A Comparative Analysis of the Impact of World Oil Prices on Oil-exporting and Oil-importing Countries: the Cases of Azerbaijan and Turkey

By

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Abstract

This thesis studies the impact of world oil prices changes on two neighboring countries: oil-exporting Azerbaijan and oil-importing Turkey. In particular, it is concentrated on the impact of the changes in the world oil market on Azerbaijan's GDP, oil exports, budget revenues and expenses, as well as foreign direct investments in the country, and GDP, oil exports and imports, budget revenues and expenditures of Turkey. Using Static and also Finite Distributed Lags models comparative analysis of the oil price fluctuations impact on these countries' macroeconomies is provided. It is concluded that Azerbaijan's macroeconomy is highly vulnerable to the changes in the world oil markets, while these changes do not significantly influence Turkey's macroeconomy.

In loving memory of my dear Grandfather…

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1. Introduction

It is well-known fact that world oil prices have a significant influence on economies and societies of both oil-importing and oil-exporting countries. As a fundamental energy resource it is used in almost all the sectors of economy and hence affects their productivity. That is why the volatility of oil prices is very important issue, and this issue does not lose its importance although a lot of works have been written in this area.

During the last decade there has been a significant increase in oil prices. If in 2000 the inflation-adjusted price of a barrel of crude oil was generally about \$20/barrel, by 2005 it rose above \$60/barrel, and peaked at \$132.30 in July 2008[1] (Figure 1). Of course this substantial increase in oil prices did not leave the world macroeconomic situation without any changes.

Energy resources are not distributed equally among the countries. For oil–importing countries, oil prices influence macro-economic variables such as exchange rates, costs, and they are taken into consideration while building macro-economic policies of these countries. For oil-exporting countries, changes in oil prices also cause changes in growth and determine their activity. It is an accepted fact that oil price increases and decreases influence significantly budget expenses and revenues, and also almost all economic processes. Being an oil-importing or oil-exporting country significantly influences the character of impact of world price changes on the country. In this thesis I will analyze the impact of oil price fluctuations on macroeconomic factors of two neighboring countries: Azerbaijan as the oil-exporting country and Turkey as the oil-importing country, and compare the characters of these influences.

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[1] Crude oil price chart, 2000-2010, http://www.mongabay.com/images/commodities/charts/crude_oil.html

Figure 1. Crude oil price chart, 2000-2010

Crude oil, avg, spot price chart
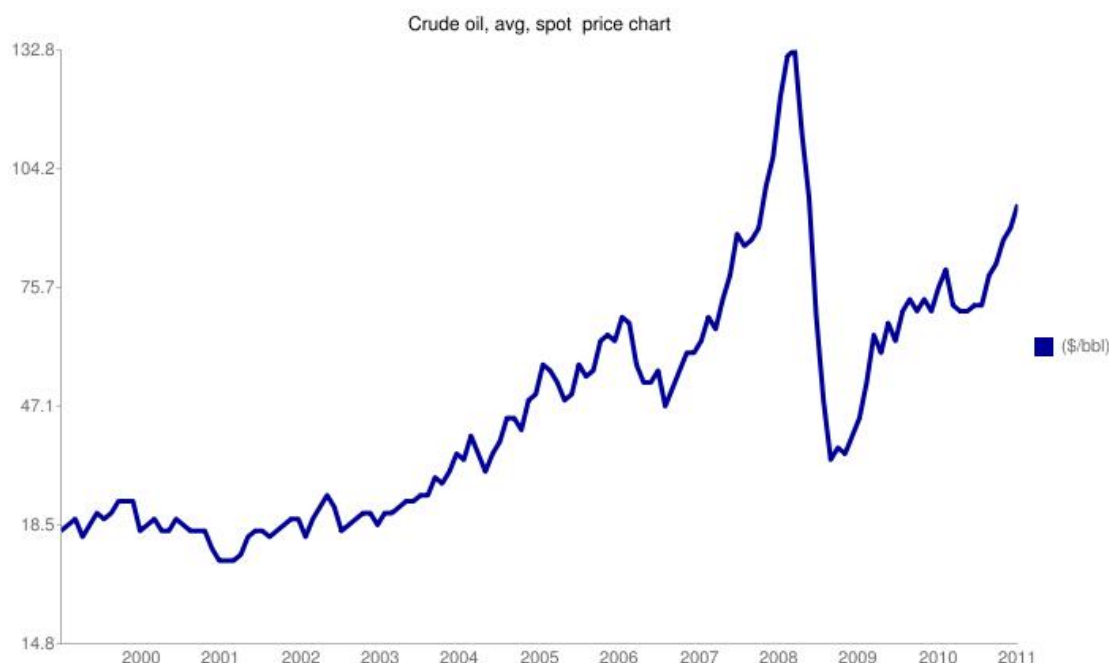
Source: http://www.mongabay.com/images/commodities/charts/crude_oil.html

During a long period the oil-exporting country Azerbaijan is realizing significant projects on exploration of oil resources and their transportation to the world market. After signing the first contract (The Contract of the Century) in September 20, 1994 regarding the joint development and production sharing of oil Azeri, Chirag fields and the deep water part of Guneshli (ACG) field Azerbaijan became the geopolitical center where the interests of USA, European states and Russia are crossing. Since that time oil production in Azerbaijan increased from 283,000 barrels per day (bbl/d) in 1999 to more than 1 million bbl/d in 2009, increasing more than 15 percent compared yearly[2]. Hence the significant economic growth of Azerbaijan economy during the last years is mostly explained by the oil boom. According to the State Statistical Committee of Azerbaijan, Republic in 2001-2007 years the share of oil in GDP increased from 30% to a more than 60%. As the country's revenue significantly depend

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[2] State Statistical Committee of Azerbaijan Republic

on revenues from oil sector, the fluctuations of oil prices should have a great impact on oil export, production and other macro-economic variables.

The oil-importing country Turkey is considered to be one the most import energy dependent countries. Although it has 270 million barrels of oil resources[3] located in the Hakkari Basin and significant amounts of oil in Aegean Sea, almost 90 percent of its consumption is imported. In 2008 Turkey's oil exports were equal to 141,700 bbl/d, while oil imports were 783,800 bbl/d. Also, Turkey plays strategic role as in the transit of oil supplies to the West because of its location on the crossroads of oil pipelines. But being highly dependent on oil imports implies high vulnerability to world oil price changes.

