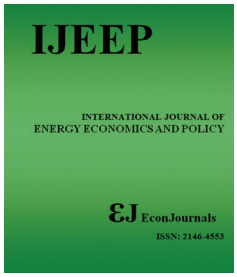

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Losers of the Falling Oil Prices: Changes in Oil Vulnerability in the Oil Exporting Countries

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ABSTRACT

The oil market was relatively balanced between 2011 and 2013 at around 100 USD. In the second half of 2014 the sharp decline in oil prices was an unexpected event for most of the market players. The size of price drops justifies an analysis of the oil vulnerability of the most significant net oil exporting countries. In this study many types of trade statistics (export intensity index, terms of trade index, export sensitivity, Herfindahl-Hirschman index), and furthermore the Bennett method are applied to quantify the oil vulnerability of the 14 most important oil exporting nations. It is possible to identify country groups, which enables us to differentiate the applicable economic instruments and make policy recommendations.

Keywords: Oil Prices, Vulnerability, Energy Security
JEL Classifications: F19, Q41, Q43

1. INTRODUCTION

1.1. Theoretical Background

The vulnerability of a system is the term used to refer to the effect of an external influence (shock) and to the degree with which the system is able to cope without adverse events(Christie, 2009). Many studies apply the term of resilience (such as Rowies, 2015), which means in general sense a flexible resistance capability, so a reactive ability of a system to return to its original form after an external shock. In this study we use the more general term of vulnerability.

A generally accepted definition of energy and oil vulnerability cannot be found. Oil vulnerability can be interpreted as a multidimensional concept, which is dominated by mainly the perspective of the oil importing countries. We distinguish the vulnerability to changes in the oil prices (market risk) and vulnerability to other shocks coming from the supply side (such as geopolitical conflicts, size of reserves or other risks of physical disruptions. etc.). Another form of risk is in connection with the climate change, global warming and environmental pollution, and is called environmental risk (Gupta, 2008).

In the time period of rising oil prices most of the studies focused on oil importing developed countries and calculated many indicators to measure the different risks and vulnerability. Many kinds of approaches can be found, with an economic, national security, geopolitical or environmental-ecological focus. It is important to note that most of the studies analyzing the degree of the vulnerability focus on energy security issues, which has a central role in economic security (Gazdag and Tálas, 2008). Energy security is often defined as energy indepence (mainly by policymakers), which can be improved by decreasing energy imports and by the development of diversification (both in the energy mix and the supply as well). However, Cohen et al. (2011) emphasize that higher dependency on one supplier means lower energy security, but the degree of vulnerability is not certain to be critical. So these two definitions (security and vulnerability) should be separately examined. In the case of vulnerability the economic and energy factors of the host country are in the focus, but during investigations of energy security analysts evaluate primarily the supplying countries, with special regard to the economic, political and social risks (see Jobbágy (2010) for a detailed discussion of social risks). Next we concentrate on the examination of the oil vulnerability; our main objective is to evaluate it from the

perspective of the main oil exporting countries during the time period of oil price drops.

In this topic the first significant study was published by ESMAP (Energy Sector Management Assistance Program, World Bank) and UNDP in 2005. This study investigated the vulnerability of oil importing countries when prices rise. Applying simple decomposition analysis, it factors the value of oil imports in the gross domestic product (GDP) in some African countries.

A more complex analysis and pioneering work is that of Gupta (2008), which examines the vulnerability of 26 net oil importing countries also in the time period of rising oil prices (the calculations were carried out in the year 2004). The study considers both market and supply risks as well and created an oil vulnerability index using the principle component technique. The macroeconomic risk is measured with the following indicators:

- GDP per capita at market exchange rate,
- Oil intensity at market exchange rate,
- Cost of oil in national income,
- Share of oil.

The supply side is measured with the indicators:

- Domestic oil reservres,
- Market liquidity,
- Oil import dependancy,
- Diversification of the oil import,
- And the political risk of the supplier country (the latter three are aggregated into the Herfindahl-Hirschman index).

Gnansounou (2008) - similarly to Gupta (2008) - investigated the vulnerability of 37 developed, industrialized countries for the year 2003, applying a composite indicator. The study of Christie (2009) is also a milestone, systematically reviewing current resultsin the topic of vulnerability. Analysing the broader EU-Russia relations, it concentrates on national and energy security issues and strives to calculate the potential loss starting from the financial literature.

In contrast with the former analysis, Rowies (2015) tested the oil exporting countries and reviewed the indicators of vulnerability on their side. The study focuses on the share of oil incomes in the total exports and of the national income and it also discusses the importance of gross debt, the total reserves and fiscal break-even oil prices. The study evaluates vulnerability and resilience at the same time.

Galland (2015) takes into consideration the main macroeconomic indicators for the investigation of vulnerability (in the case of oil exporting countries and during falling oil prices) such as:

- Fiscal balance and fiscal break-even oil prices,
- Fiscal oil revenues,
- External assets,
- Share of oil exports,
- Current account balance.

In this study the countries whose vulnerability is medium (in time of sharp price decline) are Kuwait, Qatar, Saudi Arabia and the United Arab Emirates. The vulnerability of the economies of Algeria, Bahrain, Oman, Kazakhstan and Nigeria is average (a little worse than the former group). The case of Russia is very particular: It could cope with only oil price drops, but in its case there are many other risks (international sanctions, isolation, freezing Russian assets, devaluation of the Russian ruble), so its risk is higher. The vulnerability of Iraq, Libya, Venezuela and Yemen is high: "These countries combine both current account and budget deficits and limited or rapidly diminishing available resources" (Galland, 2015. p. 4).

The studies investigating oil vulnerability during oil price drops only make their suggestions after examining some macroeconomic indicators with simple time series analysis. These do not aggregate the selected indicators or create a complex index which would show the exact degree of the vulnerability. In contrast, in our study we carry out not only trade calculations but we produce a synthesized indicator using the Bennett method. The basic advantage of using this method is that it shows not only the rank of the selected countries but the absolute distance of them. Although this methodology does not apply weight factors, it is very informative and gives diversified results which enable us to classify the examined countries and select appropriate economic tools.

1.2. Main Reasons and Consequences of the Drop in Oil Prices

Generally oil is the basic element of the blood circulation of the world economy: In 2013 the share of oil in total world energy consumption was more than 45% (IEA, 2015). Approximately 60% of it is internationally traded, so it can be stated that crude oil is largely a global product (Gupta, 2008).

As an effect of the financial crisis of 2008 a sharp decline in the oil prices occurred, but after the shock the spot prices started to rise again. Between 2011 and 2013 the market recovered (crude oil was trading at around 100 USD per barrel), but the price collapse in the second half of 2014 (Figure 1) was unexpected. The current fall in oil prices is a consequence of demand and supply shocks as well: Lower than expected oil demand and higher than expected supply are the main causes (but the supply-related factors have played the major role). In the last decade and a half the proved reserves increased substantially. The main reasons are the discovered oil reserves in Venezuela, Iraq and Canada (furthermore, reserves rose by 15% in Qatar, Kazakhstan, the USA and Nigeria between 1991 and 2014) and the shale or light tight oil production surge in the USA. Between early 2011 and mid-2014 this balanced price of 100 USD per barrel was the direct consequence of the Arab Spring that swept through the Middle East after 2011 and the oil production boom in the USA (in this time period daily production increased by 1 million barrels in each of these years). The expansion of revolutionary waves by itself would cause upward price movement, while increased production led to a downward shift. In the second half of 2014 some of the production outages were restored in Libya (in 2012 the production reached 90% of the pre-revolutionary level) and in Iraq, furthermore the weakening global and especially Chinese economy led to crude's rapid price slump. The situation became worse after Saudi Arabia brought its market share to the fore (giving up the former swing position by which it could

influence the prices) and in the OPEC meetings (after November 2014) decided to maintain its production level (Deák, 2016; EY, 2015; World Bank, 2015). We note here that when Saudi Arabia made a similar decision in 1986 it took 5 years for the market to recover and prices start to rise. This raises the question of the main reasons of Saudi Arabia to change their policy. On the one side the swing position is very costly; it burdens the budget considering the increasing production data of the non-OPEC countries. On the other side the decision of the OPEC (eventually it did nothing to stop the price drops) does not mean the members of the organization are pulled apart and that the OPEC has no strategy. In some views (such as Deák, 2016) the members want to discourage the investors in the long run from turning to the more difficult to exploit oil sources (such as shale oil and deepwater oil production) and furthermore to make the newly arrived companies uncertain.

