t}$) to allow for within-country across industry correlation of error terms.

Analyzing the regression, I will pay close attention to the level of significance, which can be estimated via a t-statistic and a p-value. A t-statistic is a numerical summary of a set of data that reduces the data to a number that can be used to perform a hypothesis test. If its value is close to zero, then it presents the strongest evidence in favor of the null hypothesis. However, if a t-value is far from zero, there is evidence against the null hypothesis. A p-value is considered to be the probability of obtaining a t-statistic at least as extreme as the one that was actually observed, assuming that the null hypothesis is true. It tells the exact level of significance. Furthermore, the p-value is more accurate than t-statistic. A p-value is said to be significant if it is less than the level of significance, which is commonly 5 %, 1 % or 0.1 %.
The smaller the p-value, the greater confidence in rejecting the hypothesis is. If a p-value is greater than the applied level of significance, it means that there is no evidence of a statistically significant relationship between variables. Therefore, the null hypothesis should be accepted. Thereby, if in the given regression a t-statistic is high and a p-value is small, I will conclude that the financial crisis exerted influence on world oil and gas companies’ stock returns.

This analysis will include examining oil and gas price indices for each region. All prices will be daily analyzed with the regression to evaluate companies’ stock returns for the crisis and after the crisis periods. I will run two separate regressions: one regression – for the crisis period returns and another one – for the post-crisis period profits. On the basis of these regressions, especially, p- and t- values of each coefficient, I intend to see if there are any differences in the significance of the variables. If there are any, it indicates that stock returns vary in the crisis versus non-crisis periods. The stock return behavior will then be compared over each period across Russia, Europe and the United States. Thereby, the regression will show the percentage of difference between the prices (if any) which would then allow to assess the impact of the 2007-2008 financial crisis on stock performance in each regions' oil and gas sector.

RESULTS

The results of the OLS model are represented in Table 4. They are measured with the intercept of the regression, the beta coefficients, the t-statistics and the P-value.

First, I take a look at the derived values regarding the USA.

The t-statistics for the intercept, the market capitalization and brent oil prices during the crisis period are close to zero. The values equal -1.38, 1.36 and 1.05, respectively. The P-
values for these variables have appeared to be more than 0.10, which is a rather high number. Therefore, a conclusion can be made that there is no evidence of the statistically significant relationship between the two variables and the null hypothesis is accepted.

The beta coefficients for the crisis period are less than 1 in both cases, which represents that the market capitalization and brent oil prices bear a more systematic risk than the market. The coefficient for the market capitalization of 0.01202 means that the log US stock returns in the oil and gas sector increase by 1.2% for every one additional dollar to the log market value of the US oil and gas companies' shares outstanding in the crisis period, considering that the effect of other variables on the US stock returns is held constant. The coefficient for the brent oil prices equals 0.00007123, signifying that the log US stock returns grow by 0.007% for a dollar increase in the brent oil price, considering that the effect of other variables on the US stock returns is held constant. Furthermore, the intercept coefficient is -0.30705 when all other variables equal zero. This figure shows a negative impact of the financial crisis on the US oil and gas stock returns in the turmoil period.

Over the post-crisis period the P-values for the intercept of 0.0546 and the market capitalization of 0.0566 seem to be practically the same and less than 0.10, the t-statistics are low. This means that the variable is significant at 10% level, and the null hypothesis is rejected with 90% confidence. Thus, a conclusion can be drawn that the 2007-2008 financial crisis exerted influence on the US oil and gas companies’ stock returns in the after crisis period. The P-value for the brent oil prices is slightly more than 0.10 and the t-statistic has a small value of 1.50. So the null hypothesis should be accepted.

The beta coefficient for the market capitalization variable equals 0.02331. It illustrates that the log US stock returns in the oil and gas sector increase by 2.3% for one dollar growth in the log market capitalization, considering that the effect of other variables on the US stock returns is held constant. The coefficient for the brent oil prices of 0.00015426 means that the
log US post-crisis period returns go up by 0.02% for every one additional dollar increase in the brent oil prices, considering that the effect of other variable on the US stock returns is held constant. In addition, the value of the intercept coefficient is negative, which is a sign of the US oil and gas stock return decrease in the non-crisis period.

