Impact of Oil Prices on Sovereign Funds (The Assets and Investments)[1]

Iveta PAUHOFOVÁ – Soňa SVOCÁKOVÁ***

Abstract

The contribution is aimed at detecting how changes in oil prices influenced the development of assets of the oil sovereign funds, which countries possessing sovereign funds have been most affected, and whether and how changes in oil prices affected the foreign direct investments made by countries with the sovereign wealth funds. Analytical apparatus use the officially available data for oil prices, import, export, FDI and assets and investments of sovereign funds from SWF Institute.The causality between oil prices and annual growth of sovereign funds wealth in Kazakhstan, Norway and Russia has been confirmed. Shock in oil prices had the greatest impact on the value of assets in Russian sovereign wealth funds, then the SWF of Kazakhstan and the least impact had been obsereved upon Norwegian SWF. In the case of Russia, the shock in oil prices has had a long lasting effect. Saudi Arabia does not suffer from the low oil prices and it does not affect the principles of its investment decisions.

Keywords: *Sovereign Wealth Funds, assets of SWF, oil prices, foreign direct investment*

JEL Classification: G34, M12

Introduction

Despite the fragile recovery of economy worldwide, the growth of individual economies lags the pre-crisis period. Slower growth means smaller demand for oil and other raw materials, especially in the industry and construction. In addition to a smaller demand for oil from the side of China (slowdown in growth), geopolitical wars of oil powers are the additional important factors affecting the

* Iveta PAUHOFOVÁ, Slovak Academy of Science, Institute of Economic Research, Šancová 56, 811 05 Bratislava, Slovak Republic; e-mail: ipauhofova @yahoo.com

** Soňa SVOCÁKOVÁ, Technical University of Košice, Faculty of Economics, Department of Finance, Němcovej 32, 040 01 Košice, Slovak Republic; e-mail: sona.svocakova @gmail.com

[1] Contribution is funded by the project VEGA 2/0026/15 *Income Stratification and Polarization Perspective of Slovakia until 2030*.

price of oil countries, mainly Saudi Arabia (which in the period of falling demand refuses to reduce the volume of extraction) pursue their own strategic objectives. By low price they aggravate the situation of their competitors which have much higher costs of mining. This concerns, in particular, the American shale oil resources. Low price also affects negatively Russian state budget, which is vitally dependent on the exports of oil and gas. In the USA, low oil prices have caused a decline in the number of newly opened boreholes and the indebtedness of American mining companies. The concern about the economic health and ability to repay the debts caused a reduction in the performance of high yield bonds compared to the previous period. OPEC countries do not suffer even when the oil prices are low as their costs of extraction are low (20 – 30 USD per barrel). Since the beginning of 2015 an increase in oil prices has been observed which reached the level of 60 – 65 USD per barrel. The minimum observed was 48 USD (Brent price). It is realistic to expect that a sharp drop in oil prices and keeping them at the low level in the previous period must have had a significant impact on the acumulation of most sovereign wealth funds (SWFs) of oil-exporting countries. This is an expected process as after the start of crisis of 2008, SWFs represent relatively new entities and the strengthening subjects of the world's financial architecture. According to Pauhofova and Svocakova (2015) and Pauhofova (2014), SWFs are the largest holders of the real finances which can be not only promptly, but also strategically used for future needs of their countries. In the background of their activities the formation of a new world map can be seen on which the economically powerful countries share the areas of their competence. They are an important new phenomenon used as a part of economic and geopolitical trends. Similarly to hedge funds, SWFs play a role of key investors. While the hedge funds accumulate the capital of private investors, sovereign wealth funds represent the public resources used for achieving the objectives of the countries that own SWFs. SWFs of oil-exporting countries are now, right behind the Chinese SWFs, in the amount of assets, the second biggest group of SWFs. SWFs of United Arab Emirates, Norway and Saudi Arabia are dominant ones. Russian SWFs are not comparatively large in the volume of accumulated capital, but of a great importance for the national economy, especially the modernization of Russian army. It is assumed that low oil prices in Russia should have played a more important role than the sanctions having been imposed.

1. Research Background

Since most sovereign wealth funds worldwide gain and accumulate financial resources from the sales of oil and gas, price changes have a significant impact on them. The aim is therefore to find out, or confirm the existence of a causal

relationship between the amount of assets in the SWFs and the price of oil. Subsequently, we need to analyze in which SWF a rapid change in the oil price may cause the greatest shock. The third aim is to quantify changes in foreign direct investment triggered by changes in oil prices, all with regard to the ownership of oil based SWF.

Kaletsky (2015) claims that if there is a number that determines, the fate of the world economy, it is the price of oil per barrel. Each global recession since the 1970s was preceded by at least a doubling of oil prices. On the other hand, every time when the price of oil had decreased to half and remained there for six months, the acceleration of global growth followed.

As such, gas and oil are part of economic environment of local specific economics (Michalski, 2015) and should be considered with expected influences on the results (Michalski, 2009). Oil gained a new role in the twentieth century in commercial and industrial heating and as a raw material to produce fuel for vehicles. It has become an integral part of key economic sectors, from manufacturing to cars selling. The demand for oil products increased significantly between 1946 and 1947, when the price of oil increased by 48.31%. During the Korean War, the oil prices had been frozen. The global boycott of Iran had the effect of a loss of 19 million barrels of Iran's monthly production in the world markets. When the Suez Canal was nationalized in 1956, Britain and France in the belief of regaining the control of the channel, called on Israel to invade Egypt. The events had dramatic consequences for Europe which was dependent on oil supplies from the Middle East. Oil production in the US peaked in 1972, which led to a huge rise in prices since 1973 and to the use of oil fields in Alaska in the 1980s. The end of BrettonWoods system caused the depreciation of the dollar and the increase in dollar prices of most internationally traded commodities (Hamilton, 2011). In economic terms, the oil price shock is defined as a sharp increase in oil prices that occurs when demand exceeds supply (Mazraat and Tayyeb Jazayeri, 2004). Historically, after World War II, five oil shocks had been observed. Each shock was accompanied by a new economic and political situation, on the basis of which the reasons of individual shocks can be determined:

- 1973 – 1974: OPEC Embargo
- 1978 – 1979: Iranian revolution
- 1980 – 1981: Iran-Iraq War
- 1981 – 1986: The great price collapse
- 1990 – 1991: First Persian Gulf War

The nature of sovereign wealth funds (with respect to the state ownership and enormous pool of real finance) forces the attention not only at scientific level but also between „representatives and administrators“of the political and economic decisions.