By January 2016 the prices had dropped one third (to under USD 30) compared to August 2014. The potential price rise was offset by the lifted sanctions against Iran, because another producer entered the market. The USD appreciated by approximately 20% against the EUR between January 2013 and January 2016, which had a negative effect on the oil prices (according to the World Bank (2015) a 10% appreciation of the USD against major currencies is associated with a decline of about 3-10% in the oil price).

Next we focus on the potential economic, social, and political consequences of the sharp decline in oil prices.

In spite of the fact that the profits and losses arising from the changes in oil prices offset each other (the sum of them is zero), the effect of the decreasing oil prices is absolutely positive: According to the EY (2015) a USD 50 reduction in the price of crude oil translates into a USD 4.6 billion/day stimulus to the global economy, while the IMF (2015) calculates that a 30% price decline increases the world GDP by 0.5%, and predicts an increase of probably 0.4-0.8% in 2016) (IMF Blog, 2016).

Generally it can be stated that the benefits to the world economy exceed the losses of the oil and gas industry. The production (or input) costs decrease as the effect of the oil price drops, which generates lower break-even and higher profit rates (mainly in the material and energy intensive branches). The lower costs result in price reductions of the products, which have a positive effect on the consumption and the economic growth (but we note here it depends on how the price reductions are realized in fuel prices, utility bills, etc.). The level of investments increases, the current account balance improves in most countries, and the low inflation rate encourages the central bank to start a programme of monetary easing(IMF, 2015). However, monetary easing is not possible in many countries, because the central bank rates converge to zero. We call attention to the fact that the strength of the effects is mainly dependent on many other factors (such as the role of oil in the economy and rates of fuel subsidies and taxes). Analysts (such as Krugman, 2016) agree that while the effects of oil price increases are greater and arrive more quickly, the consequences of decreasing are uncertain: In the case of a USD 10-20 decrease the processes described above occur, but the effects of a USD 60-70 decline can be dramatic. The study of the World Bank (2015) argues that households probably choose to put any realized income into savings (as opposed to spending) in the weakened global economy.

It is important to review the effects of oil price drops on the oil exporting countries. As the production and a significant part of the oil reserves are concentrated in politically and socially instable regions, decreasing revenues cause social insecurity. A rising unemployment rate and economic recession can bring about growing unrest. In countries where the state control is strong (such as price subsidies on fuel, food, water and other consumer goods), governments have to cut support because of the decreasing central incomes, which can raise tensions. According to the World Bank (2015), a 10% decrease in the oil price can cut the GDP by 0.8-2.5% and governments have to make serious adjustments in the budget. In the view of the IMF (2015) study, the economy of the oil exporting countries will shrink by an average 3.5%. In these countries both the real incomes and the profits derived from the oil producing will decline (which is essentially a mirror image of the processes occurring in the oil importing countries), but the rate of the downturn depends on the share of oil the exports, the economic policy responses, and precautions taken earlier. In most of the oil exporting countries afiscal deficit is a probable scenario. We note here that the selection criteria of the examined countries in this study can be found at the end of the methodology section.

2. METHODOLOGY

In this study many trade indicators (export intensity index, terms of trade index, export sensitivity, Herfindahl-Hirschman index), and furthermore the Bennett method are applied, which enables us to carry out a complex analysis.

The export intensity indicator is suitable for measuring the economic openness. It is a ratio that shows what share (%) of the domestic products of a nation sells in external markets. An optimal value cannot be determined, but generally the smaller the economy, the more dependent it is on international economic cooperation. (Lakos and Szivi, 2005).

$$\text{Export intensity index}=\frac{\text{Export}}{\text{GDP}}\times 100 \quad (1)$$

One of the most informative indicators is the terms of trade index, which is the ratio of the export price and import price index. It shows whether the average purchasing power of the exports has developed or not from 1 year to the next.

$$\text{Simple terms of trade index}=\frac{\text{Export price index}}{\text{Import price index}}\times 100 \quad (2)$$

The export sensitivity indicates the effects of economic growth on export volume.

$$\text{Export sensitivity}=\frac{\text{Dexport}}{\text{DGDP}} \quad (3)$$

The Herfindahl-Hirschman index (Christie, 2009; IMF, 2012) is suitable for measuring the concentration (the diversification of the export partners).

$$S_j = \frac{X_j}{\sum_j X_j} \quad HHI = \sum_j S_j^2 \tag{4}$$

Where, X_j is a chosen quantitive indicator (here it is the share of an oil importing country from the total exports of an oil producing country) and j is the country group (j=1,…, N).

The Herfindahl-Hirschman index can measure diversification: The closer to the value 1, the more concentrated the market. If it is 1, it means that the particular country has only one trade partner (customer or supplier). (Chuang and Ma, 2013).

Applying the Bennett method synthesized index can be created from heterogeneous indicators. The essentials of this methodology are the following: We choose the data of a geographical unit to use as the basic value by selecting the highest value. After that we calculate the ratio of the data of the other geographical unit to this basic value. We repeat the process for every chosen indicator. The result of the calculation is the sum of these ratios (%) for the different territorial units. The higher the result of a selected territorial unit, the higher the relative development is (so, in this case, the less the oil vulnerability). The general formula is:

$$a_{ik} = \frac{A_{ik}}{A_{imax}} \ (i=1,2,\ldots,n) \text{ es } (k=1,2,\ldots,m) \tag{5}$$

Where,
a_{ik}: The relative size of the i natural indicator in k territorial unit;
A_{ik}: The value of i natural indicator in k territorial unit;
A_{imax}: The maximum value of i natural indicator (in the examined territorial units);
m: The number of the examined territorial units;
n: The number of the analyzed indicators. (Abonyiné, 1999).

There is an important condition for the analyzed indicators: These have to be linear, so the higher the value, the higher the level of the development. In this study we apply a specific indicator (such as per capita, etc) and we find the effect of the indicators on the oil vulnerability (whether it decreases or increases).

In this analysis we use a wide range of data available, which is included in the Appendix (Appendix Table 1). The study focuses on countries in which the share of oil exports (USD) to the GDP (current prices, USD) was over 15% in 2013 (this year was selected for the basic year because it was the last one when the oil prices was stable at 100 USD/barrel, so it provides a good benchmark to analyze the effects of the further price drops). The countries are: Algeria, Bahrain, Iraq, Kuwait, Kazakhstan, Qatar, Norway, Oman, Nigeria, Russia, Saudi Arabia, the United Arab Emirates, Yemen and Venezuela (Appendix Table 2). The oil export data contain the main commodity groups 2709-2715 from the Comtrade (2016) database (HS classification ~ Harmonized Commodity Description and Coding Systems) (Appendix Table 3). The 15% limit was determined because under this value there are many countries that are not significant oil exporting countries, such as Belgium, the Netherlands, Lithuania or Singapore. These economies are mostly diversified so it was not considered appropriate to examine oil vulnerability. The question may arise why traditionally significant players of the market - such as Angola, Libya, or Iran - were not included in the study. In these cases there are no available data in the Comtrade database, so we were not able to include them.

We apply annual data (collecting from the World Bank, UNCTAD, Comtrade, OECD, Transparency International, IMF, and BP databases) to analyze the 2000-2014 time period and we draw conclusions about how well these markets were prepared for the price drops. The picture is modified by many other factors (such as current political events and other country-specific factors), but these are only limited considered within this study frame. Furthermore we examine the effects of the sharp decline in oil prices with monthly data (after January 2013) considering inflation rates, the total reserves and the exchange rates (monthly data are only available in some cases, so this part just gives a short insight into the latest economic incidents). The applied data are given in detail in the Appendix Table 2. We note here that in the case of most figures the legend includes the country names in descending order by the data under consideration (for ease of interpretability).