I investigate the impact of oil price fluctuations on the oil exports and imports, budget revenues and expenditures, foreign direct investments into the country and some other macro-economic variables for the period 2000-2010. I use the Augmented Dickey-Fuller test to check the time series for existence of unit root, and then I build a model using Ordinary Least Squares method. For Azerbaijan I use quarterly data for the period between 2000Q1 – 2010Q2, for Turkey I use yearly data for the period 1990-2010. I find a significant impact of oil price fluctuations on these macro-economic variables for the oil-exporting country Azerbaijan, while no significant influence of the changes in the world oil markets exists for the oil-importing country Turkey.

The comparison of oil price impacts on Azerbaijan and Turkey exporting can contribute for building and implementing the economic policy recommendations for two types of countries according to their classification into oil-importing or oil-exporting. This should be done to protect the country vulnerable to the changes on the world oil market. The results of the model can be used in the future researches in this area.

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[3] http://www.eia.doe.gov/cabs/Turkey/Oil.html

2. Literature Review

In this section I provide the overview of some previous researchers' works relevant for my study. Mohammad (2010) analyzes how oil prices volatility influence export earnings in oil-importing country Pakistan. He uses annual observations from World Development Indicators (WDI) [4] for the years 1975 – 2008, and builds a model where export earnings depend on gross domestic product, monetary aggregate, GINI coefficient and oil prices. To analyze the trend of data he uses the Augmented Dickey-Fuller test and concludes that the series are non stationary. Also to find whether there exists the long run association among the variables he uses the Johanson cointegration test. The results shows that the coefficients of GDP, GINI, monetary aggregate are significant and have positive sign; the coefficient of oil price is negative and significant and implies that 1 percent increase in oil price may cause up to 1.6 percent reduce in export earning because increase in world oil price decreases country's current account and this creates a negative influence on exports and increases the costs of production.

Another study concerning the influence of oil price on oil-importing country is provided by Faria et al. (2009): they study the impact of the recent increase in oil prices on oil-importing country - China's oil exports. They attempt to explain a paradox that the increase of oil price positively influenced the oil exports of oil-importing country. They build the stylized open economy macro model using the data for labor, goods and money markets, and also local and international export markets to check the hypothesis that oil price increases have positive impact on its exports. They also use other independent variables standing for real exchange rate, foreign income, and labor productivity. The results of the model evidence either a positive or a zero impact of oil prices increasing on oil exports of China, although this

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[4] http://data.worldbank.org/data-catalog/world-development-indicators

increase of oil prices should negatively affect export. This phenomenon is explained by its large labor surplus which helps Chinese economy suffer less from the increase in energy costs than its competitors - other oil importing countries: it replaces oil with labor in its production more successfully than its competitors, hence an increase in China's relative labor productivity results in an increase in its exports.

One more study about oil price impact on oil-importing country's macroeconomy is written by Aktas, Ozenc, Arica (2010): they use data from 1991 to 2008 to study the influence of oil price fluctuations on GNP, inflation, unemployment and exports-to-imports ratio. VAR model based on Granger causality test and impact-response functions are used for estimations, and Dickey-Fuller Unit Root Test is used for examining the stationarity of series. Their results evidence about negative influence of oil price fluctuations on export-to-import ratio and unemployment, and positive relationship between oil price shocks and inflation. But observed influence is only short-term.

Other works are dedicated to oil-exporting countries: Hasanov (2009) study how world economic crisis affected the Azerbaijan's economy, and one area of his interests was oil sector. He investigates how crisis affected Azerbaijan through oil sector, non-oil sector, commerce banks' activity and foreign direct investments into country. He concludes that the declines in oil prices resulted in fall of oil non-oil exports, growth rate of GDP and other factors of economic activity. He also studies how real oil prices influence real effective exchange rate in Azerbaijan using Error Correction Model and Johanson cointegration approach. He finds that statistically significant and positive coefficients of real oil price, which implies the positive influence of oil prices on exchange rate.

Ramcharran (2002) explains how oil producing countries' react to oil price changes. He builds a competitive model for OPEC and non-OPEC countries and uses supply function,

based on modification of Griffin's model[5]: this supply function of oil production, where output depends on the real price of oil with a coefficient meaning the price elasticity of supply, is estimated for oil producers (separately for OPEC and non-OPEC countries) using data for the years 1973-1997. The advantage of this model is the usage of data for both the periods of price increasing (1970s) and decreasing (1980s-1990s): the different impacts of oil prices increase and decrease on the countries' economies are studied. That's why the results of the model are considered to better estimate the production under price volatility. According to the results, for OPEC countries negative supply elasticity is obtained at the aggregate level. Researcher explains this with the Target Revenue Theory (Ezati, 2006) in response to price increases OPEC countries cut production. For non-OPEC countries, positive and significant price elasticity is supported at the aggregate level. The results of this study are important as they imply that as OPEC can meet the same demand at increasing prices by cutting production, the increasing of output from non-OPEC countries is observed.

Numbers of papers are written on comparison of oil-producing and oil-importing countries: Abeysinghe (2001) investigates Southeast and East Asian economies during Asian financial crisis to find out how high oil prices impose their recovery process. Among the countries studied Indonesia and Malaysia are net oil exporters, Singapore, Taiwan, Thailand, Philippines, Hong Kong and China are net oil importers. According to him, high oil prices can affect economies in two ways: directly and indirectly depending on whether the country is oil exporter or oil-importer. To measure these two effects he uses a multi-equation framework: he derives the model for GDP series through a trade matrix using structural VARX model (Abeysinghe, 2000); he also analyzes the effects of both negative and positive oil price shocks. He finds that the direct influence of high oil prices are positive for oil-exporting countries, while both direct and indirect impacts of it on oil-importing countries are low. The

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[5] J.M. Griffin , OPEC behavior: a test of alternative hypotheses. *Am. Econ. Rev.* 75 (1985), pp. 954–963.

indirect effect of high oil prices on Singapore is also positive; author explains it by the fact that oil-exporting Indonesia and Malaysia are two major trading partners of Singapore, so the author concludes that for a large economy such as US the oil price shocks may not show high impact, but for small open economies such as countries of ASEAN it can have a fundamental influence.

Cunado and Perez de Gracia (2004) investigate the influence of oil price shocks on economic activity in six Asian countries for the years 1975 - 2002. They provide analysis using Granger causality tests on the relationships between oil price, production growth rate and inflation growth rate. It is concluded that CPI, oil prices and economic activity are integrated of order one. They find that in the countries studied oil price shocks do not impact economic growth in the long-run, but only in the short-run. Asymmetric relationship between oil price volatility and macroeconomic variables is also investigated in this paper following Mork (1989) and Mork et al. (1994), and evidence on asymmetric connections between growth rate-oil prices and inflation rate-oil prices for South Korea case was found. Also they find that when oil prices are measured in local currency the influence of oil prices are higher and more significant "which could be due to the role of exchange rates or national price variations on macroeconomic variables" because in this case inflation rates are concerned.