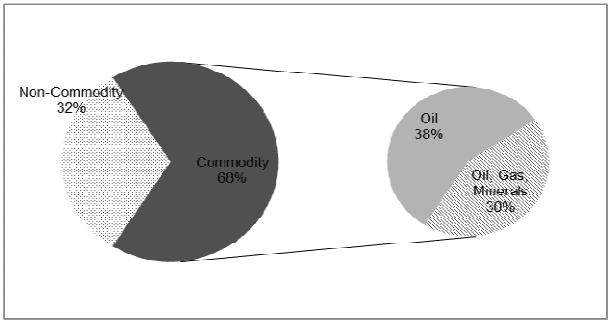
Sovereign Wealth Fund Institute (SWFI, Las Vegas, USA, <http://www.swfinstitute.org/>) defines SWF as a state-owned investment fund or entitiy established from balance of payments surpluses, official foreign currency operations, the revenues of privatizations, governmental transfer payments, fiscal surpluses and revenues resulting from exports of resources. The definition of sovereign wealth fund excludes, among other things, foreign currency reserves assets held by monetary authorities for the traditional balance of payments or monetary policy purposes, state/owned enterprises (SOEs) in traditional sense, government-employee pension funds and assets managed for the benefit of individuals.

Each SWF was created because of some reason and in most countries represents an important instrument of its economic policy. The states that own SWFs pursue their own specific interests through them. Therefore, for some developed economies the question remains (in terms of security strategies) whether to allow SWF investments in their territory, while it is also questionable (in strategic terms) for SWFs where to direct their investments. These issues are extremely important mainly in the current stage of the crisis and its relation to the indebtedness of the countries in the European area (Pauhofova, 2014).

Actually, according to the SWF Institute (July 2015), 76 sovereign wealth funds operate worldwide worth nearly 7.367 trillion USD. SWFs can be of commodity or non-commodity origin. Commodity funds are created by the means of commodity exports, either taxed or owned by the government. Non-commodity funds are usually created by the transfers of the assets of foreign currencies official reserves. Out of 76 SWFs there are 59 commodity-like and majority of these (up to 38%) derive their resources from the oil sales.

F i g u r e 1

Origin of Sovereign Wealth Fund



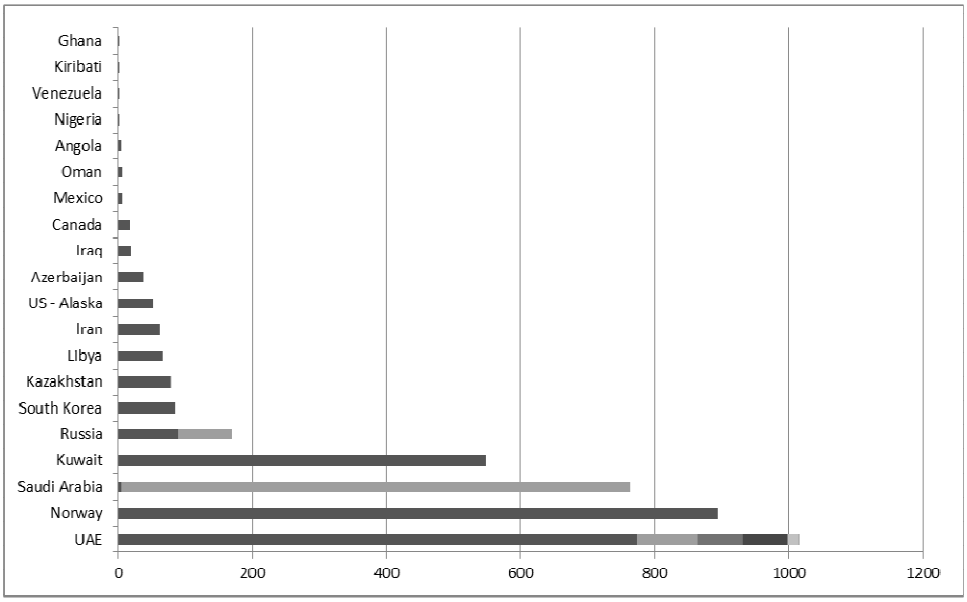
Source: Design based on data from <http://www.swfinstitute.org/>.

The largest amount of accumulated assets of oil based sovereign wealth funds is managed by United Arab Emirates – 1023.9 bl. USD. The assets are owned by six SWFs: Abu Dhabi Investment Authority (773 bl. USD), Abu Dhabi Investment

Council (90 bl. USD), International Petroleum Investment Company (68.4 bl. USD), Mubadala Development Company (66.3 bl. USD), RAK Investment Authority (USD 1.2 bl.) and Emirates Investment Authority (15 bl. USD). The second country in ranking is Norway, which manages 893 bl. USD in Government Pension Fund-Global. The third is Saudi Arabia with 762.5 bl. USD, which has two sovereign funds – SAMA Foreign Holdings (757.2 bl. USD) and the Public Investment Fund (5.3 bl. USD).

F i g u r e 2

Assets of Oil Based SWFs (in billion/bl. USD, 2015)



Source: Design based on data from <http://www.swfinstitute.org/>.