3. RESULTS

The break-even fiscal oil price (per barrel) indicator is essential for analyzing oil vulnerability. A country's dependency on oil prices can also be derived from its fiscal break-even price, which is the oil exporting price that would be required in order to register a balanced government budget (Rowies, 2015). After 2014 all of the selected countries (except Yemen) decreased the break-even price, but despite this, today the numbers are extremely high. The correction was essential because in the time of the price boom (between 2008 and 2012) governments increased their budgets considering the rising oil prices (for example in Qatar and Kuwait the break-even fiscal oil prices increased by USD 15 and in the United Arab Emirates by USD 55), so the value of this indicator reached (and exceeded) the USD 100 limit in most of the selected countries (IMF, 2012). Despite all measures, the fiscal break-even prices are also higher than the expected average oil price (about USD 50) for 2016, except for Kuwait and Norway. Figure 2 depicts the break-even fiscal prices for the countries investigated; the predicted average priced of oil is marked with a horizontal black line.

The examined countries have to correct their central bank rates: The central banks tend to tighten monetary policy rather thanstart a program of monetary easing. The low oil prices weaken the position of firms in the energy sector, whose foreign exposure is high. The financial positions of banks and other financial institutions can deteriorate, which is verified by conducted stress tests (IMF Blog, 2016). While in the oil importing countries the appreciation of the national currencies is expected, in the oil exporting countries depreciation is a possible scenario.

One of the important factors of the oil vulnerability is the share of oil to the total exports (the more dependent the country is

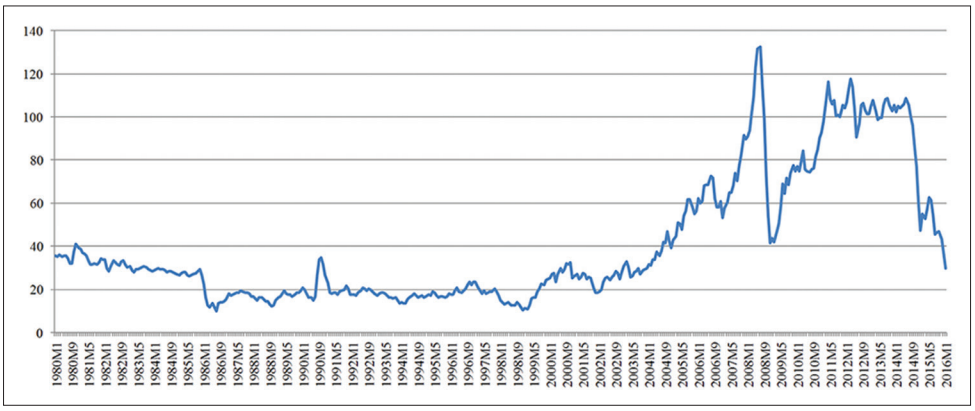
on oil revenues, the higher its vulnerability to a negative price shock) and the social and economic development of the country, which is presented here with GDP per capita. In Figure 3 the selected countries are positioned with regard TO these two indicators. Iraq, Venezuela, Algeria and Nigeria are countries where under-diversification is combined with low GDP per capita. Here oil makes up almost all of the exports, which makes their economies extremely vulnerable. In Saudi Arabia, Kuwait and Qatar this proportion is significant as well (more than 85%), but with regard to the GDP these are much richer countries (the GDP per capita in at purchasing power parity (PPP) was more than USD 45,000 in 2013, according to World Bank data).

Considering the diversification level it can be observed in Figure 3 that Kazakhstan, Russia, Yemen and Oman are at a similar stage, but the GDP per capita in PPP is widely dispersed (Yemen has USD 3,609 and Oman USD 41,186 in 2013). In the case of Bahrain, Norway and the United Arab Emirates we find the lowest rate of oil exports to total exports, but Norway and the UAE are far from each other on the imagineary scale. Looking at this figure, we can identify another way is to create the groups: Qatar and the United Arab Emirates could separately create another two groups, because in Qatar the GDP per capita is an outlier, while in the United Arab Emirates the outlier is oil exports. But in this way the 14 countries would form 6 groups, which is too many, in our opinion, and considering other economic factors (such as development and other macroeconomic indicators) it is justified to classify them into one common group.

The rate of oil exports not only to total exports, but to the GDP, can provide us with useful information (Figure 4). This indicator shows a decrease in the investigated countries (with the exception of Oman), and this can be observed not only in the time period of sharp price decline, but as a process occurring since 2011 (later this will be explained by the export intensity index).

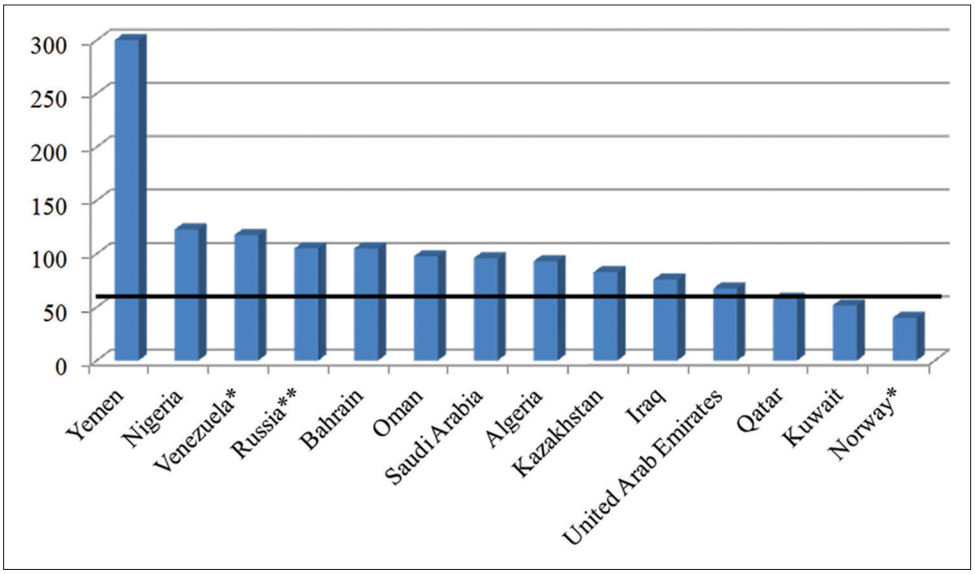
Calculating the Herfindahl-Hirschman index we used the World Integrated Trade Solution database of the World Bank. In some cases (marked with*) the Unspecified code is indicated as partner (it is the same in the Comtrade database of the United Nations), which

Figure 1: Crude oil price chart (simple average mean of the Brent, WTI and Dubai oil spot prices, January 1980- January 2016, USD/barrel)



Source: Own compilation based on EIA (2016)

Figure 2: Break-even fiscal oil prices per barrel (2016, USD)