The report prepared by the Research Department of International Monetary Fund (2000) mentions some reasons of the oil price increases observed before 2000 and discusses the implications of this increase on the global economy, oil-importing countries and oil-exporting countries. They conclude that a $5 per barrel oil price increase will raise net balance of OPEC nations by $64 billion, but the impact of price increase on the growth and economic activity will depend on the country's own internal politics. Another important finding is that sustained oil price increase can result in a permanent shift of approximately quarter percent of gross domestic product from global oil importers to oil exporters. Moreover, within countries

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income can transfer to oil producers from oil consumers. On the other hand, according to the report oil importing countries from HIPC (Heavily Indebted Poor Countries) and CIS (Commonwealth of Independent States) are the most seriously affected by oil price increasing because of the high level of oil imports relative to GDP and high external debt.

From the literature review observed I can conclude that while oil-exporting countries are usually highly vulnerable to oil price shocks, oil-importing countries show different response to these fluctuations. However, there is no deep research for Azerbaijan's and Turkey's cases. The current work provides more evidence about the world oil prices impact on oil-exporting countries on the example of Azerbaijan, and opens new windows for discussion of how it can affect oil-importing countries on the example of Turkey.

3. Economic Overview of the Countries

3.1. Azerbaijan

Azerbaijan is a small country which gained independence in 1991. It is located in the South Caucasus region in the shore of Caspian Sea. The country is rich in many natural resources but the main sources of wealth are oil and natural gas. After signing The Contract of the Century in September 20, State Oil Company of Azerbaijan Republic (SOCAR) and 13 international oil companies, such us BP, Amoco, ExxonMobil, Lukoil and Statoil regarding the joint development and production sharing of oil Azeri, Chirag fields and the deep water part of Guneshli (ACG) field Azerbaijan became the geopolitical center where the interests of USA, European states and Russia are crossing. Since that time oil production in Azerbaijan increased from 283,000 barrels per day (bbl/d) in 1999 to more than 1 million bbl/d in 2009, increasing more than 15 percent compared with the prior year. Also the State Oil Fund of Azerbaijan was established as an extra-budgetary fund to ensure the macroeconomic growth and pureness in the management of oil revenues.

Recently, total government spending, including consumption and transfer payments, rose to 31.1 percent of GDP. Public-sector debt stands at around 12 percent of GDP. According to the State Statistical Committee of Azerbaijan Republic in 2001-2007 years the share of oil in GDP increased from 30% to a more than 60%. In 2006-2008 large oil exports influenced high economic growth of Azerbaijan. This supports the idea that the country shows the signs of the "Dutch disease". In 2009, economic growth was above 9%; in 2010 it slowed to 3.7%[6].

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[6] State Statistical Committee of Azerbaijan Republic

3.2. Turkey

Republic of Turkey is located in a strategically important region at the crossroads of Europe and Asia. The main industries developed in the country are tourism, services, construction and agriculture. It is also an important country as a transit of oil and gas from Russia and Caspian region to Europe. The Baku-Tbilisi-Ceyhan pipeline launched in May 2006, brought up to 1 million barrels per day from the Caspian to market[7]. As of January 1, 2011 Turkey has proved oil reserves at 270 million barrels of oil. In 1991 Turkey's oil production was estimated at 85 thousand bbl/d, but then declined till 53 thousand bbl/d in 2009 [8]. Turkey's oil consumption grew the last years, reaching 690 thousand bbl/d in 2007. But then as a result of the world economic crisis it decreased till 580 thousand bbl/d. As the level of oil production is not very high it makes Turkey an oil importer. Turkey is considered to be one of the most import energy dependent countries: according to 2009 data, Turkey imported about 90 percent of its total consumption[9]. However, recently new oil fields were discovered and it can help Turkey to reach a higher level of independence in energy production. In 2008 Turkey's oil exports were equal to 141,700 b/d, while oil imports were 783,800 b/d. Being highly dependent on oil imports should imply high vulnerability to world oil price changes. In 2001 some financial and fiscal reforms positively influenced the Turkey's economy further were adopted by the government. The country's economy faced the global financial crisis without any significant changes in GDP and exports thanks to its well-regulated financial markets and banking system. However, a high current account deficit exists even today[10].

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[7] http://www.indexmundi.com/turkey/economy_profile.html
[8] The *Oil & Gas Journal*
[9] Energy Information Administration, Country analysis briefs. http://www.eia.doe.gov/cabs/Turkey/pdf.pdf
[10] CIA Fact book: https://www.cia.gov/library/publications/the-world-factbook/geos/tu.html

4. Data Description

In my study I used quarterly time-series data for the years 2000-2010 for Azerbaijan and annual time-series data for the years 1990-2010 for Turkey. The choice of variables was made according to previous works and availability of data. All the data was presented by the Economic Reform Center under the Ministry of Economic Development of the Azerbaijan Republic and collected from International Financial Statistics, "Statistic bulletin" of Central Bank of Azerbaijan Republic, "Social-economic bulletin" of Azerbaijan State Statistical Committee, International Monetary Fund's World Economic Outlook Database. The variables I used in my thesis are following:

oipr: Following most researchers analyzing the oil prices impact on different economies I used the $US world UK Brend oil price. The data was obtained from the website of International Monetary Fund's International Financial Statistical Database (http://www.imfstatistics.org/imf/).

gdp : The data for Azerbaijan's GDP at time t is measured in mln AZN. It was obtained from Central Bank of the Republic of Azerbaijan, Statistical Bulletin (http://www.cbar.az/pages/statistics/key-macroeconomic-indicators/). This is time-series data for the same range of years. Following Faria, Mollick, Albuquerque, Leon-Ledesma (2009) I will study the impact of world oil prices on oil-exporting country's GDP.

gdpt: The data for Turley's GDP at time t is presented in current prices. It was obtained from International Monetary Fund's World Economic Outlook Database (http://www.imfstatistics.org/imf/). Using the data for GDP of both countries I can compare the impact of being oil-exporting or oil-importing country on the way of influence of world oil prices on GDP.

bexp: The state budget expenditure of Azerbaijan are measured in current prices. The data was obtained from Statistical Bulletin of Central Bank of the Republic of Azerbaijan (http://www.cbar.az/pages/statistics/key-macroeconomic-indicators/). Following Hasanov (2009) I expect to find that oil price increase's consequence is rise in budget expenditures.