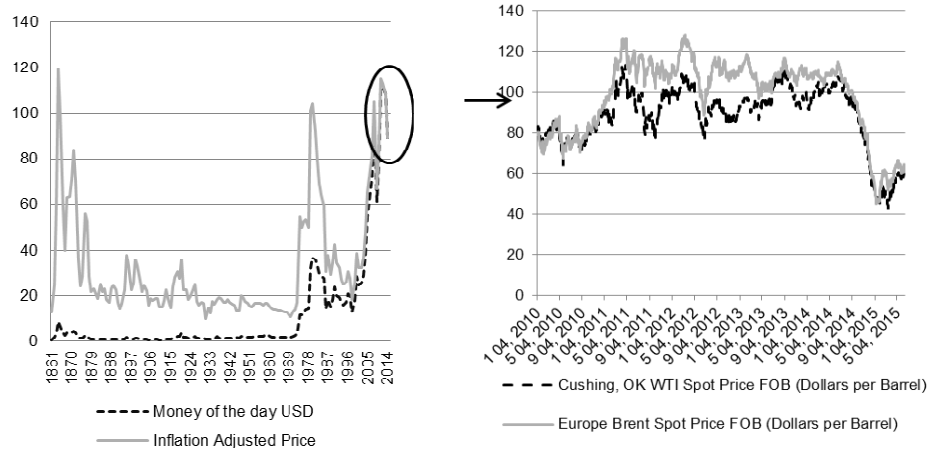
The meaning of directing the alternative (non-credit) sources of capital from strong and stable financial partners in the crisis period is becoming clearer. Sovereign funds represent an important impulse for the revival of the economic activity in the global economy and their territorial direction suggests a possible configuration of economic power in the post-crisis period. It is about certain shifts of forces in the world power within and in favour of the regional structure of free investment capital sources. The arising development strategies might be an answer to the questions about the future global consumption. By placing investments in different regions of the world, SWFs secure the positions of power of the countries owning them. In addition to SWFs, public pension funds, state enterprises and state investment companies (Sovereign Wealth Enterprises – SWEs) can be considered as sovereign investment tools.

Most of SWFs are funded from commodity sources with the largest proportion of oil. Therefore, the oil 'ownership' allows not only to express the opinions, but also to enforce them. The countries, that possess oil reserves and its production, can influence economic and (which is more fundamental) geopolitical processes. We are currently witnessing the so called war between Russia and the US, taking place in the field of oil industry, too. It is crucial to decide which country other states will support. While maintaining the price of oil at a low level it can be said that it is a kind of waiting game to find out which party will withstand more, or more specifically, how long Russia is able to withstand.

According to Hamilton (2011), the oil was used differently in the past. Its economic importance in the nineteenth century was considerably smaller than today. Figure 3 documents that when expressed in constant (inflation-adjusted) prices, crude oil reached level of 119.56 USD per barrel in 1864. That was historically the highest price in the reported period. It took another 147 years to reach the same price level. In 2011 the oil price equalled 115.22 USD per barrel.

F i g u r e 3

Historical Crude Oil Prices – Brent & Dayly WTI, Brent Oil Prices 1. 4. 2010 – 15. 6. 2015



Source: Design based on data from:
<http://chartsbin.com/view/oau>; <http://www.nasdaq.com/symbol/bno/stock-chart>.

From the beginning to the end of 2014, the oil prices fell sharply by 49%. The regrowth of oil price was not until February 2015 and until 15 June the price of oil has risen by almost 18%.

Low oil prices are beneficial to all those countries depending on its import. In an economy, which is also a producer, it can have a positive effect in the decrease of consumption expenditure. The example being the US where the fall

in oil prices increased the real incomes of US consumers, however, these are short-term effects in relation to the recovery of domestic demand. Deflation caused by lower oil prices should also be beneficial to public finances.

The countries that most 'suffer from low prices' are so called 'enemies' of the US and of its allies, for example Venezuela, Iran and Russia. These countries are heavily dependent on oil revenues, since these support relevant government expenditures (social programs, modernization of the army and so on). At the price of 75 – 80 USD per barrel, according to experts, the difficulties in financing the programs needed for maintaining public support already arise.

Saudi Arabia and other Gulf countries belong to major exporters of oil and differ from other oil producers in two basic ways. The first is the cost of extraction which is extremely low. This means that they are able to generate profit at much lower resulting price of oil. The second is the enormous financial reserves that enable to finance both domestic and international activities for a longer period of time, irrespective of price developments. This concerns particular efforts of the countries to transform their economies so as to reduce their dependence on oil revenues in the future.

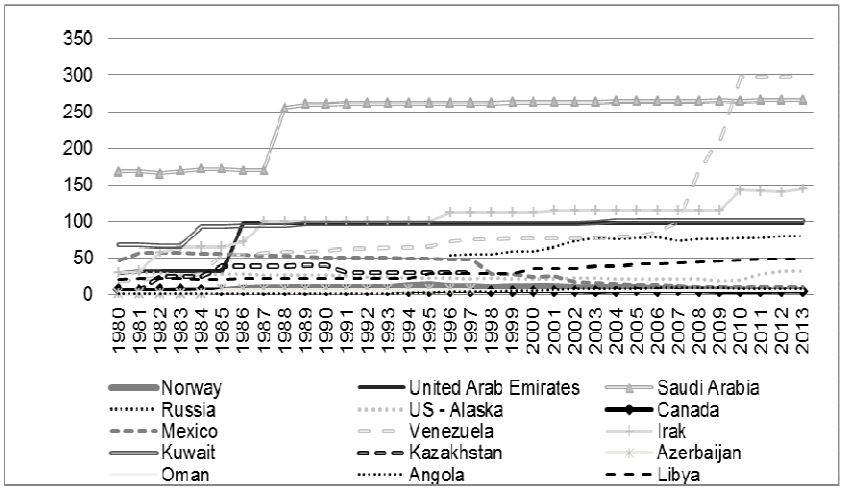
According to Feldstein (2014) further decline in the oil prices might have crucial geopolitical consequences. Keeping the oil prices at 60 USD per barrel would cause serious problems, especially in Russia. The similar impact might also appear in Venezuela and Iran. To reduce a massive deficit, in February 2015, Russia used almost half of its resources from the SWF. According to Melow (2015), SWFs‘managers do not expect the price of oil to rise above 100 USD per barrel in the foreseeable future.