Secondly, I concentrate on the results obtained with the regression concerning Russia. The t-statistics for the intercept and the market capitalization variable during the crisis period are not close to zero. The values equal -2.11 and 2.08, respectively. The P-values have appeared to be less than 0.05. Thus, the variable is significant at 5 % level, and the null hypothesis is rejected with 95 % confidence. For the brent oil prices, the P-value is 0.0727, which is less than the 10 % level, and the t-statistic is pretty small. So a conclusion is made that this variable is marginally significant, and I reject the null hypothesis with 90% confidence. For the US stock returns variable, the t-statistic is high, whereas its P-value is extremely small. This means that the variable is significant at 1 % level, which is considered to be highly significant. Therefore, the null hypothesis is rejected with 99 % confidence.

Regressing the post-crisis period for Russia produced the P-values of 0.0012, 0.0017 and 0.0047 for the intercept, the market capitalization and brent oil prices, respectively. The t-statistics for these variables have appeared to be high. Thereby, all the variables are significant at 1 % level, and the null hypothesis is rejected with 99 % confidence. The US stock returns’ P-value is 0.9311, which is a high figure, and the t-statistic is close to zero. So the null hypothesis should be accepted.

All the values above considered, the obvious conclusion to be drawn is that the global financial crisis, started in the US market, had a dramatic impact on the oil and gas companies’ stock returns in Russia for the whole research period.
The betas for the crisis and post-crisis periods in Russia are far less than 1, which reports that the examined variables bear a greater systematic risk than the market. Besides, the intercept coefficient equals -0.19278 during the crisis period and -0.40342 in the non-crisis period when all other variables equal zero. These figures demonstrate that the 2007-2008 financial crisis exerted a pernicious influence on the Russian oil and gas stock returns in the turmoil period and afterwards.

Lastly, I analyze the derived values in respect of the European Union.

Over the whole research period the t-statistics for the intercept, the market capitalization and brent oil prices are close to zero, the values range from -1.80 to 1.79, and the P-values are less than 0.10, except the value of the brent oil prices variable. Therefore, a conclusion can be made that the intercept and market capitalization variable are significant at 10 % level, and the null hypothesis is rejected with 90 % confidence. However, the P-value for the brent oil prices is more than 0.10. Thus, there is no evidence of the statistically significant relationship between the two variables and the null hypothesis is accepted. For the US stock returns variable, the P-value is extremely small, it is less than 0.01, and the t-statistic is high over the crisis and after crisis periods. This means that this variable is significant at 1 % level, which is considered to be highly significant. Thereby, the null hypothesis is rejected with 99 % confidence. Hence, taking this into account, there is no doubt that the movement in the US oil and gas stock returns led to the similar change in stock return performance in the European oil and gas sector during and after the stock market crash of 2008.

The beta coefficient for the US stock returns variable in the crisis period in the European Union equals 0.33597. This value signifies that the European companies' stock returns (log) grow by 33.6% for a dollar increase in the log US stock returns, considering that the effect of other variables on the European stock returns is held constant. The coefficient
for the US stock returns of 0.44612 means that the after crisis period returns (log) of the European oil and gas sector go up by 44.6% for every one additional dollar in the log US stock returns, considering that the effect of other variables on the European stock returns is held constant. Furthermore, the values of the intercept coefficient seem to be quite resembling for the whole research period. They are -0.31462 and -0.30136. Consequently, these negative numbers point out that the oil and gas companies’ stock returns in the European Union declined in the crisis and post-crisis periods.

Taking the above-described values into consideration, I compare the results across Russia, the European Union and United States. The intercept coefficient for all three regions over the whole research period is negative and statistically significant at different levels, with the only exception being the US stock returns which have appeared to be insignificant. This implies that the global financial crisis of 2007-2008 had a significant impact on oil and gas companies' stock returns in Russia, Europe and the USA. The sector returns decreased during the crisis, and they did not recover subsequently. Moreover, the returns went down even greatly in Russia and the United States after the turmoil of 2008. They became approximately half as many crisis period returns.

The coefficients for the market capitalization variable are seemed to be all optimistic for both periods and statistically significant at 1 %, 5 % and 10 % levels, except for the USA during the crisis. We can see a twice increase in the US and Russian oil and gas companies' market capitalization (the US values changed from 0.01202 to 0.02331, the figures for Russia are 0.00762 and 0.01508 in the crisis and after crisis periods, respectively), while the market capitalization of the oil and gas companies in the European Union remained practically unchanged. Therefore, we can observe the increase in the companies' market capitalization over the post-crisis period, which, in turn, led to the growth in the US and Russian stock returns.
Speaking about the brent oil prices variable, the coefficient is also positive over the whole period. Its values for the crisis period are twice less than those during the non-crisis period in the USA and Russia. This suggests that the increase in the brent oil price contributes to the increase in the US and Russian companies’ stock returns over the crisis and post-crisis periods. There is no evidence of any significant difference in the figures of the brent oil prices variable for the European Union. They are nearly the same, 0.00009618 and 0.00009233 - during the crisis period and after the crisis, respectively.