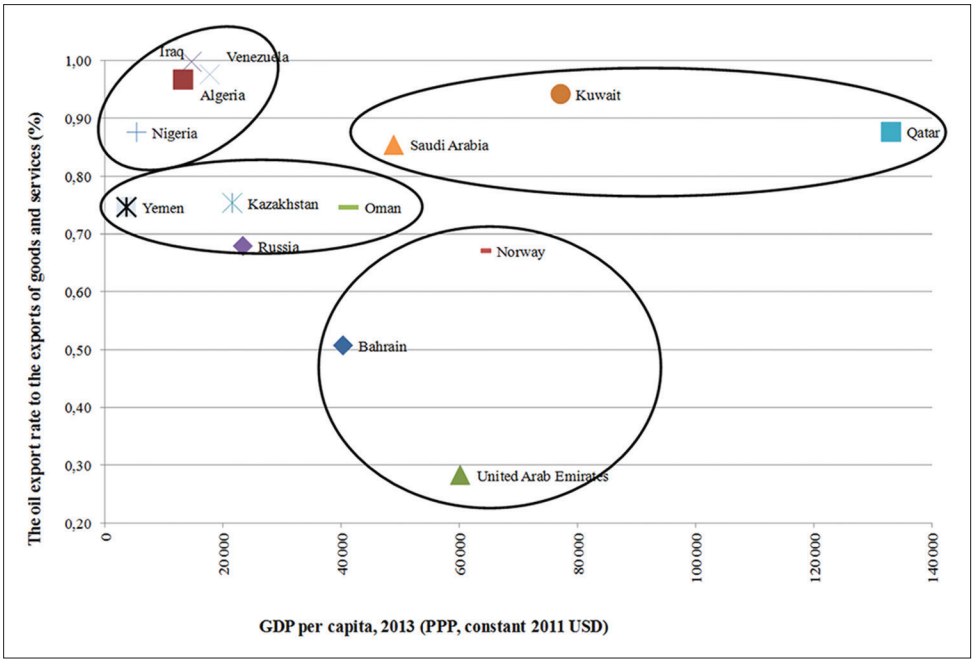


Comments: *2014 data, **2015 data; horizontal line shows the expected USD 50 per barrel oil prices for 2016
Source: Own compilation based on IMF (2016) database and Giles (2014)

biases the results. Results are shown in Figure 5. Based on results, we can observe under-diversification of exports in Kuwait, Bahrain and Venezuela. In the other countries the values are scattered between 0.1 and 0.2, which refers to normal export diversification (with regard to the number of partners). This indicates that the dependency on trade partners is not a problem, as it is not typical that these nations sell their oil to only one or two countries.

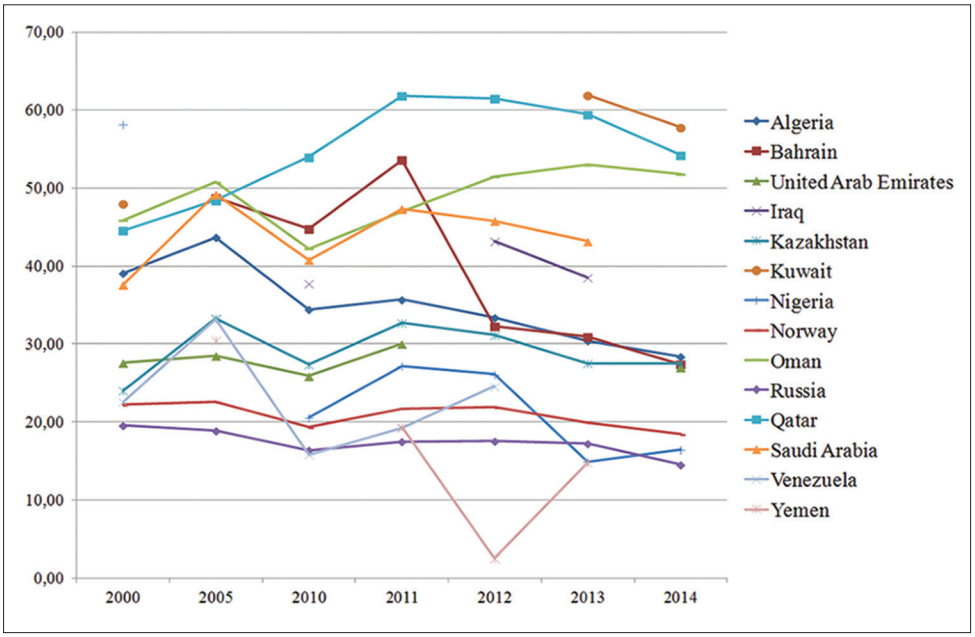
According to the results of the export intensity index (Figure 6) - the indicator presents the openness of an economy - the small Gulf States form a well separated group. In the case of the United Arab Emirates an outlier can be found; the value of its export intensity index exceeds 100% in 2012 and 2013. Bahrain, Qatar and Kuwait create another group whose index value is about 70%, which refers to high openness and vulnerability. The value is between 40% and 50% in Saudi Arabia, Iraq, Kazakhstan and Norway, while the most closed group contains Russia, Algeria and Nigeria. The index has declined in the last few years, but this occurred in Oman and the United Arab Emirates only in 2014 (similarly to the results for export sensitivity, which are discussed later).

Figure 3: Positions with regard the share of oil export and the Gross domestic product per capita, 2013



Source: Own compilation based on COMTRADE (2016) and World Bank (2016) database

Figure 4: Value of net oil exports (USD) to Gross domestic product (nominal value, USD) (%, 2000-2014)



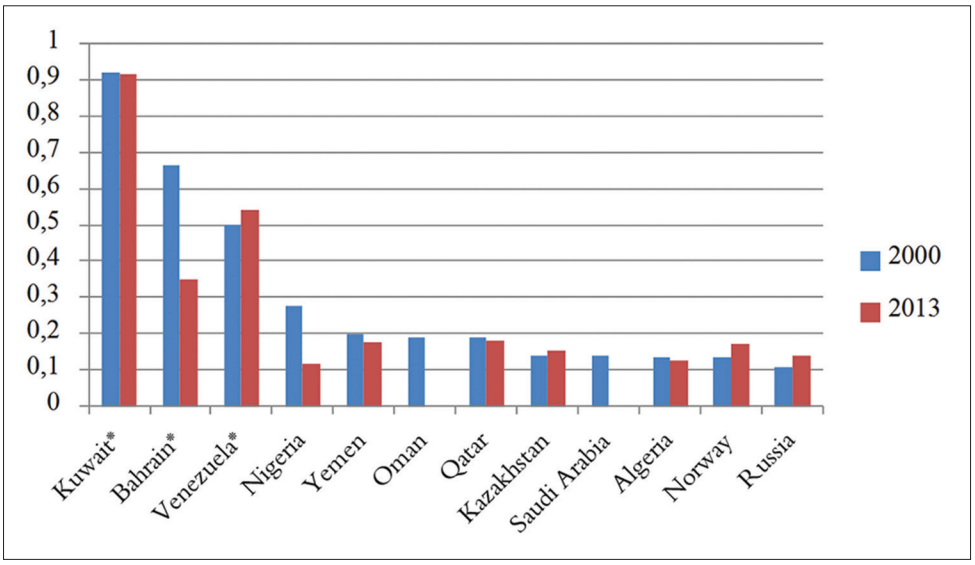
Source: Own compilation based on World Bank (2016) database

According to the results of the terms of trade index (Figure 7), the average purchasing power of exports intensively increased until 2008, but after the price collapse it declined sharply. However, this negative tendency was only temporary; in 2013 the purchasing power of the export started to develop again in the selected economies. The main factors leading to this improvement were the stable 100 USD per barrel oil price and the strengthening dollar. In 2014 the signs of the price decline are reflected: The value of index decreased slightly in all of the countries except Norway. The realized comparative advantages relatively increased between 2000 and 2014 (although the values are widely dispersed), but after 2015 a slight decrease is expected.

Between 2000 and 2013 the export sensitivity of the selected countries decreased significantly; the unit change of the GDP indicates ever smaller changes in exports. Next we focus on 2012-2013. In a number of countries we can see negative values, which is the result of positively change of the GDP and declining export indicator. So since 2012 the demand stagnation can be sensed (the saturation of the market) because of the declining export. But the macroeconomic environment favoured to the economic growth which led to GDP growth in all countries (Table 1).