For countries producing the oil at low cost, the oil is becoming a powerful tool for affecting the global affairs. The fact that helps to such use of oil is the existence of sovereign wealth funds which accumulate the capital from oil sales. Enormous amount of real financial reserves creates a margin for these countries to maneuver their strategic pricing. The function of SWFs as well as economies dependent on SWFs varies in the individual countries, which means that the decrease in income to SWFs can have different impact upon individual countries.

The largest oil reserves in the world are owned by the Middle East countries. Out of the countries that established their sovereign funds from the sales revenues of oil, the largest reserves of the raw material are posessd by countries such as Venezuela, Saudi Arabia, Iraq, Kuwait, the United Arab Emirates and Russia (Fig. 4). In case of Russia, not only its oil reserves but also other raw materials situated on an extensive area of former Grande Tartarie, have always been and will be subject to various geopolitical tension and efforts of gaining the access to these resources.

Figure 4

World Proven Crude Oil Reserves – Countries with Oil Based SWF (in million barrels, 1980 – 2013)

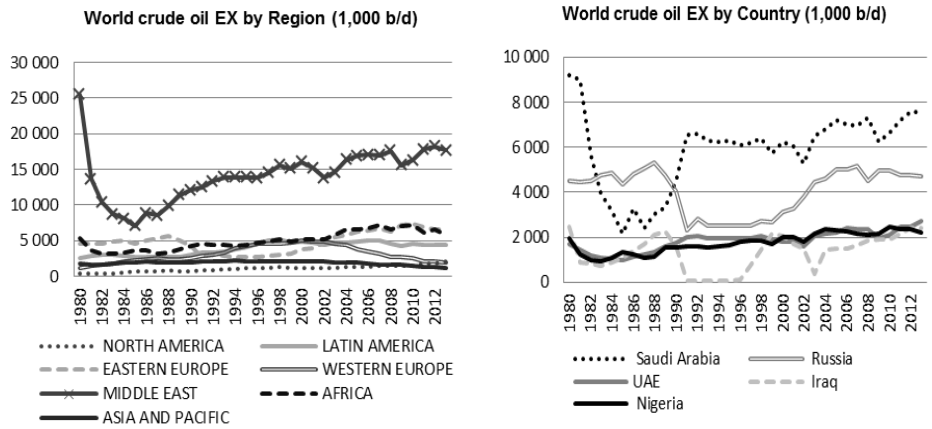


Source: Design based on data from: <http://www.opec.org/library/Annual%20Statistical%20Bulletin/interactive/current/FileZ/Main-Dateien/Section3.html>.

The following figure demonstrates the largest world exporters to be the countries in the Middle East of which Saudi Arabia is the first. The second world's largest producer is Russia. Saudi Arabia has the third largest reserves of finance accumulated in SWF derived from oil sales. Russia is the fifth.

Figure 5

Export and Import of Oil by Region, and the World Largest oil Exporters and Importers (in 1,000 barrels per day, 1980 – 2012)



Source: Design based on data from: <http://www.opec.org/library/Annual%20Statistical%20Bulletin/interactive/current/FileZ/Main-Dateien/Section3.html>.

When talking about pricing, the oil differs from other goods. The price of oil is not the result of current supply and demand in the market, but depends on expectations about the future supply and demand. The oil companies create a market supply by reducing their production or by holding the stocks of oil in the tankers. Conversely, the producers increase the supply by reducing the stocks and by higher production. Those are formally accepted thesis of oil price policy. However, the practice shows that the process of oil price development is affected by geopolitical factors, often of regional character.

According to Blanchard and Gali (2007), since the 1970s, from a macroeconomic point of view, changes in oil prices have been a major source of economic fluctuations, as well as the paradigms of global shocks that have simultaneously been affecting many economies. Kaletsky (2015) argues that the price range for oil trading has been the same in the last ten years compared with the first decade of OPEC operation, although characterized by entirely different rules. The price of oil increases sharply after 2005. Chinese demand has temporarily created a global shortage of oil.

Oil SWFs have become a major force in the international investments. Over the last five years the assets in sovereign wealth funds have grown by 12% on average. The expected growth in 2015 will only be 5% (Duncan, 2015), due to oil prices.

Oil exporting countries may use finances of SWFs to eliminate holes in their state budgets. According to IMF estimates and Fitch Ratings, Norway, Kuwait, Qatar and the United Arab Emirates need relatively low oil prices (40 USD, 54 USD, 60 USD and 77 USD) to maintain their budget. According to Delaney (2015), conversely, Saudi Arabia, Venezuela, Libya, Russia and many other oil producers need prices above 100 USD/barrel. Therefore, it draws significant attention not only to the fact that oil reserves will sometimes run out, but also that traditional assets will not generate sufficient returns. Therefore, SWFs focus towards the alternative investments (currently in infrastructure, generally in commodities, private equity, hedge funds and at uncertainity in real estate). According to Thind (2014) the official currency reserves are growing and therefore the funds exert pressure to place more capital into more risky assets.

2. Objectives, Methods and Data Base

Fundamental objective – finding out how the price of oil affects the size of the assets of SWFs accumulated from oil sales, is met through three sub-objectives:

1. To analyse the causality between the amount of assets in sovereign wealth funds and the oil price.

2. To analyse in which SWF a rapid change in the oil price causes the greatest shock.
3. To quantify changes in FDI (Foreign Direct Investment) by the ownership of oil SWF due to changes in the oil prices.

Examining the impact of oil prices on the SWFs is therefore based on three separate analyses – A, B and C. Together, they provide a mosaic view of the studied relations. The following table presents data sources used in the analysis.

T a b l e 1

Data Sources Used in the Analysis

Variable	Data	Source
WTI	WTI Crude Oil Spot Price	<https://www.quandl.com/data/DOE/RWTC-WTI-Crude-Oil-Spot-Price-Cushing-OK-FOB>
DP	Money of the day Oil Price	<http://chartsbin.com/view/oau>
IAP	Inflation Adjusted Oil Price	
SWF	SWF Assets	SWFI Institute Web pages of SWFs
oFDI	Outflow FDI	<http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx>
Oil reserves Oil Ex Oil Im	Oil reserves Oil export Oil import	<http://www.opec.org/library/Annual%20Statistical%20Bulletin/interactive/current/FileZ/Main-Dateien/Section3.html>

Source: Own design.