For the US stock returns variable, the coefficient for Europe is highly significant over the whole period, with the extremely small P-value and high t-statistic. It went up slightly in the non-crisis period compared to the previous period. This indicates that the growth in the US stock returns made the European stock returns rise. An interesting finding is concerned with the Russian case. The US stock returns variable’s coefficient for the crisis period is positive having a high t-statistic and the P-value less than 0.01. The after crisis situation is exactly the opposite. The coefficient has a negative value of -0.00617 with a high P-value and low t-statistic. It turns out that the increase in the US stock returns during the crisis drove the growth in the Russian stock returns, while after the crisis the decline in returns of the US oil and gas sector led to the oil and gas return fall in Russia.

Hence, there is a direct relationship between the oil and gas companies’ stock returns in the countries observed and the market capitalization, brent oil prices, US stock returns variables. Any change in the US stock returns, market capitalization and brent oil prices is reflected on the stock returns likewise. Thereby, the stock returns in the United States and Russia vary in the crisis versus non-crisis periods, due to the fact that there is a substantial difference in the values of the market capitalization and brent oil prices coefficients for these countries in the examined periods. However, the European oil and gas returns do not differ
CONCLUSION

This paper provides a methodological framework to study the impact of the global financial crisis of 2007-2008 on oil and gas companies’ stock returns in Russia, the European Union and the United States. The investigation is conducted by means of the OLS regression applied to daily stock returns of the oil & gas sector for these three regions. The stock return behavior is analyzed over two periods – the crisis period and post-crisis period.

On the basis of the obtained results it is found that the stock returns in the United States and Russia vary in the crisis versus non-crisis periods, whereas the European oil and gas returns do not differ depending on the period. This can be explained by a direct relationship between the oil and gas companies’ stock returns in the countries observed and the market capitalization, brent oil prices, US stock returns variables, used in this study to describe the stock return behavior. The movement in these variables led to the similar change in stock return performance in the US, Russian and European oil and gas sector during and after the financial crisis of 2007-2008.

Furthermore, the sector returns declined during the crisis, and they did not manage to recover subsequently. Not to mention the fact that the returns went down even greatly in Russia and the United States after the stock market crash of 2008. They became approximately half as many crisis period returns. Thus, the 2007-2008 global financial crisis had a dramatic impact on the oil and gas companies’ stock returns in Russia, Europe and the USA for the whole research period.
REFERENCES


http://0-

   Available at http://www.keynote.co.uk/market-intelligence/view/product/2011/european-oil-%26-gas-
   industry?highlight=EU+oil+and+gas&utm_source=kn.reports.search.

   http://www.keynote.co.uk/market-intelligence/view/product/10351/energy-
   industry?highlight=EU+oil+and+gas&utm_source=kn.reports.search#.

   Commodities*, 12 (2), 361-378.

19. LUKOIL. (n.d.). *Company Information – General Information.* Available at


    an Emerging Market: The Nigerian Case. *International Journal of Business and

25. ROSNEFT. (n.d.). *Rosneft at a Glance.* Available at
    http://www.rosneft.com/about/AboutGlance/.


    Gas Sector in Russia: Fueling Growth.* Available at
    http://www.thomaswhite.com/explore-the-world/bric-spotlight/2010/russia-oil-and-
    gas.aspx.