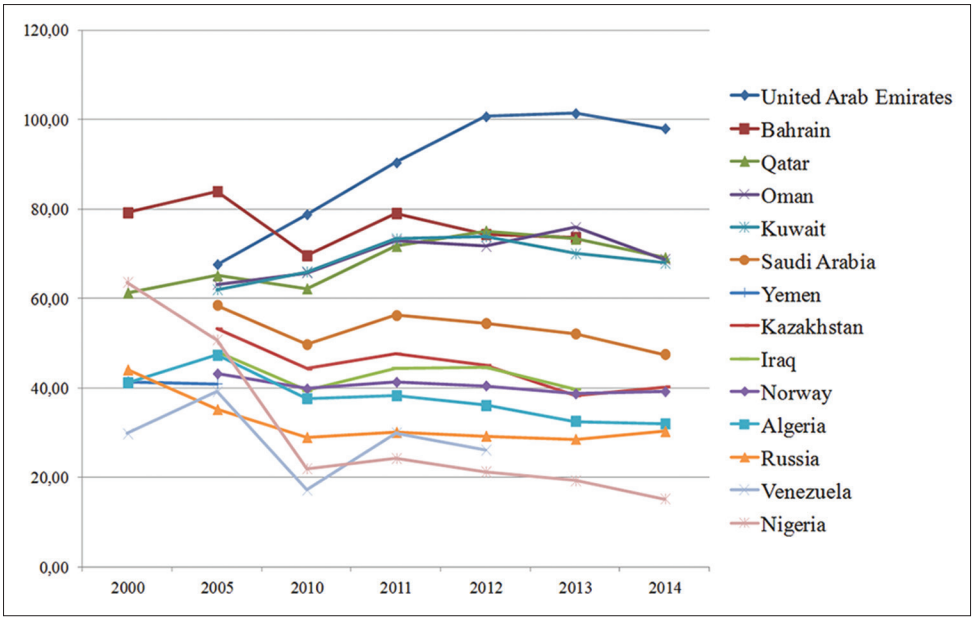
The results of oil vulnerability calculated with the Bennett method (Figure 8) confirm the conclusion of Galland (2015) but modify it slightly as well. There is civil war in Yemen and in Iraq and the political risks are more significant: In Yemen the main fight is between forces loyal to President Hadi (and his predecessor President Saleh, who has remained politically influential) and the Shia Houthis rebels, and the conflict significantly expanded in 2015. A Saudi leading coalition developed, which launches air

Figure 5: Results of Herfindahl-Hirschman index in the examined countries (2000, 2013)



Comments: *In the World Integrated Trade Solution database of World Bank the code unspecified is indicated as partner
Source: Own compilation based on World Bank (2016) database

Figure 6: Export intensity trends (2000-2014) in the examined countries (%)



Source: Own compilation based on World Bank (2016) and UNCTAD (2016) database

Table 1: Export sensitivity in the examined countries (2000-2013, %)

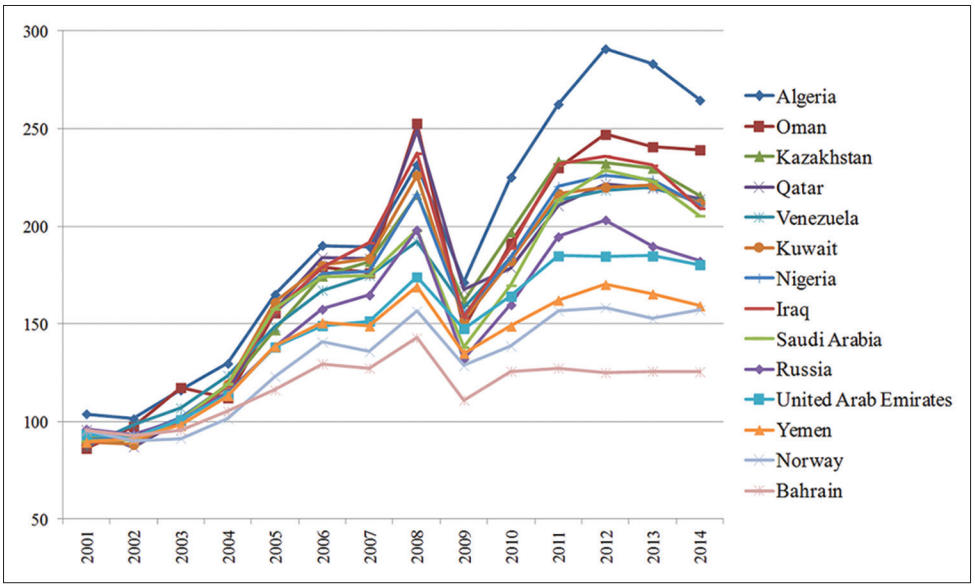
Countries	2000	2005	2010	2011	2012	2013
Algeria	19.21	7.33	7.20	9.22	−0.57	−3.38
Bahrain	5.33	4.37	3.20	13.49	−0.11	1.14
Iraq			4.87	6.78	1.26	
Kazakhstan		3.61	4.99	4.89	0.50	−0.56
Kuwait	11.62	5.24	−6.48	4.56	1.79	−6.43
Nigeria	6.66	5.71	3.88	4.75	−0.39	−0.18
Norway	7.80	8.80	12.68	18.97	−0.07	−6.28
Oman	8.22	15.69	6.56	6.81	2.03	1.79
Qatar	7.53	5.65	2.84	4.19	3.63	0.80
Russia	3.52	4.99	6.40	6.85	0.76	0.33
Saudi Arabia	9.61	6.30	6.21	4.39	1.15	−1.00
United Arab Emirates	2.83	6.16	7.06	8.14	2.19	1.99
Venezuela	15.07	3.87	−8.73	9.64	0.89	−5.77
Yemen	8.18	6.17	3.97	−0.55	−6.57	2.69

Source: Own compilation based on UNCTAD (2016) and IMF (2016) database

strikes against the Houthis (some views, such as Dispatch (2016) describes the conflict as the Vietnam war of Saudi Arabia, whose end is unpredictable). In Iraq the Al Abadi government keeps only the south part of the country under control, and the areas north of Baghdad are dominated by ISIS. So it can be stated that the vulnerability is the most critical in Yemen and in Iraq, moreover in Yemen the break-even fiscal oil price is over USD 300 according to the IMF (2016).

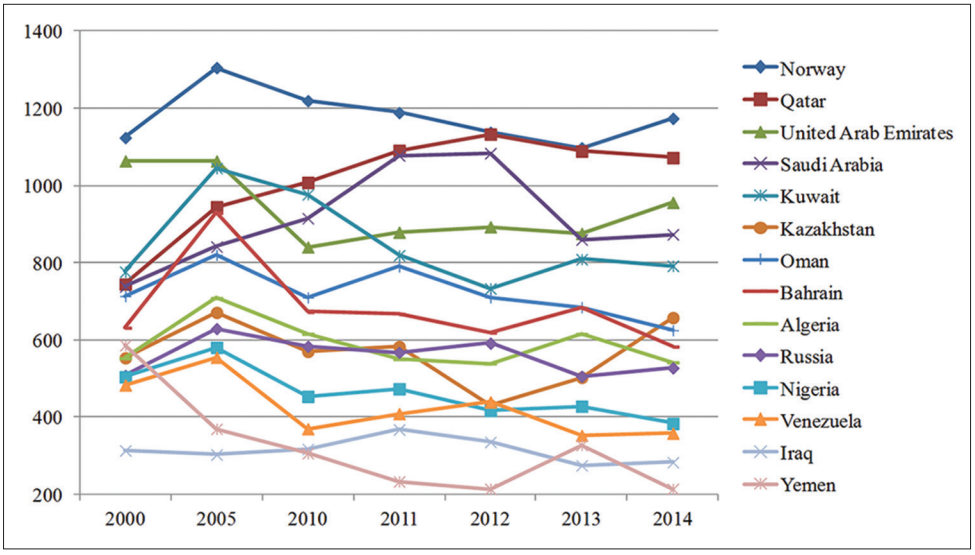
Considering the vulnerability in Nigeria and Venezuela, continous deterioration can be observed in the analyzed time period and the economic risks are more significant compared with the previous group. At the time when the oil prices were around USD 100 these countries could not make majors changes. At the beginning of 2016 Nigeria turned to the IMF for financial assistance because it lost nearly half of its total reserves (Figure 9) and was not able to balance its

Figure 7: Terms of trade trends (2000-2014) (%)



Source: Own compilation based on UNCTAD (2016) data

Figure 8: Oil vulnerability positions using the Bennett method (%, 2000-2014)



Source: Own compilation

budget. According to the data from Moody's, both of these countries have a serious chance of sovereign default in the next 5 years (Moody's 2016). There are mainly political and economic reasons for this in Venezuela: The former President Hugo Chavez strengthened the state role extremely and with the lack of economic restructuring, high inflation rate, concentration and abuse of power he left a weak legacy to his successor. Furthermore the declining oil revenues enhanced the imbalance, so nowadays only a total change in economic policy can restore the confidence of the international market.