The aim of analysis A was to detect the impact of oil prices on the amount of assets in oil based sovereign wealth funds:

- from the list of sovereign wealth funds the ones with their origin only in the oil were selected (not those funded by a combination of oil and gas, or other commodity combination), representing a core set of data;
- from the core dataset those SWFs were selected whose value is more than 5 bl. USD;
- the third step determined the resulting database based on data availability (9 SWFs remained in the selection);
- analysis A was performed on two data files. In the first set of data there were annual figures for the nine sovereign wealth funds, the second set of data is counted as the value of assets within the country which provided us with 6 observations.

We had been using the following data on annual basis for the period of 19 years (1996 – 2014):

- oil price at current prices (daily price in given year – DP);
- oil price at constant prices (inflation-adjusted prices – IAP);
- annual percentage changes of accumulated capital in sovereign wealth funds.

To identify the relationship between oil prices changes and the amount of assets in oil based sovereign wealth funds Granger causality test was applied.

We analyzed whether the percentage changes in the price of oil affect the amount of assets accumulated in sovereign wealth funds. Granger causality test claims that the current and historic values of one variable provide us with the information for the explanation and prediction of another variable (Baumöhl, Lyócsa and Výrost, 2011). The hypothesis is being tested:

- H_0: *The price of oil does not, in Granger' sense, affect the amount of accumulated assets in sovereign wealth funds.*
- H_1: *The price of oil, in Granger's sense, affects the amount of accumulated assets in sovereign wealth funds*.

Based on the results from alnalysis A, analysis B was meant to find out which sovereign fund/country has been most affected by the change in oil price. The Impulse Response Function (IRF) method was applied. IRF refers to the reaction of any dynamic system in response to an external change.

We worked with the dataset of 4 variables – oil price (WTI), the amount of assets at SWF of Norway – GPFG, Kazakhstan – KNF and Russia SWF – NWF at RF at sum. We used quarterly data for the time period from the first quarter of 2008 till the first quarter of 2015.

The aim of the analysis C was to identify and quantify the impact of oil price on foreign direct investments in the individual countries. The analysis was done with the use of Regression analysis for Panel Data Analysis. Panel data combine a time series dimension with a cross section dimension. We used data set of 185 countries and 44 years (1970 – 2013) and three variables. The variable being explained was oFDI representing the value of FDI outflows.

The explanatory variables were the price of oil per barrel – expressed in current prices (DP) and a dummy variable (SWFoil). Dummy variable divided countries into those owning oil based sovereign wealth fund and the ones that do not own oil based SWF. In the data set thera are 25 countries with dummy variable 1 which means that 25 countries have their own oil based sovereign wealth fund. The remaining countries have assigned a dummy with the value of 0. The group of countries owning the oil based sovereign wealth funds contains only the countries that have their ownership of SWF financed from incomes from oil sales exclusively (not those that are financed by combination of oil and gas, or oil and other commodities).

3. Results of Analyses

The idea of examining the effects of oil prices changes versus the size of asset of oil based SWF arose after observing the current geopolitical processes and the increase of interest in energo sector and financial architecture changes after

the start of the world financial and economic crisis. In the background of the formulation of individual hypothesis there were the questions whether to create new SWFs as reserve funds and the issues concerning possibilities and ways of weakening Russia after its stepping on an individual way of democracy practices without the recommendations of the West. It was not only important to consider the different realia in terms of variables, but also to select an appropriate analytic apparatus to verify and prove our assumptions.

3.1. Analysis of the Causal Relationship between the Oil Price and the Amount of Assets in SWFs

In order to analyze and to apply Granger causality test, the stationarity of data was tested. Therefore, in the first step, the stationarity was tested with the use of Kwiatkowski-Phillips-Schmidt-Shin statistic (KPSS) test (withouth trend). KPSS tests the null hypothesis that the data are stationary. The results of KPSS test are presented in Table 2. We do not reject the hypothesis H_0 in any analyzed combination of data, since the values of Tstat KPSS are smaller than the critical values.

T a b l e 2

KPSS Test

		KPSS			KPSS
Oil price	DP	0.541361	**Sovereign Wealth Funds**	ADIA	0.323788
	IAP	0.534251		ALBERTA	0.086258
Countries	Canada	0.527136		GPFG	0.484574
	Kazahkstan	0.497398		IPIC	0.269673
	Norway	0.484574		KAZAHSTAN	0.497398
	Russia	0.500000		MUBADALA	0.133140
	Saudi Arabia	0.150908		NWF	0.332224
	UAE	0.322605		RF	0.214427
				SAMA	0.150908
Asymptotic critical values 1% level – 0.739000					

*ADIA – Abu Ahabi Investment Authority (UAE); ALBERTA – Alberta´s Heritage Fund (Canada); GPFG – Government Pension Fund-Global (Norway); IPIC – International Petroleum Investment Company (UAE); KAZAHSTAN – Kazahstan National Fund; MUBADALA – Mubadala Development Company(UAE); NWF – National Welfare Fund (Russia); RF – Reserve Fund (Russia); SAMA – SAMA Foreign Holding (Saudi Arabia).

Source: Own calculation in R program.

Prior to Granger causality test application, the number of lags had to be determined to be used for conduction of the analysis. The number of lags was determined with the use of SC test. In the data set where the SC test (due to short time series) could not be applied, one lag was applied. For countries and sovereign wealth funds with the SC test applied, the result suggested 1 lag to be used in Granger causality test with the exception of one country: the United Arab Emirates. The combination of the oil price, both at stable prices and inflation adjusted oil prices required the application of 2 lags.