Table 1: Market Capitalization of Russian Oil and Gas Companies 2007-2010

<table>
<thead>
<tr>
<th>Company Name</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>JSOC &quot;Bashneft&quot;</td>
<td>2 773 766 990</td>
<td>765 763 893</td>
<td>4 254 243 850</td>
<td>7 555 537 078</td>
</tr>
<tr>
<td>OAO &quot;Gazprom&quot;</td>
<td>332 269 116 838</td>
<td>85 224 646 440</td>
<td>145 118 634 077</td>
<td>151 510 482 560</td>
</tr>
<tr>
<td>OAO &quot;LUKOIL&quot;</td>
<td>72 696 220 964</td>
<td>28 238 700 066</td>
<td>48 482 105 535</td>
<td>48 482 105 535</td>
</tr>
<tr>
<td>JSC &quot;NOVATEK&quot;</td>
<td>22 316 849 100</td>
<td>4 675 911 240</td>
<td>16 851 498 300</td>
<td>27 296 390 940</td>
</tr>
<tr>
<td>OJSC &quot;OC &quot;Rosneft&quot;</td>
<td>100 394 842 752</td>
<td>41 014 948 152</td>
<td>90 084 511 445</td>
<td>76 240 005 780</td>
</tr>
<tr>
<td>JSC &quot;Gazprom Neft&quot;</td>
<td>30 107 252 708</td>
<td>9 719 664 260</td>
<td>26 314 212 996</td>
<td>19 889 751 986</td>
</tr>
<tr>
<td>&quot;Surgutneftegas&quot; OJSC</td>
<td>43 347 421 155</td>
<td>21 435 596 823</td>
<td>31 689 314 563</td>
<td>35 368 734 758</td>
</tr>
<tr>
<td>OAO &quot;Tatneft&quot;</td>
<td>13 126 611 468</td>
<td>4 248 446 865</td>
<td>10 218 059 383</td>
<td>10 555 756 442</td>
</tr>
<tr>
<td>JSC &quot;Transneft&quot;</td>
<td>3 086 426 875</td>
<td>412 041 875</td>
<td>1 259 448 750</td>
<td>2 044 660 625</td>
</tr>
<tr>
<td>OAO &quot;Ufaneftekhim&quot;</td>
<td>977 423 658</td>
<td>253 304 159</td>
<td>819 108 559</td>
<td>1 252 754 266</td>
</tr>
</tbody>
</table>
Table 2: Market Capitalization of Oil and Gas Companies in the European Union 2007-2010

<table>
<thead>
<tr>
<th>Company Name</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Royal Dutch Shell plc (United Kingdom)</td>
<td>267 890 000 000</td>
<td>165 990 000 000</td>
<td>178 230 000 000</td>
<td>180 440 000 000</td>
</tr>
<tr>
<td>BP plc (United Kingdom)</td>
<td>255 880 000 000</td>
<td>163 450 000 000</td>
<td>181 100 000 000</td>
<td>138 400 000 000</td>
</tr>
<tr>
<td>Total S.A. (France)</td>
<td>197 870 000 000</td>
<td>131 160 000 000</td>
<td>143 000 000 000</td>
<td>125 420 000 000</td>
</tr>
<tr>
<td>Eni SpA (Italy)</td>
<td>145 050 000 000</td>
<td>95 770 000 000</td>
<td>101 360 000 000</td>
<td>87 420 000 000</td>
</tr>
<tr>
<td>E.ON AG (Germany)</td>
<td>135 410 000 000</td>
<td>76 410 000 000</td>
<td>79 830 000 000</td>
<td>57 910 000 000</td>
</tr>
<tr>
<td>Statoil ASA (Norway)</td>
<td>97 250 000 000</td>
<td>53 060 000 000</td>
<td>79 310 000 000</td>
<td>75 250 000 000</td>
</tr>
<tr>
<td>BG Group plc (United Kingdom)</td>
<td>82 650 000 000</td>
<td>47 090 000 000</td>
<td>60 750 000 000</td>
<td>68 160 000 000</td>
</tr>
<tr>
<td>RWE Aktiengesellschaft (Germany)</td>
<td>73 940 000 000</td>
<td>44 430 000 000</td>
<td>48 360 000 000</td>
<td>32 420 000 000</td>
</tr>
<tr>
<td>Endesa SA (Spain)</td>
<td>58 850 000 000</td>
<td>44 340 000 000</td>
<td>37 890 000 000</td>
<td>27 900 000 000</td>
</tr>
<tr>
<td>Repsol YPF, S.A. (Spain)</td>
<td>43 770 000 000</td>
<td>25 970 000 000</td>
<td>32 750 000 000</td>
<td>33 420 000 000</td>
</tr>
</tbody>
</table>