Russia, Algeria and Kazakhstan create the next group: In the last few years they obviously financed their economy from oil revenues (as a result of the high oil prices); they launched serious infrastructure projects and developed the social system. Today their most important tasks are the adjustment of their budget and stabilizing their currencies. The positions of all these countries deteriorated in absolute terms between 2000 and 2014, but there is no shift within the group (although the result of Kazakhstan improved a little between 2013 and 2014). However, we should investigate these countries separately considering the actual geopolitical circumstances as well.

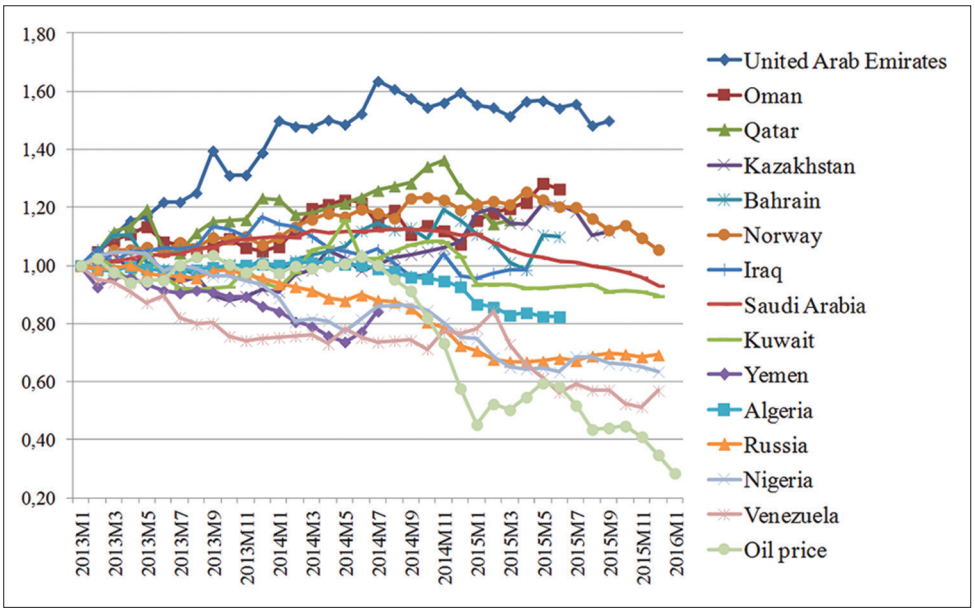
The Putin-led Russian government has started a more active foreign policy, escaping from the problems of home affairs policy, and furthermore contributed also to the hurt of its sphere of influence (so linking Ukraine with Europe by a free trade agreement) and the maintenance of the energetic status quo (see Kovács (2015) for more details). Today the Russian economy is weakened by not only the low prices of hydrocarbons but by sanctions as well (enhancing vulnerability), but it can finance the operation of the economy thanks to its total reserves.

Algeria is in a totally different situation. From looking at the economic indicators it would seem to be a well prepared economy for the changes of the world economy, but if we consider current events, we can see that in Algeria the picture is mixed: It is the most vulnerable in this group. Its currency has significantly depreciated, the government cut social and economic recovery programs and decreased state price subsidies. The stability of the country is endangered by the civil war in neighboring Libya and Islamists coming from Libya and Mali. As the expectations are that the Berber minority independency intentions/pursuits will probably become stronger, some experts warn that the country will fall to pieces (the risk is increased by the uncertainty of the succession). So in Algeria the fall in oil prices may launch some negative tendencies (or have already launched them) which, supplemented by the current geopolitical tendencies, make the country strongly vulnerable.

The degree of oil vulnerability is acceptable in Kazakhstan, but there are some warning signs, such as the depreciation of the national currency and the decreasing total reserves. But – in contrast with most of the oil exporting countries - it is a politically and economically stable country with good prospects. The Kashagan oil field may begin operation shortly, which will bring in extra revenue and contribute to economic growth.

The Gulf States traditionally belong to the high-income country groups (according to the UN (2015) classification). The most vulnerable nations in this group are Bahrain and Oman, which create a separate group. In Bahrain in the examined time period the total reserves did not increase; moreover, in 2016 the fiscal break-even price was over USD 100. The Moody's credit rating downgraded the long-term issuer rating of the country to Ba1 (to junk status) in March 2016, which refers to an unfavorable market sentiment. Oman performs well considering most of the selected economic indicators, and the GDP per capita (PPP) is extremely high (in 2016 it was over USD 4.5000). But its fiscal break-even

Figure 9: National total reserves and the crude oil price (simple average of three spot prices; Dated Brent, West Texas Intermediate, and the Dubai Fateh) (January 2013 – January 2016; January 2013=100%)



Source: Own compilation based on World Bank (2016) database

price is nearly USD 100 and international reserves declined after 2013 as well, which enhance the vulnerability (it confirms Al-Mawali et al., 2016). We note here that the big picture in case of the vulnerability of the selected oil exporting countries is modified by the different state reserves, which can amount to tens of billions of dollars managed by mutual funds. We could not carry out the investigation of these because of the lack of data.

The effect of the declining oil price is the lowest in Norway, Qatar, the United Arab Emirates, Saudi Arabia, and Kuwait. In our calculations these countries are the least vulnerable among the selected oil exporting nations: They have significant amounts of total reserves, their oil production costs are the lowest (approximately 10 USD per barrel, except Norway, where it is 35-40 USD per barrel), and the engine of their economic growth is non-oil sectors (except for Kuwait and Saudi Arabia). Probably they can offset the negative effects on their economies for a few years. The only exception is Saudi Arabia if we look at the big picture (although it is not the worst performer in this group), because it has to cope with not only economic but also political and social tensions. On the one hand it is waging a costly war in Yemen, whose end and consequences are unpredictable. A weak and old king, an uncertain succession and furthermore the low level of the public services are cause for concern. The pressure for the privatization of Saudi Aramco signals the decline of the total reserves. So taking all of these facts into consideration, the oil vulnerability of Saudi Arabia is the most serious in this group, but this country alone can influence prices by cutting production. This will probably happen if the economic circumstances start to deteriorate.

The results of the Bennett method present clearly the absolute differences (and the huge gap) among the selected countries. While the least vulnerable Norway and Qatar reached more than 1,000% in the examination, the value of lagging Nigeria, Venezuela, Iraq and Yemen is under 400%.

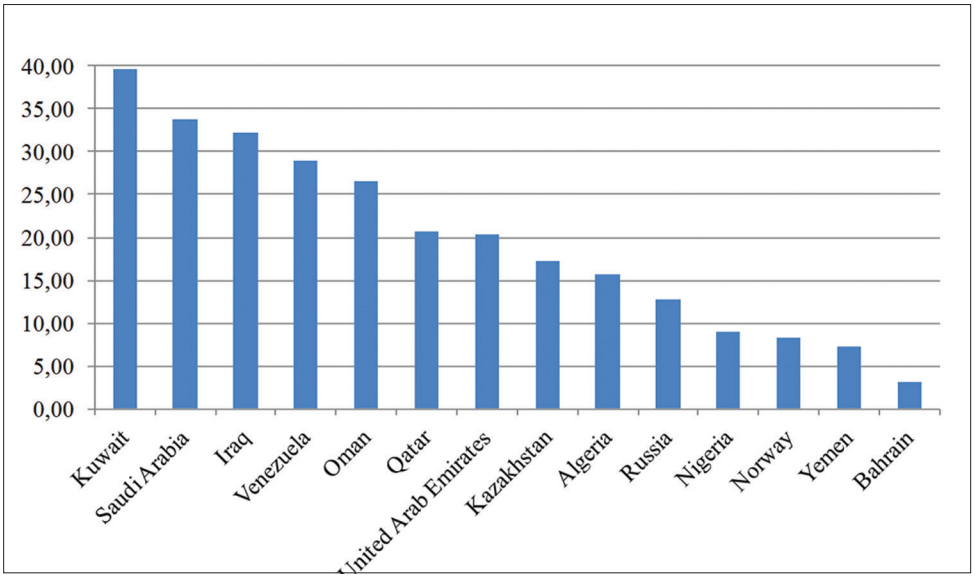
We assumed a USD 60 price drop in oil prices (compared to the stable 100 USD per barrel) and examined the potential losses (in % of GDP) considering the oil production data in 2014. The results are widely dispersed, as shown in Figure 10. The potential loss in Kuwait is nearly 40% of its GDP, while in Bahrain it is only 3%. Naturally the total losses are not realized because our calculation includes the total oil production, of which only a portion is exported, while the other part is consumed domestically. The price drop has a positive effect in the case of domestic use, because it decreases the fuel subsidies and makes industrial production cheaper because of the declining energy costs.