texp: The state budget expenditure of Turkey are measured in current prices. The data for this variable was obtained from International Monetary Fund's World Economic Outlook Database (http://www.imfstatistics.org/imf/). Using the data for budget expenditures of both countries I can compare how their budget expenditures are influenced by the world oil prices.

brev: The data for the state budget revenue of Azerbaijan is presented in mln AZN. It was obtained from Azerbaijan Republic's Central Bank's Statistical Bulletin (http://www.cbar.az/pages/statistics/key-macroeconomic-indicators/).

trev: The state budget revenues of Turkey are measured in current prices. The data for this variable was obtained from International Monetary Fund's World Economic Outlook Database (http://www.imfstatistics.org/imf/). I will use the data for budget revenues of Azerbaijan and Turkey to in comparative analysis of estimation results.

expO: The oil exports of Azerbaijan are presented in mln USD. The quarterly data was obtained from the Statistical Bulletin issued by Central Bank of Azerbaijan Republic. I argue that influence of world oil prices on oil exports following Hasanov (2009).

expot: Oil exports of Turkey are given in bln USD. The annual data was obtained from International Monetary Fund's World Economic Outlook Database (http://www.imfstatistics.org/imf/). Following Mohammad (2010) I expect to find an impact of world oil prices on oil exports of oil-importing country.

fdi: The foreign direct investments in Azerbaijan are presented in mln USD. Using quarterly data I expect that oil price increasing will increase the foreign direct investments in the country.

impot :   This variable stands for oil imports of Turkey. The annual data for oil imports is given in bln USD. It was collected from International Monetary Fund's World Economic Outlook Database (http://www.imfstatistics.org/imf/). As Turkey is oil-importing country I expect to find significant impact of oil prices on oil imports.

All the variables were obtained from reliable sources and they did not need any additional transformations. The sample for Azerbaijan's data consists of 45 observations. The description of variables used for Azerbaijan's study is given in the Table 1A, Appendix. The sample for Turkey's data consists of 21 observations. The description of variables is given in the Table 1B, Appendix. We can see from the Tables 1A and 1B that the difference between maximum and minimum values of all variables is large enough, what is characteristically for transition and developing countries. This fact can influence the reliability of estimations.

5. Model and Methodology

5.1. Theoretical framework

In this section I discuss the theoretical framework for my model which explains the impact of oil prices on oil exports, GDP, budget revenues and expenses, foreign direct investments in Azerbaijan, and also its impact on GDP, oil exports and oil imports, budget revenues and expenses of Turkey. I use an augmented Dickey-Fuller (ADF) unit-root test following Mohammad (2010), Cunado and Perez de Gracia (2004) to find time-series properties of the variables given. Testing for unit root is very important because if time series have a unit root the large sample normal approximations are not applicable.

The ADF (1979) is a test for a unit root in a time series sample.[11] This test is based on a following model:

$$Y_t = \lambda Y_{t-1} + u_t, \; t=1, 2, \ldots,$$

The null hypothesis is:

H0: λ=1 (there is a unit root).

And alternative hypothesis is:

*H1: 0<λ<1 (*Hence Y_t is a stationary process)*.*

The ADF statistics used in the test is a negative number. If $t^* > ADF$ critical value, then we do not reject null hypothesis, i.e., unit root exists. If $t^* < ADF$ critical value, ==> reject null hypothesis, i.e., unit root does not exist. The lengths of lags are chosen based on Schwarz (1973) information criteria.

If time-series are found to be non-stationary, they can be transformed into stationary series using ratios, first differences, second differences, cointegraton, error correction and

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[11] Greene, William H.. 1997. *Econometric Analysis.* 3nd edition.

other methods. I applied first differences method to make non-stationary time-series stationary. It is favorable that variables I used in my model are stationary as their probability distributions are stable over time. Otherwise, using non-stationary series in regressions can result in spurious regression, what can make the results non-adequate as the variables studied can be related to each other through the correlation with another variable. Further, I build Static and Finite Distributed Lags models and use Ordinary Least Squares (OLS) for estimation following Hasanov (2009) accounting for White Heteroskedasticity-consistent standart errors and covariance. I discuss the econometric model I choose in the next subsection.

5.2. Econometric Model

The econometric model I used is based on different models built by previous researchers; in particularly I follow Hasanov (2009), Aktas, Ozenc, Arica (2010) and Mohammad (2010). First, I tested the hypothesis that variables have unit root. I found that the levels of all the variables have unit root, while first differences of series are stationary. The results of unit-root tests are given in the Table 2A, Appendix.

Based on the unit-root test results I built econometric model. Also I included time trend in regressions as most economic processes has an upward trend. Including the trend into regressions I attempted to learn if these variables are correlated only because they are trending over time for some other reasons not included into regressions.

I want to find how word oil prices influence GDP, oil exports and imports, state budget expenses and revenues, foreign direct investments in two given countries. I take world oil price as exogenous variable. I expect that world oil price play significant role on these variables for Azerbaijan, because Azerbaijan's economy highly depends on petrodollars. Particularly I expect to find large influence of world oil prices on GDP, as earnings from oil

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sector make up an enormous share in Azerbaijan's GDP. To find this impact I estimate the following regression:

$$log(gdp_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t. \qquad (1)$$

I also expect to find significant influence of oil prices on budget expenditures, as historically world oil price increases were followed by sharp rises in government expenditures aimed at country's infrastructure and salaries increases. To analyze this influence I regress the budget expenditures on world oil price:

$$log(bexp_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t. \qquad (2)$$

The volumes of oil export are influenced by two factors: the level of oil production and oil prices. As the level of oil production is fixed by the contracts signed between Azerbaijan and countries importing Azeri petroleum, oil prices should have significant influence on oil exports of Azerbaijan. To study this influence I estimate the following regression:

$$log(expo_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t. \qquad (3)$$

I also expect that state budget revenues of Azerbaijan are also highly influenced by world oil prices, as the main source of those revenues is oil profits in Azerbaijan. To check this I use the following regression:

$$log(brev_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t. \qquad (4)$$

To study the impact of oil market on the foreign direct investments in the country, I take the general FDI, not the particular FDI in oil sphere. But the largest share of general FDI in Azerbaijan is FDI in energy sector. For example, in 2002 FDI in oil and gas sector of Azerbaijan comprised almost 70% of general FDI in the country[12]. That is why I expect to find significant results while estimating the following regression:

$$log(fdi_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t. \qquad (5)$$

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[12] http://www.unctad.org/sections/dite_fdistat/docs/wid_ib_az_en.pdf