Table 3: Market Capitalization of the US Oil and Gas Companies 2007-2010

<table>
<thead>
<tr>
<th>Company Name</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache Corporation</td>
<td>35 770 000 000</td>
<td>24 940 000 000</td>
<td>34 680 000 000</td>
<td>43 720 000 000</td>
</tr>
<tr>
<td>Anadarko Petroleum Corporation</td>
<td>30 640 000 000</td>
<td>17 700 000 000</td>
<td>30 680 000 000</td>
<td>37 460 000 000</td>
</tr>
<tr>
<td>ConocoPhillips</td>
<td>141 240 000 000</td>
<td>77 220 000 000</td>
<td>75 770 000 000</td>
<td>99 910 000 000</td>
</tr>
<tr>
<td>Chevron Corporation</td>
<td>197 060 000 000</td>
<td>150 290 000 000</td>
<td>154 460 000 000</td>
<td>184 340 000 000</td>
</tr>
<tr>
<td>Devon Energy Corporation</td>
<td>39 560 000 000</td>
<td>29 240 000 000</td>
<td>32 640 000 000</td>
<td>33 770 000 000</td>
</tr>
<tr>
<td>Halliburton Company</td>
<td>33 400 000 000</td>
<td>16 250 000 000</td>
<td>27 140 000 000</td>
<td>37 300 000 000</td>
</tr>
<tr>
<td>National Oilwell Varco, Inc.</td>
<td>26 210 000 000</td>
<td>10 200 000 000</td>
<td>18 440 000 000</td>
<td>28 070 000 000</td>
</tr>
<tr>
<td>Occidental Petroleum Corporation</td>
<td>63 790 000 000</td>
<td>48 580 000 000</td>
<td>66 030 000 000</td>
<td>79 320 000 000</td>
</tr>
<tr>
<td>Schlumberger N.V.</td>
<td>117 640 000 000</td>
<td>50 630 000 000</td>
<td>78 160 000 000</td>
<td>113 730 000 000</td>
</tr>
<tr>
<td>Exxon Mobil Corporation</td>
<td>511 890 000 000</td>
<td>406 070 000 000</td>
<td>322 670 000 000</td>
<td>369 920 000 000</td>
</tr>
</tbody>
</table>
Table 4: OLS Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>The USA</th>
<th>Russia</th>
<th>The European Union</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>CRISIS period</td>
<td>POST-crisis period</td>
<td>CRISIS period</td>
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<tr>
<td>The Intercept</td>
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<tr>
<td>Coefficient</td>
<td>-0.30705</td>
<td>-0.60597</td>
<td>-0.19278</td>
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<tr>
<td>T-statistic</td>
<td>-1.38</td>
<td>-1.93</td>
<td>-2.11</td>
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<tr>
<td>P-value</td>
<td>0.1695</td>
<td>0.0546</td>
<td>0.0349</td>
</tr>
<tr>
<td>US Stock Returns (log)</td>
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</tr>
<tr>
<td>Coefficient</td>
<td></td>
<td></td>
<td>0.20908</td>
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<tr>
<td>T-statistic</td>
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<td>4.12</td>
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<tr>
<td>P-value</td>
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<td></td>
<td>&lt;0.0001</td>
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<tr>
<td>MCAP (log)</td>
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<td></td>
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<tr>
<td>Coefficient</td>
<td>0.01202</td>
<td>0.02331</td>
<td>0.00762</td>
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<tr>
<td>T-statistic</td>
<td>1.36</td>
<td>1.91</td>
<td>2.08</td>
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<tr>
<td>P-value</td>
<td>0.1728</td>
<td>0.0566</td>
<td>0.0381</td>
</tr>
<tr>
<td>Brent Oil Prices</td>
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<tr>
<td>Coefficient</td>
<td>0.00007123</td>
<td>0.00015426</td>
<td>0.000159</td>
</tr>
<tr>
<td>T-statistic</td>
<td>1.05</td>
<td>1.5</td>
<td>1.8</td>
</tr>
<tr>
<td>P-value</td>
<td>0.2936</td>
<td>0.1335</td>
<td>0.0727</td>
</tr>
</tbody>
</table>
Figure 2: Oil and Gas Companies’ Stock Returns in the United States

Scale invariant return trend of oil and gas companies’ stocks in the United States over the sample period from August 9, 2007 to August 31, 2010. This is the daily stock return behavior based on the Dow Jones daily index prices for the oil & gas sector in the United States. The stock returns are used in the OLS regression.
Figure 3: Oil and Gas Companies’ Stock Returns in Russia

Scale invariant return trend of oil and gas companies’ stocks in Russia over the sample period from August 9, 2007 to August 31, 2010. This is the daily stock return behavior based on the MICEX daily index prices for the oil & gas sector in Russia. The stock returns are used in the OLS regression.
Figure 4: Oil and Gas Companies’ Stock Returns in the European Union

Scale invariant return trend of oil and gas companies’ stocks in the European Union over the sample period from August 9, 2007 to August 31, 2010. This is the daily stock return behavior based on the Dow Jones daily index prices for the oil & gas sector in the European Union. The stock returns are used in the OLS regression.