T a b l e 3

SC Test

	Lag	CANADA	KAZAKHSTAN	NORWAY	SAUDI_ARABIA	UAE
DP	0	12.71745	9.582956	8.012019	10.90404	10.34368
	1	11.64366*	8.565689*	7.348400*	10.59235*	9.505967
	2	11.81873	9.263339	7.733914	11.25480	8.871819*
	3	12.04409	9.124511	8.348664	11.64594	9.301365
	Lag	**ADIA**	**ALBERTA**	**GPFG**	**KAZAKHSTAN**	**SAMA**
	0	8.538806	7.682985	8.012019	9.582956	10.90404
	1	7.385002*	6.507951*	7.348400*	8.565689*	10.59235*
	2	7.622602	7.112201	7.733914	9.263339	11.25480
	3	8.201470	7.150277	8.348664	9.124511	11.64594
	Lag	**CANADA**	**KAZAKHSTAN**	**NORWAY**	**SAUDI_ARABIA**	**UAE**
IAP	0	12.59866	9.389766	7.826967	10.71127	10.18892
	1	11.33161*	8.563243*	7.317158*	10.58163*	9.558246
	2	11.44632	9.246858	7.708339	11.22117	9.041968*
	3	11.73140	8.965536	8.315410	11.57885	9.475845
	Lag	**ADIA**	**ALBERTA**	**GPFG**	**KAZAKHSTAN**	**SAMA**
	0	8.388155	7.507303	7.826967	9.389766	10.71127
	1	7.377587*	6.544174*	7.317158*	8.563243*	10.58163*
	2	7.625011	7.146271	7.708339	9.246858	11.22117
	3	8.175730	7.182042	8.315410	8.965536	11.57885

Source: Own calculation in R program.

Granger causality test results are presented in Table 4. The causal relationship of the oil price inmpact (real as well as constant) on annual growth of sovereign wealth funds was confirmed in the case of SWFs of Norway and Kazakhstan. In the data set for the countries which own SWF financed by oil sales the causal relationship of impact of oil prices on the annual growth of sovereign wealth funds was confirmed in Kazakhstan, Norway and Russia.

T a b l e 4

Granger Causality

	H_0	Prob.	H_0	Prob.
Countries	DP ‡ CANADA	0.0720	IAP ‡ CANADA	0.0546
	DP ‡ KAZAKHSTAN	0.0214	IAP ‡ KAZAKHSTAN	0.0234
	DP ‡ NORWAY	0.0051	IAP ‡ NORWAY	0.0051
	DP ‡ RUSSIA	0.0319	IAP ‡ RUSSIA	0.0316
	DP ‡ SAUDI_ARABIA	0.2765	IAP ‡ SAUDI_ARABIA	0.2914
	DP ‡ UAE	0.1345	IAP ‡ UAE	0.1636
Sovereign Wealth Funds	DP ‡ ADIA	0.7787	IAP ‡ ADIA	0.7281
	DP ‡ ALBERTA	0.9124	IAP ‡ ALBERTA	0.9585
	DP ‡ GPFG	0.0051	IAP ‡ GPFG	0.0051
	DP ‡ IPIC	0.5371	IAP ‡ IPIC	0.6264
	DP ‡ KAZAKHSTAN	0.0214	IAP ‡ KAZAKHSTAN	0.0234
	DP ‡ MUBADALA	0.8854	IAP ‡ MUBADALA	0.9957
	DP ‡ NWF	0.9752	IAP ‡ NWF	0.8902
	DP ‡ RF	0.2104	IAP ‡ RF	0.2498
	DP ‡ SAMA	0.2765	IAP ‡ SAMA	0.2914

* Symbol ‡ means: does not Granger Cause.

Source: Own calculation in R program.

3.2. Analysis of the Impact of Oil Price Changes on the Volume of SWFs Assets

In the analysis B, IRF model requires VAR model (vector autoregression) to be made first. VAR is an econometric model that captures the interdependence among the time series. The number of lags needs to be determined when forming the VAR and IRF models. To determine the number of lags, Schwartz Criterion (SC) was applied because it results to the lowest number of lags. The results of SC test are in Table 5. Since data file for the sovereign funds of Norway and Kazakhstan contain one SWF (Norwegian GPFG and Kazakh KNF) the IRF analysis uses the data per country.

Based on the results of SC test, one lag was applied in the case of Kazakhstan and Russian SWF. In case of Norway, two lags were applied. In R program, VAR model with trend and constant (type = both) was applied:

$$Y_t = C + A_1 Y_{t-1} + A_2 Y_{t-2} + ... + A_k Y_{t-k} + \varepsilon_t \quad (1)$$

where

C – k x 1 vector of constants,

A – k x k metrix,

ε_t – k x 1 vector of error terms.

The estimate of VAR model coefficinets is documented in Table 6.

T a b l e 5

Schwarz Criterion and Model Results with the Use of Stated Number of Lags

	NORWAY	KAZAHSTAN	RUSSIA
SC(n)	2	1	1
Multiple R-squared	0.9881	0.9932	0.7604
Adjusted R-squared	0.9853	0.9924	0.7305
p-value	<2.2e-16	<2.2e-16	1.271e-07

Source: Own calculation in R program.

T a b l e 6

VAR Models Coefficients Estimation

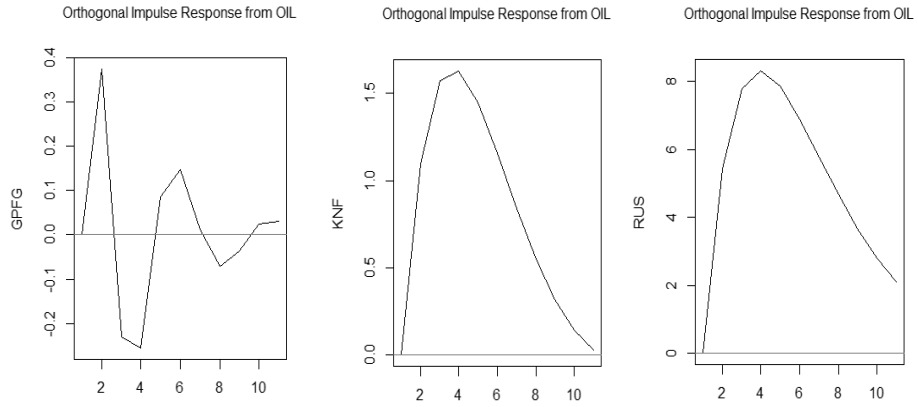
Response to OIL	Estimate	Pr(>|t|)
	NORWAY	
NORWAY.l1	0.4136	0.030971 *
OIL.l1	0.8967	0.007089 **
NORWAY.l2	0.3242	0.096132 .
OIL.l2	–1.4294	0.000919 ***
	KAZAHSTAN	
KAZAHSTAN.l1	0.77537	1.09e-11 ***
OIL.l1	0.07897	0.000206 ***
	RUSSIA	
RUSSIA.l1	0.9217	7.94e-09 ***
OIL.l1	0.3094	0.0498 *

Source: Own calculation in R program.