In the case of Turkey the impact of world oil prices can be less significant for GDP as petroleum does not play such an important role for Turkey as it does for Azerbaijan. To check the dependence between oil prices and GDP I estimate the same regression I already estimated for Azerbaijan but using Turkey's data:

$$log(gdpt_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t. \qquad (6)$$

As Turkey heavily relies on oil imports I am interested in how world oil prices influence this oil-importing country's oil imports. The world oil prices changes can either influence imports significantly or not insignificantly if oil imports are not price-elastic. To learn this dependence I estimate the following regression:

$$log(impot_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t. \qquad (7)$$

It is known that Turkey also exports some part of its oil. The world oil prices should also influence oil exports of oil-importing country. To know whether this influence is positive, negative or even does not exist I estimate the following regression:

$$log(expot_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t. \qquad (8)$$

Budget expenditures of oil-importing country should also response to the changes in the world oil markets. To find how budget expenditures are influenced by the world oil prices I estimate the following regression:

$$log(texp_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t \qquad (9)$$

The government budget revenues of Turkey are also expected to be influenced by the world oil prices. To check the direction of this influence I use the following regression:

$$log(trev_t) = \alpha_t + \beta_1 log(oipr_t) + \beta_2 tt + e_t. \qquad (10)$$

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Note that all mentioned-above regressions are static as I was looking for contemporaneous impact of oil prices on macroeconomic variables: in other words, I checked if the change in world oil price at time *t* has an immediate influence on GDP, oil exports, imports, FDI, budget revenues and expenditures. Time trend was created in such way that it has value one in the first period and increases by one each next period. Including time-trend into regressions accounts for the fact that dependent variables can change also for the reasons not related to oil price. I also take use log-log functional form to account for elasticity and see how much the percentage impact of oil price on dependent variables is.

I found before that there is a unit root in levels of variables. That's why the regressions estimated above can be spurious. This makes the results of regressions non-reliable. To study how lagged world oil prices influence Azerbaijan's and Turkey's macroeconomy's I used Finite Distributed Lag models. As time series are stationary for the first differences of the same variables I apply them. I no longer need time-trend as first differencing made time-series stationary. Lag length is chosen based on Schwarz criterion. To find if GDP of Azerbaijan is influenced by the world oil prices with a lag I estimate the following regression:

$$\Delta log(gdp_t) = \alpha_t + \beta_1 \Delta log(oipr_t) + + \beta_2 \Delta log(oipr_{t-1}) + \beta_3 \Delta log(oipr_{t-2}) + \beta_4 \Delta log(oipr_{t-2}) +$$

$$\beta_5 \Delta log(oipr_{t-3}) + \beta_5 \Delta log(oipr_{t-4}) + e_t \qquad (11)$$

To study the impact of the world oil prices with a lag on oil exports of Azerbaijan I built the following model:

$$\Delta log(expO_t) = \alpha_t + \beta_1 \Delta log(oipr_t) + + \beta_2 \Delta log(oipr_{t-1}) + \beta_3 \Delta log(oipr_{t-2}) + \beta_4 \Delta log(oipr_{t-2}) +$$

$$\beta_5 \Delta log(oipr_{t-3}) + \beta_5 \Delta log(oipr_{t-4}) + e_t \qquad (12)$$

The following equation I used to estimate the world oil prices with a lag impact on the budget expenditures of Azerbaijan:

$$\Delta log(bexp_t) = \alpha_t + \beta_1 \Delta log(oipr_t) + + \beta_2 \Delta log(oipr_{t-1}) + \beta_3 \Delta log(oipr_{t-2}) + \beta_4 \Delta log(oipr_{t-2}) +$$

$$\beta_5 \Delta log(oipr_{t-3}) + \beta_5 \Delta log(oipr_{t-4}) + e_t \qquad (13)$$

To analyze how the world oil prices with a lag affect budget expenditures of Azerbaijan I use the following regression:

$$\Delta log(brev_t) = \alpha_t + \beta_1 \Delta log(oipr_t) + + \beta_2 \Delta log(oipr_{t-1}) + \beta_3 \Delta log(oipr_{t-2}) + \beta_4 \Delta log(oipr_{t-2}) +$$
$$\beta_5 \Delta log(oipr_{t-3}) + \beta_5 \Delta log(oipr_{t-4}) + e_t \qquad (14)$$

The next equation I used to find the world oil prices with a lag influence the budget expenditures of Azerbaijan:

$$\Delta log(fdi\_o_t) = \alpha_t + \beta_1 \Delta log(oipr_t) + + \beta_2 \Delta log(oipr_{t-1}) + \beta_3 \Delta log(oipr_{t-2}) + \beta_4 \Delta log(oipr_{t-2}) +$$
$$\beta_5 \Delta log(oipr_{t-3}) + \beta_5 \Delta log(oipr_{t-4}) + e_t \qquad (15)$$

Then to find how GDP of Turkey is affect by the lagged world oil prices I estimate the following equation:

$$\Delta log(gdpt_t) = \alpha_t + \beta_1 \Delta log(oipr_t) + \beta_2 \Delta log(oipr_{t-1}) + e_t \qquad (16)$$

To study the impact of the world oil prices with a lag on oil exports of Turkey I use the following model:

$$\Delta log(expot_t) = \alpha_t + \beta_1 \Delta log(oipr_t) + \beta_2 \Delta log(oipr_{t-1}) + e_t \qquad (17)$$

To analyze how the world oil prices with a lag influence oil imports of Turkey I use the following regression:

$$\Delta log(impot_t) = \alpha_t + \beta_1 \Delta log(oipr_t) + \beta_2 \Delta log(oipr_{t-1}) + e_t \qquad (18)$$

To study the impact of the world oil prices with a lag on budget revenues of Turkey I use the following model:

$$\Delta log(trev) = \alpha_t + \beta_1 \Delta log(oipr_t) + \beta_2 \Delta log(oipr_{t-1}) + e_t \qquad (19)$$

To find how the world oil prices with a lag influence the state expenditures of Turkey I use the following regression:

$$\Delta log(texp) = \alpha_t + \beta_1 \Delta log(oipr_t) + \beta_2 \Delta log(oipr_{t-1}) + e_t \qquad (20)$$

Lag lengths were chosen based on Schwarz criterion. I estimate the equations (1)-(20) by least squares method assuming that error term has the following properties: E $(e_t) = 0$, var$(e_t) = \delta^2$, cov$(e_t, e_s) = 0$. However, there is a potential risk of collinearity which can cause imprecise estimation: insignificant coefficients, imprecise signs and etc.