Furthermore, we use monthly data from January 2013 to examine how the exchange rate of the national currencies (Figure 11), the inflation rates (Figure 12) and the total reserves (Figure 9) changed.

Where there is a fixed rate (Venezuela, Bahrain, Iraq, Oman, Qatar, United Arab Emirates, and Saudi Arabia) we count on a serious decrease in the total reserves because that is the only solution for them to preserve the parity of their currencies against the USD. Where the exchange rate is flexible significant depreciation is expected (or can be observed) (Figure 11).

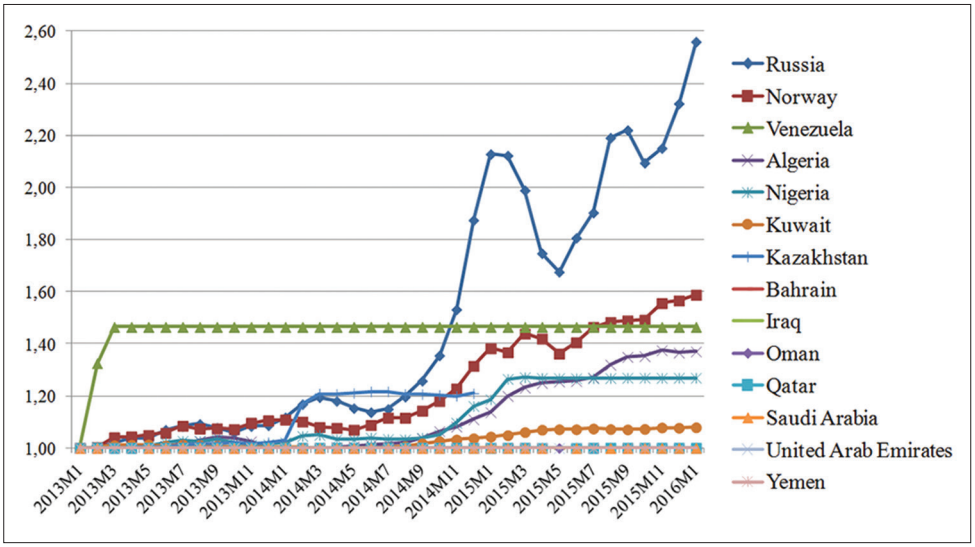
Figure 12 shows the inflation rate trends in the selected economies. Venezuela is in a serious recession, here the indicator value is over 700% (it is not indicated in the figure because as an outlier it biases the sample). In every country the inflation pressure has enhanced, but the extent of it is manageable except in Algeria, Russia, Yemen, Nigeria, and Kuwait.

Figure 10: Potential loss (% to the Gross domestic product) in the oil industry of the examined countries (%)



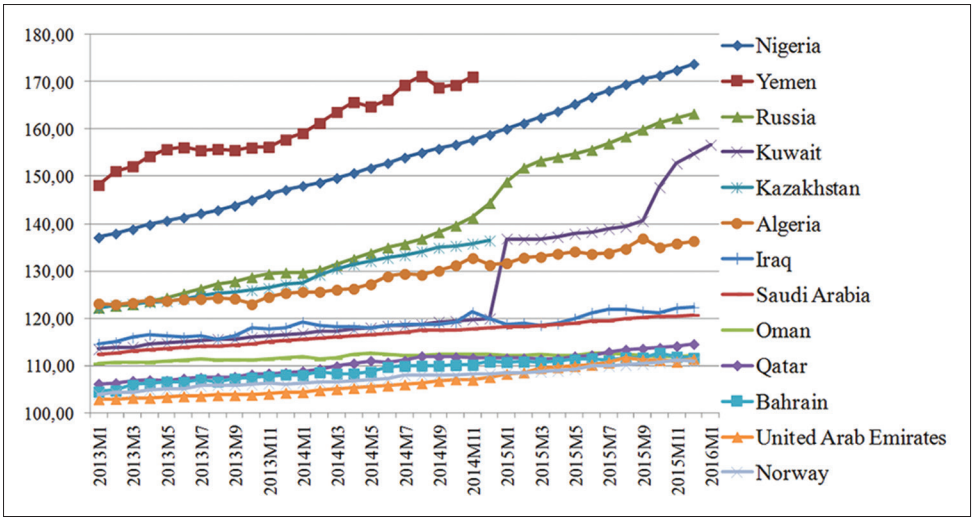
Comments: Assuming 60 USD/bbl price drop, based on the 2014 oil production data (1000 barrels) and Gross domestic product (2014, current prices, USD)
Source: Own compilation based on BP (2015) and CIA Factbook (2015)

Figure 11: Exchange rate trends (new LCU per USD) (January 2013–January 2016; January 2013=100%)



Source: Own compilation based on World Bank (2016) database

Figure 12: CPI price trends (%, January 2013 – January 2016)



Source: Own compilation based on World Bank (2016) database

Table 2: Correlation coefficients in the examined countries (January 2013 – January 2016)

Countries	Correlation between total reserves and crude oil prices	Correlation between CPI price index and crude oil prices	Correlation between exchange rate (new LCU per USD) and crude oil prices
Algeria	0.94	−0.90	−0.95
Bahrain	−0.32	−0.82	-
Iraq	0.67	−0.77	-
Kuwait	0.52	−0.94	−0.93
Kazakhstan	−0.85	−0.56	0.89
Nigeria	0.85	−0.89	−0.96
Norway	−0.34	−0.86	−0.98
Oman	−0.47	−0.55	-
Qatar	−0.26	−0.79	-
Russia	0.93	−0.94	−0.98
Saudi Arabia	0.50	−0.85	-
United Arab Emirates	−0.49	−0.93	-
Venezuela	0.71	−0.88	-
Yemen	−0.30	−0.48	0.45

Source: Own compilation based on IMF (2016) database

The total reserves of Venezuela, Nigeria and Russia show the sharpest decreasing tendencies from the beginning of the year 2013, but in addition to the three countries mentioned the results show a positive correlation between the oil price and the total reserves in Algeria, Iraq, Kuwait and Saudi Arabia, so we concluded falling oil prices result in an immediate reduction in reserves (Figure 9).

In countries where the exchange rate is not fixed (Table 2) a strong, negative correlation can be observed between exchange rate (new LCU per USD) and crude oil prices. So the crude's rapid price slump results in obviously (at the 5% level) the currency depreciation. Furthermore strong, negative correlation can be detected (at the 5% level) between the CPI price index and crude oil prices anticipating the negative trend of expected inflation in these countries.

4. SUMMARY

In this study the oil vulnerability of the main oil exporting countries was assessed on the basis of various calculations, and the analysis involved not only economic but also social and political indicators. The results show the degree of preparedness in the selected economies considering the current geopolitical incidents in a time of sharp oil price decline (2014-2016). While there is no standard methodology for such an analysis (compared to the analysis of oil importing countries), by applying the Bennett method it is possible to rank the examined countries (with regard to oil vulnerability) and to differentiate policy recommendations. The calculation of trade indicators (export intensity index, terms of trade index, export sensitivity, Herfindahl-Hirschman index) give more information and make the conclusions more robust.