We subsequently analysed, with the use of IRF method, upon which sovereign wealth fund the oil price shock has the greatest impact. The price of oil was the impulse and the amount of assets in sovereign wealth funds was the response. The results of IRF are presented in graphs in Figure 6. The figure shows that the oil price shock has the greatest impact on the value of assets in Russian sovereign wealth funds (in aggregate), then SWF of Kazakhstan and the smallest on Norwegian SF. Moreover, if the impulse is positive, the answer is also positive in the case of Kazakhstan and Russia at all time periods (quarters). In case of Norway, almost half of the responses are positive and the value fluctuates around 0. It can be said that the effect is dying after about ten periods (quarters) for Norwegian GPFG and Kazakhstan KNF. In case of Russia (RUS), the shock in oil prices has a long lasting effect on the amount of accumulated capital in the sovereign wealth funds.

F i g u r e 6

Impulse Response of Oil Prices on the Amount of Assets in Sovereign Wealth Funds



Source: Own calculation in R program.

3.3. Analysis of the Impact of Changes in Oil Prices on FDI

For C analysis, data of foreign direct investment and oil prices per barrel were standardized by logarithm. Linear model in this case has the following form:

$$Log\ oFDI = \alpha + ß_1\ log\ DP_{it} + ß_2\ SWFoil_{it} \qquad (2)$$

where ß are the unknown parameters of the regression model. Their values are estimated by the estimation method. The method was decided after the Hausman Test. A generally accepted way of choosing between fixed and random effects is running a Hausman test. Hausman test shows more efficient model against a less efficient but consistent model to make sure that the more efficient model also gives consistent results.

$$H = (ß_{FEM} - ß_{REM}) [Var(ß_{FEM}) - Var(ß_{REM})]^{-1} (ß_{FEM}) - (ß_{REM}) \quad (3)$$

We test the following hypothesis H_0 with the alternative hypothesis H_1. The results of test are in Table 7.

- H_0: *Estimators of the parameters of the generalized least squares method in a RE and FE estimators are consistent, and the method of least squares is not efficient.*
- H_1: *Only least squares method is consistent*.

T a b l e 7

Hausman Test Results

Hausman test - Null hypothesis: GLS estimates are consistent Asymptotic test statistic: Chi-square(1) = 1.2661 with p-value = 0.2605

Source: Own calculation in R program.

Based on the results of Hausman test ($p < 0.05$ – H_0 is rejected – fixed effect model (FEM) is preferable, $p > 0.05$ – we do not reject H_0 – random effects model (REM) is preferable) the null hypothesis is rejected and for the estimation of model coefficients random effects method is used. Linear model in our case has the following form:

$$l\_oFDI = const + l\_DP + SWFoil \quad (4)$$

T a b l e 8

REM Model Results

Model: Random-effects (GLS), using 4 665 observations Included 185 cross-sectional units Time-series length: minimum 1, maximum 44 Dependent variable: l_oFDI					
	Coefficient	***Std. Error***	***t-ratio***	***p-value***	
Const	–7.45415	0.370525	–20.1178	<0.00001	***
l_DP	2.72803	0.0643399	42.4003	<0.00001	***
SWFoil	1.81745	0.806104	2.2546	0.02420	**

Source: Own calculation in R program.

To comply with the basic conditions of the regression model, the model should be tested for the presence of heteroskedasticity, autocorrelation and multicollinearity. Homoskedasticity describes a situation in which the error term (that is random disturbance in the relationship between the independent variables and the dependent variable) is the same across all values of the independent variables. If the value of variance is not the same, the opposite phenomenon known as heteroscedasticity arises. Thus heteroscedasticity is the absence of homoscedasticity.

Another assumption of a linear regression model is that the random component of any two observations must be independent. Multicollinearity refers to a situation in which two or more explanatory variables in a multiple regression model are linearly related. The test methods and test results are in the table below:

T a b l e 9

Test Results

Heteroskedasticity	**Autocorrelation**	**Multicollinearity**
Tests		
White's test	**Durbin-Watson**	**Correlation coefficient**
H_0: homoscedasticity H_1: heteroscedasticity	H_0: autocorrelation H_1: no autocorrelation	
p-values		
4.39613e-060	0.133475	–0.0000
p-value > α (0.05) → H_0 not reject		

Source: Own calculation in R program.

According to tests results, autocorrelation and multicolinearity are not present in the model, but White's test did not reject the presence of heteroskedasticity. However, according to Wooldridge (2010), the presence of heteroskedaticity in the model with large data sets does not affect the ability to perform the exact conclusions with the use of a linear regression model.

After testing the selected regression mode our claim is that the model selected is appropriate one and in our case coefficients are:

$$l\_oFDI = -7.45 + 2.73 * l\_DP + 1.82 * SWFoil \quad (5)$$

As follows from the above mentioned, the price of oil has impact on foreign direct investment, which can be interpreted like this:

- The increase in oil prices has a positive impact on the growth of foreign direct investments of individual countries.
- The ownership of oil based sovereign wealth fund has a positive impact on foreign direct investment of the countries.
- 1% increase in oil prices causes an increase in foreign direct investment by 2.73%.
- If a country owns the oil based sovereign wealth fund, l_FDI will increase by 1.82; which means additional increase of FDI by $e^{1.82} = 6.17\%$.