6. Estimation and Discussion of the Results

6.1. Azerbaijan

In this chapter I report and discuss the results of regressions provided in the previous subsection. The results of estimations are provided in the Table 2 in Appendix. According to the results of static regressions, a one percent increase in oil price increases Azerbaijan's GDP by 0.46% during the same period when the price increasing was observed. The coefficient I got has the expected sign and it is significant: as oil comprises a large part in GDP, oil price changes directly influence country's GDP.

The significance of oil price influence on GDP in Azerbaijan can be explained by the fact that oil reserves contribute largely to the country's economy. Most economists even argue that Azerbaijan has „Dutch disease". For example, in the first quarter of 2007 Azerbaijan's GDP grew up till 41.7%, and this happened after launching Baku-Tbilisi-Ceyhan pipeline through which Azerbaijanian oil is exported to Turkey and further to European market.

I apply the same logic to budget revenues and expenditures. These variables are also significantly influenced by world oil prices according to the results of static model. A 1% increase in world oil price increase the budget expenditures and budget revenues of Azerbaijan by 0.35%. These are expected results as it is logical that the main source of budget revenues for oil-exporting country Azerbaijan is oil sector. Increase in oil prices should increase oil revenues, and hence it increases overall state revenues. On the other hand, during the recent decade extremely increasing of state expenditures were observed, especially wages were raised for the workers in oil sector. According to our model these expenditures are influenced by the world oil prices increases. Here it is useful to mention the role of organizations responsible for the distribution of oil revenues and the character of budget expenditures, such as The State Oil Fund of Azerbaijan Republic (SOFAR) and The State Oil

Company of Azerbaijan Republic (SOCAR) and other funds which were created for accumulating of oil revenues, preventing an unfavorable impact of enormous oil revenues on country's economy, reducing the symptoms of Dutch disease and distributing oil expenditures.

Oil exports are influenced by oil price increases in the following way: a 1% increase in world oil prices increases the oil exports of Azerbaijan by 1.13%. Here the results are adequate and significant. Moreover they are close to results that previous researchers got. I expected that oil prices increases should have positive impact on oil-exporting country's oil exports. As oil exports mainly depend on two factors – oil price and oil production, oil price increase should increase oil exports.

Foreign direct investments in Azerbaijan are also influenced by oil price changes according to my model: a 1% increase in world oil prices can increase FDI in the country up to 0.47%. The investments caused by oil price changes are directed mostly to environmental programs, infrastructure and military. The significant influence of world oil prices on FDI can be explained by the fact that these prices also have significant influence on foreign countries investing in Azerbaijan.

I included the trend into the regressions discussed above to learn if these variables are correlated because they are trending over time for some other reasons not included into regressions. What I found is that the trend coefficients are small, positive and significant for all variables. It means that there are some other factors not captured in the regressions but significantly influencing GDP, oil exports, budget revenues and expenditures, foreign direct investments in Azerbaijan. Their influence is quite small, and macroeconomic variables mentioned above are explained mostly by oil prices. But these results are doubtful as I could not reject the hypothesis that unit root exists for levels of variables.

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I also added dynamics into regressions. I used differences to eliminate unit root. The results show that a 1% increase in oil price increases the same quarter's GDP by 0.35%, while the coefficient of the first lag of oil price causes the increase of Azerbaijan's GDP by 0.32%. These results are highly significant. They imply that world oil price changes continue influencing Azerbaijan's GDP during two quarters after this change occurred.

Budget expenditures and revenues are also influenced significantly by the changes in world oil prices. But this influence is a quarter-lagged: a 1% increase (decrease) in world oil prices cause 0.76% increase (decrease) in budget revenues and budget expenses after 1 quarter. This can be explained by the expenditure mechanism of oil revenues which makes up large part of general government revenues: it takes up to 3-4 months for oil revenues to be transferred to government budget and then to be spent. To struggle with symptoms of „Dutch disease" oil revenues are invested into the non-oil sector: infrastructure, tourism, agriculture. On the other hand, if unexpected oil price fall happen, it will result in significant decreases of budget revenues and expenditure. This can cause recession in economic activity of the country.

Oil exports are significantly influenced by world oil price changes during two quarters. The same period when the price increased at 1% the oil exports increase by 0.65%. After 3 months it rises by 0.3%. As we see this influence is quite large, and it stays persistent for almost a half-year because oil is the main export product of Azerbaijan and world oil price increase (decrease) should result in oil export increase (decrease). This again supports the idea that Azerbaijan is influenced by the changes in world oil market.

Foreign direct investments are influenced by oil price increases lagged 1 year back: today's oil price increase by 1% increases foreign direct investments in Azerbaijan after one year by 0.085. This result is also adequate, as it should take time to decide about investing into country. The positive impact of oil price increase on FDI into oil-exporting country is

also adequate, as the largest part of FDI in Azerbaijan consists of FDI in the country's oil sector, and it makes FDI vulnerable to changes in oil market.

6.2 Turkey

For an oil-importing country, which is Turkey in our case, I got significant results for the static model. Time trend stays positive and significant for all the variables. This means that there are other factors unrelated to oil price influencing Turkey's GDP, oil exports and oil imports, the state budget revenues and expenditures.

According to my model, an increase (decrease) in world oil prices positively (negatively) affects country's GDP: the coefficient of GDP in regression is 0.44, and it is significant. For an oil-importing country I expected to get negative coefficient for GDP. But I can explain my finding by the fact that there are other factors not covered in my regression that affect oil-importing country's GDP. As oil does not play such an important role in Turkey's economy, and its share is not large in the country's GDP as it does in Azerbaijan's case, there are factors other than oil price affecting country's GDP. Also according to Aktas, Ozenc and Arica (2010) the impact of oil prices on Turkey's GDP is not similar to the impact on other oil-importing countries, because of the implementation of stabilization programs there the last 10 years.

Turkey's oil exports are also vulnerable to oil price changes: a 1% increase (decrease) of world oil prices significantly increase (decrease) oil exports of oil-importing country by 1.12%. The result I got is very similar to Azerbaijan's one. It shows that oil exports of both countries response equivalently to the changes in world oil markets. As revenues from oil exports depend on oil price and amount of oil exported it is logical that an increase in oil price will positively affect the amount of oil exports.