In the examination of the main oil export countries the following findings were obtained.

1. The analysis of oil vulnerability is mainly carried out for oil importing countries. We can find examples for oil exporting nations as well, but a robust methodology is lagging behind.
2. The effect of crude's rapid price slump after the end of 2014 on the world economy is mainly positive, but the uncertainty (economic, social and political) of the oil exporting countries significantly increased. In these countries an economic slowdown can be expected (except for Nigeria and Saudi Arabia, where economic growth is projected in 2016 according to the IMF (2016)).
3. According to the results of terms of trade index in the examined economies there was a relative increase in the realized comparative advantages between 2000 and 2014 (but the size of it is widely scattered). In our expectations these advantages have fallen from 2015.
4. Between 2000 and 2013 the export sensitivity of the examined countries significantly decreased, but later this favorable tendency turned around, and sensitivity started to rise.
5. With regards to oil vulnerability, Yemen and Iraq are in the worst situation andthe states of Venezuela and Nigeria are a little better (but also critical). Russia, Algeria and Kazakhstan form another group, which to some extent can be considered temporarily between the stable and critical groups. The prospect of the Gulf States and Norway is good, but Bahrain and Oman are dropping behind them. It is important to note that the analysis of oil vulnerability mainly highlights the economic state, but nation-specific factors also have to be considered (such as political system and geopolitical conditions), which modifies the big picture.

It can be stated that the most important task of these governments is to fit the national budget to the current oil prices. Time available for this is dependent on the total reserves and the analyzed macroeconomic measures and vulnerability. Nations can stabilize the exchange rate of their local currencies with careful choice of the monetary policy instruments and can also decrease the inflation pressure.

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APPENDICES

Appendices Tables

Table 1: Data and methods applied

Data	Applied calculation method	Effect on vulnerability in Bennett method (+: Increase; −: Decrease)
Control of corruption, estimate (annual data, 2000-2014, Source: World Bank, Worldwide Governance Indicators database)	Bennett method	−
Country risk (annual data, 2000-2014, Source: OECD, country risk classifications of the participants to the arrangement on officially supported export credits database)	Bennett method	+
CPI corruption index (annual data, 2000-2014, Source: Transparency international, corruption perceptions Index)	Bennett method	+
CPI price, nominal, seas. adj. (monthly data, January 2013 - January 2016, source: World Bank)	Correlation calculation	
Current account balance, % to GDP (annual data, 2000-2014, Source: IMF)	Bennett method	−
Exchange rate (old LCU per USD extended forward, period average, monthly data, January 2013 - January 2016, source: World Bank)	Correlation calculation	
Export and import of goods and services (annual data, 2000-2014, USD, Source: UNCTAD)	Export intensity, export sensitivity	
Export price index (annual data, 2000-2014, Source: UNCTAD, 2000=100%)	Terms of trade index	
GCI competitiveness index (annual data, 2000-2014, Source: World Economic Forum)	Bennett method	−
GDP per capita , PPP (PPP), (USD, current prices, annual data, 2000-2014, Source: IMF)	Bennett method	−
GDP, current prices (USD, annual data, 2000-2014, Source: World Bank and IMF)	Bennett method; export intensity, export sensitivity	
Geographical distribution of oil export (annual data, 2000, 2013, Source: World Bank World Integrated Trade Solution, 1000 USD)	Herfindahl-Hirschman index	
Government effectiveness, estimate (annual data, 2000-2014, Source: World Bank, Worldwide Governance Indicators database)	Bennett method	−
Gross debt, % to GDP (annual data, 2000-2014, Source: IMF)	Bennett method	+
Gross national savings, % to GDP (annual data, 2000-2014, Source: IMF)	Bennett method	−
Import price index (annual data, 2000-2014, Source: UNCTAD, 2000=100%)	Terms of trade index	
Inflation, average consumer prices (annual data, 2000-2014, Source: IMF)	Bennett method	+
Oil export trade value, HS 2709-2715 code (USD, annual data, 2000-2014, Source: UN, Comtrade database)	Bennett method	− (% to the GDP)
Oil production (1000 barrel/day, annual data, 2000-2014, Source: BP)	Bennett method	−
Political Stability and Absence of Violence/Terrorism, estimate (annual data, 2000-2014, Source: World Bank, Worldwide Governance Indicators database)	Bennett method	−
Proved oil reserves (billion barrel, annual data, 2000-2014, Source: BP)	Bennett method	− (Per capita)
Regulatory quality, estimate (annual data, 2000-2014, Source: World Bank, Worldwide Governance Indicators database)	Bennett method	−
Rule of Law, estimate (annual data, 2000-2014, Source: World Bank, Worldwide Governance Indicators database)	Bennett method	−
Total reserves, % to GDP (annual data, 2000-2014, Source: IMF)	Bennett method	−
Total reserves (it comprise holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities; monthly data, January 2013 – January 2016, source: World Bank)	Correlation calculation	
Unemployment rate, percent of total labor force (annual data, 2000-2014, Source: World Bank and IMF)	Bennett method	+
Voice and Accountability, estimate (annual data, 2000-2014, Source: World Bank, Worldwide Governance Indicators database)	Bennett method	−

Source: Own compilation, GDP: Gross domestic product, PPP: Purchasing power parity

Table 2: Oil export value (USD), GDP (nominal value) and the share of these indicators in 2013, in the examined countries

Countries	Oil export value (USD)	GDP (current prices, USD)	Oil export value to the GDP
Algeria	63,826,166,780	209,703,529,364	30.43
Bahrain	10,170,713,782	32,897,606,382	30.91
United Arab Emirates	107,895,956,302**	387,192,103,471	30.00
Iraq	89,553,582,953	232,497,236,277	38.51
Kazakhstan	63,855,361,733	231,876,282,133	27.53
Kuwait	107,788,213,034	174,161,495,063	61.88
Nigeria	76,917,867,536	514,964,650,436	14.93
Norway	104,255,391,371	522,349,106,382	19.95
Oman	41,417,713,489	78,182,574,772	52.97
Russia	358,214,299,081	2,079,024,782,973	17.22
Qatar	119,960,483,942	201,885,439,560	59.42
Saudi Arabia	321,195,906,561	744,335,733,333	43.15
Venezuela	85,861,000,000	381,286,237,847*	24.54
Yemen	5,323,124,947	35,954,502,303	14.80

Comments: *2012 data, **2014 data. Source: Own compilation based on Comtrade (2016) and World Bank (2016). GDP: Gross domestic product

Table 3: Codes and descriptions of crude oil categories

Code	Description
2709	Name: Petroleum oils, oils from bituminous minerals, crude description: Petroleum oils and oils obtained from bituminous minerals, crude
2710	Name: Oils petroleum, bituminous, distillates, except crude description: Petroleum oils and oils obtained from bituminous minerals, other than crude; preparations not elsewhere specified or included, containing by weight 70% or more of petroleum oils or of oils obtained from bituminous minerals, hese oils being the basic constituents of the preparations; waste oils
2711	Name: Petroleum gases and other gaseous hydrocarbons description: Petroleum gases and other gaseous hydrocarbons
2712	Name: Petroleum jelly, petroleum wax, other mineral waxes description: Petroleum jelly; paraffin wax, micro-crystalline petroleum wax, slack wax, ozokerite, lignite wax, peat wax, other mineral waxes, and similar products obtained by synthesis or by other processes, whether or not coloured
2713	Name: Petroleum coke, bitumen and other oil industry residues description: Petroleum coke, petroleum bitumen and other residues of petroleum oils or of oils obtained from bituminous minerals
2714	Name: Bitumen, asphalt, oil shales, tar sands, asphaltites description: Bitumen and asphalt, natural; bituminous or oil shale and tar sands; asphaltites and asphaltic rocks
2715	Name: Bituminous mix, mastic from asphalt, bitumen/tar/pitch description: Bituminous mixtures based on natural asphalt, on natural bitumen, on petroleum bitumen, on mineral tar or on mineral tar pitch (for example, bituminous mastics, cut-backs)

Source: COMTRADE (2016)