Conclusions

The increasing power of sovereign wealth funds, which in the Asian region along with the Persian Gulf and with the Eastern part of Europe (Russia) is becoming a tool of investment process, particularly in Asia and Europe, has not

been and still is not being positivelly accepted. The context of this point of view is obvious in transferring of hegemony of the West to the East, linked to a gradually more active cooperation between Russia and China. The above mentioned fact will increasingly be affected by the formation of the Asian Investment Bank for Infrastructure (AIIB) in 2015 the role of which is to counterbalance the World Bank, International Monetary Fund and the Asian Development Bank, all dominated by the USA.

A kind of retrograding moment for further growth of sovereign wealth funds was a sharp fall of the oil prices and keeping these prices on a low level for a certain period. The biggest part of wealth of SWFs is of oil origin which is why a decline in oil price has a significant impact on new capital growth. But according to Basu, Indrawati (2015) declining oil prices could have the most positive impact on the global economy and governments should start taking advantage of them.

The aim of this article was to determine how oil price changes have affected the growth of the assets of oil based sovereign wealth funds, then to determine which countries with oil based SWFs have been affected most and also to determine whether and how the changes of oil prices affected the foreign direct investments. To find out all this, an analytic apparatus was made. The data sources for the countries owning sovereign wealth funds were used to verify the individual hypotheses, assumptions and formulated context.

A causal relationship of impact of the oil price on annual growth of sovereign wealth funds wealth in Kazakhstan, Norway and Russia was confirmed. The shock in oil prices had the greatest impact on the value of assets in Russian sovereign wealth funds (in sum), then on SWF of Kazakhstan and the lowest impact was obsereved upon Norwegian SWF.

In the case of Russia, the shock in oil price has had a long lasting effect on the amount of capital accumulated in the sovereign wealth funds. This confirms the assumption that problems of covering the state budget expenditures, significantly affected by income from the sale of oil and natural gas, will continue. The interesting fact is that Saudi Arabia with a very rich oil based sovereign wealth fund does not suffer from the low oil prices and it does not affect the principles of its investment decisions. Saudi Arabia despite the fall of oil prices was able to accumulate enough assets which will enable to cover the total imports for the period of five years.

Moreover, Saudi Arabia will use its SWF to increase the expenditures on infrastructure, education and health sector by 10%. A causal relationship between the oil prices and the amount of assets of small SWFs of USA was not confirmed.

The findings about the impact of the oil prices increase upon the size growth of foreign direct investment are of great importance, especially in case of owners of oil based sovereign wealth fund.

References

BASU, K. – INDRAWATI, S. M. (2015): Cheap Oil for Change. Retrieved May 10, 2015, from <http://www.project-syndicate.org/commentary/oil-price-decline-subsidies-reform-by-kaushik-basu-and-sri-mulyani-indrawati-2015-02>.

BAUMÖHL, E. – LYÓCSA, Š. – VÝROST, T. (2011): Fundamentálna analýza akciových trhov. Košice: Elfa. ISBN 978-80-8086-191-6.

BLANCHARD, O. J. – GALI, J. (2007): The Macroeconomic Effects of Oil Shocks. Why are the 2000s so Different from the 1970s? Retrieved April 22, 2015, from <http://www.nber.org/papers/w13368>.

DELANEY, J. (2015): Sovereign Wealth Investments Hold Steady Amid Oil Shock. Retrieved June 28, 2015, from <http://www.institutionalinvestor.com/article/3430310/investors-sovereign-wealth-funds/sovereign-wealth-fund-investments-hold-steady-amid-oil-shock.html#.VZBi0_ntmko>.

DUNCAN, E. (2015): Lower Oil Price Erodes Sovereign Wealth Funds. Retrieved Jun 27, 2015, from <http://www.ft.com/intl/cms/s/0/401cc4e8-0b7c-11e5-8937-00144feabdc0.html#axzz3eH2b0YrL>.

FELDSTEIN, M. (2014): The Geopolitical Impact of Cheap Oil. Retrieved May 11, 2015, from <http://www.project-syndicate.org/commentary/oil-prices-geopolitical-stability-by-martin-feldstein-2014-11>.

HAMILTON, J. D. (2011): Historical Oil Shocks. Retrieved April 21, 2015, from <http://www.nber.org/papers/w16790>.

KALETSKY, A. (2015): A New Ceiling for Oil Prices. Retrieved May 10, 2015, from <http://www.project-syndicate.org/commentary/oil-prices-ceiling-and-floor-by-anatole-kaletsky-2015-01>.

MAZRAATI, M. – JAZAYERI TAYYEBI, S. M. R. (2004): Oil Price Movements and Production Agreements. Retrieved May 12, 2015 from <http://ssrn.com/abstract=591602>.

MICHALSKI, G. (2015): Full Operating Cycle Influence on Food and Beverages Processing Firms Characteristics. Agricultural Economics – Zemědělská ekonomika, *61*.

MICHALSKI, G. (2009): A Value-oriented Framework for Inventory Management. South East European Journal of Economics and Business, *4*, No. 2, pp. 97 – 102.

PAUHOFOVÁ, I. – SVOCÁKOVÁ, S. (2015): Investičné stratégie Číny v podmienkach krízy. Bratislava: Ekonomický ústav SAV. ISBN 978-80-7144-243-1.

PAUHOFOVÁ, I. (2014): Suverénne fondy vo svete. Košice: Technická univerzita v Košiciach. ISBN 978-80-553-1855-4.

THIND, S. (2014): Oil Prices Push Sovereign Wealth Funds Toward Alternative Investments. Retrieved June 26, 2015, from <http://www.institutionalinvestor.com/Article/3311509/Investors-Sovereign-Wealth-Funds/Oil-Prices-Push-Sovereign-Wealth-Funds-Toward-Alternative-Investments.html#.VZBi0vntmko>.

WOOLDRIDGE, J. M. (2010): Econometric Analysis of Cross Section and Panel Data. London: The MIT Press. ISBN-13:978-0262232586.