As I mentioned before, the main resource of Turkey's domestic oil consumption are oil imports. Turkey now imports more than 90% of its oil and consumes 72.8% of its oil reserves (Energy Information Administration)[13]. Some researchers forecast that Turkey will be importing from 99% of its oil within next 20 years[14]. Based on my model, 1% rise (fall) in world oil prices increases (decreases) oil imports of Turkey by 0.36%. Although the result is significant as oil imports guarantee almost all oil consumption of Turkey, it should not be price elastic. Because oil-importing country with small reserves of own petroleum should agree to any import price to satisfy its demand on it. Also there can be other factors not containing in my regression but influencing oil imports of Turkey.

For the budget expenditures of Turkey I got positive but insignificant coefficient: 1% increase in the oil prices increase the government spending by 0.16%. The insignificance of the coefficient can be explained using the similar work by Nomuro M. (1991), who shows that the world oil price changes mainly have a displacement effect on oil-importing countries: budget expenditures are shifting on new level; some structural changes are being introduced to these expenditures.

The budget revenues of Turkey are decreasing by -0.73% in response to 1% increase in the world oil prices. This result is significant, and the coefficient has an expected sign taking into consideration a budget deficit of Turkey during the last decade.

The results I provided and discussed above are not reliable, as non-stationarity of time series raises a probability of spurious regressions. That's why then I use differences of variables. I also include lagged variables for oil prices into regressions to find long-term impact of oil prices on variables. I find that oil price continue to increase Turkey's GDP during two years. But this result is insignificant. This means that there are many other factors affecting Turkey's GDP which I did not include in my model as my purpose was to learn how

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[13] Energy Information Administration, Country analysis briefs. http://www.eia.doe.gov/cabs/Turkey/pdf.pdf
[14] http://www.sciencedirect.com/science/article/pii/S0960148103001381

only world oil prices affect this macro variable. Moreover, according to CIA World Factbook (2010)[15] the largest share of the country's GDP comes from services (65.5%). This means that the share of oil is not large in GDP, that's why it is not affected significantly by oil price fluctuations.

One more finding is that 1% increase in world oil prices increase oil exports by 0.21% the same year when this increase happened, while oil imports of oil-importing country decrease by 0.32% the same year. Although the results are insignificant for both factors I got expected signs: the world price changes positively affect small oil exports of oil-importing country. Even if these exports are small the world oil price increases (decreases) will bring more (less) revenues to country. On the other hand, as I discussed in the subsection about Azerbaijan's result, oil exports are explained by oil prices and oil production. As oil production is usually fixed with particular contracts and is realized according to plans developed, they are largely affected by oil price fluctuations. Turkey's oil imports are negatively correlated with oil prices. This is what I expected to find for oil-importing country. But results for both oil exports and imports are insignificant. This can be explained by the fact that there are other factors not included in regression and not related to world oil price fluctuations but affecting these two macro variables. Also it can be explained by the fact that for Turkey world oil prices are not necessarily significantly affect oil imports, as this country's oil imports assure 90% of its oil consumption, which makes it agree on each cost of oil import.

For the government expenditures I found significant increase by 0.16% after two years in response to a 1% world price increase, while the budget revenues decline first year by 0.48%, and then again rise up to 0.32%. The results for budget revenues are insignificant, and

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[15] https://www.cia.gov/library/publications/the-world-factbook/fields/2012.html

this can be because of the fact that oil price changes can cause not quantitative but qualitative changes in the structure of revenues.

6.3 Comparative Analysis of Azerbaijan and Turkey

I studied how the changes in world oil prices affect two different countries: oil-producing and exporting Azerbaijan and oil-importing Turkey. In this subsection I provide a comparative analysis of this influence on oil-exporting and oil-importing countries' macroeconomies. To make the comparison visible I generalize the estimation results in the Table 3 below where one can compare the signs and amplitudes of the coefficients:

Table 3

Comparative impact of the world oil prices on Turkey's and Azerbaijan's macroeconomic variables

	Sign		Amplitude larger	
	Same	Different	for Azerbaijan	For Turkey
GDP	✓		✓	
Oil exports	✓		✓	
Budget expenditures	✓		✓	
Budget revenues		✓		✓

I built the comparison table using only Static model's estimations. As I used quarterly data for Azerbaijan and yearly data for Turkey, and also there are different lag lengths in the Finite Distributed Lags models for two countries studied, I could not build the analogical table for the results of dynamic regressions.

It is clear from the study that oil-exporting Azerbaijan is highly vulnerable to the changes in the world oil market. Oil price fluctuations affect countries' GDP, oil exports,

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budget revenues and expenditures, and also FDI in the country. Moreover, this influence is long-lasting; it means that Azerbaijan's macroeconomy continues to be affected by the lagged world oil prices. I found that Azerbaijan's GDP is highly influenced by world oil price changes. This is common to oil-producing countries where oil reserves contribute largely to the economy.

On the other hand, I found that Turkey is not affected by the world oil price increases and decreases significantly. Turkey is an oil-importing country, and oil imports make up almost the whole of its internal oil consumption, although oil is not the main important source of its earnings. However, some insignificant influences of the world oil prices fluctuations are observed: I found that Turkey's GDP positively (negatively) responses to the world oil price increases (decreases). This contradicts to the main findings of some previous researchers, who found negative correlation between oil prices and GDP in oil-importing countries. But positive correlation between Turkey's GDP and oil price was found by Aktas et al. (2010). I explain my finding by the fact that oil does not have large share in Turkey's GDP; that is why increase in GDP following the oil price increases can be explained by the other factors not included in my regression. Moreover, as I mentioned before some stabilization programs were implemented in the country the last decade, and this can also influence different impact of oil prices on countries GDP.

I also found that both Turkey's and Azerbaijan's oil exports are affected similarly by oil price fluctuations. This can be explained by the fact that oil exports of both countries are explained by world oil prices and internal oil production. On the other hand, the reasons standing behind this increasing can be different: while for oil-exporting country oil exports consist the largest share in its general exports, for oil-importing Turkey oil is not a main input in its production, so increase in oil prices have little impact on production costs and therefore on oil exports.

The total expenditures of both countries are also positively affected by the changes in the world oil markets. But the difference is that while for Azerbaijan this influence is significant, for Turkey it is insignificant. In Azerbaijan, the world price increase is followed by the sharp increase in budget expenditures, and this is common situation for all oil-producing and exporting countries. For Turkey, the insignificance of the world oil price influence is explained with a fact that Turkey is not an oil-exporting country, and the only influence the oil price change can cause for its budget spending are structural changes.

The total revenues of Azerbaijan and Turkey are affected differently: the world oil prices increase increases the government revenues of oil-producing country and decreases these revenues of oil-importing country. For Azerbaijan it is clear that the oil price increases should increase oil revenues which make up the most part of its government revenues. For an oil-importing country the situation is different, as its oil imports are more than its oil exports, and this causes negative response to the oil price increases.

7. Conclusion

Through the history the world oil price fluctuations affected both oil-exporting and importing countries. From the literature review provided it can be concluded that while oil-producing and exporting countries' macroeconomic factors positively correlated with the oil price changes, its impact on oil-importing countries is different. In this thesis I built a model explaining the impact of the world oil prices on GDP, oil exports, budget revenues and expenses, FDIs in Azerbaijan, and also on GDP, oil exports and imports, budget revenues and expenses of Turkey. The thesis found that the world oil price changes have large impact on oil-exporting country Azerbaijan. The oil-importing country Turkey is no largely affected by the fluctuations in the world oil market, the influence is mostly insignificant.

Decrease in oil price can cause significant falls in GDP, oil revenues and expenditures, oil exports and foreign direct investments to Azerbaijan. This can lead to economic activity weakening. On the other hand, oil price increase can lead to large increase of oil revenues for the country, rapid budget expenditures, and this can be followed by price increases. Here the role of State Oil Fund of Azerbaijan Oil republic is of high importance. Taking into consideration large oil price fluctuations this Fund has to guarantee balanced increase of expenditures to ensure that future oil price decreases will not damage the country's economy.

Even though world oil prices have no significant impact on Turkey's GDP, oil exports and imports, budget revenues and expenditures the government should take them into consideration in building the policy aimed on the solution of a current account deficit problem.

Given the dynamics of the world oil markets it is reasonable to analyze further how the results I got in this thesis should influence decision-making at the government level about volumes of production, import, export and other important factors. Also separate analysis of

increases and decreases of the world oil prices' impact on oil-producing and oil-importing

countries can help to draw a clear picture of the issue.

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Appendix

Table 1A. Descriptive statistics, Azerbaijan

	GDP	BEXP	BREV	EXPO	FDI_O	OIPR
Mean	4353.234	1049.980	1058.323	2743.516	873.1321	51.51310
Median	2996.300	548.3500	502.5500	1153.987	969.6580	47.64000
Maximum	11864.70	4111.100	3255.500	9996.038	1468.840	122.4767
Minimum	840.3000	143.4000	148.0000	348.5840	168.3160	19.34000
Std. Dev.	3354.002	1050.575	998.9244	2666.113	353.4364	25.89043
Skewness	0.779768	1.293733	0.839706	1.026374	-0.464436	0.824204
Kurtosis	2.221024	3.871074	2.177563	3.040430	2.504389	3.121004
Jarque-Bera	5.571419	13.66520	6.410855	7.201318	1.708833	4.894635
Probability	0.061685	0.001078	0.040542	0.027306	0.425531	0.086525
Sum	191542.3	46199.10	46566.20	112484.2	32305.89	2215.063
Sum Sq. Dev.	4.84E+08	47459400	42907551	2.84E+08	4497023.	28153.20
Observations	44	44	44	41	37	43

Table 1B. Descriptive statistics, Turkey

	EXPOT	GDPT	IMPOT	OIL_P	TEXP	TREV
Mean	1.463000	333.8100	13.03420	38.19600	259.5394	233.5759
Median	0.333000	252.4450	7.203500	31.11500	247.7560	248.7120
Maximum	7.532000	730.3180	48.28100	92.31000	388.4570	359.2910
Minimum	0.177000	174.4480	3.419000	15.93000	149.3520	100.7660
Std. Dev.	2.051573	170.6937	12.69405	19.16166	82.29425	83.95485
Skewness	1.742870	1.176626	1.468795	1.366194	0.275417	-0.163455
Kurtosis	5.077242	2.941784	4.132533	4.253788	1.757667	1.949061
Jarque-Bera	13.72110	4.617652	8.260053	7.531612	0.692553	0.454253
Probability	0.001048	0.099378	0.016082	0.023149	0.707317	0.796820
Sum	29.26000	6676.199	260.6840	763.9200	2335.855	2102.183
Sum Sq. Dev.	79.97008	553590.6	3061.640	6976.213	54178.75	56387.34
Observations	20	20	20	20	20	20

Table 2. Unit root tests (ADF-statistics is given in parentheses)

Azerbaijan

ADF TEST. HO: the variable has a unit root (Lag=0)				
	Levels		1st differences	
Oil price	-1.483325	Do not reject	-4.803345	Reject
Oil export	-0.996640	Do not reject	-5.179025	Reject
GDP	-1.533727	Do not reject	-4.774867	Reject
Budget expenditures	-2.359205	Do not reject	-10.67768	Reject
Budget revenues	-1.387403	Do not reject	-5.806700	Reject
FDI in oil	-2.429744	Do not reject	-7.979706	Reject

ADF TEST. HO: the variable has a unit root (Lag=1)				
	Levels		1st differences	
Oil price	-2.030776	Do not reject	-6.018894	Reject
Oil export	-0.996640	Do not reject	-5.494626	Reject
GDP	-1.533727	Do not reject	-4.774867	Reject
Budget expenditures	-1.383332	Do not reject	-10.67768	Reject
Budget revenues	-1.387403	Do not reject	-5.806700	Reject
FDI in oil	-2.429744	Do not reject	-7.979706	Reject

ADF TEST. HO: the variable has a unit root (Lag=2)				
	Levels		1st differences	
Oil price	-1.218797	Do not reject	-6.018894	Reject
Oil export	-0.996640	Do not reject	-5.494626	Reject
GDP	-1.533727	Do not reject	-4.774867	Reject
Budget expenditures	-1.383332	Do not reject	-10.67768	Reject
Budget revenues	-1.387403	Do not reject	-5.806700	Reject
FDI in oil	-2.429744	Do not reject	-7.979706	Reject

ADF TEST. HO: the variable has a unit root (Lag=3)				
	Levels		1st differences	
Oil price	-1.218797	Do not reject	-6.018894	Reject
Oil export	-0.996640	Do not reject	-5.494626	Reject
GDP	-1.533727	Do not reject	-4.297313	Reject
Budget expenditures	-1.383332	Do not reject	-10.67768	Reject
Budget revenues	-1.387403	Do not reject	-5.806700	Reject
FDI in oil	-2.429744	Do not reject	-7.979706	Reject

ADF TEST. HO: the variable has a unit root (Lag=4)				
	Levels		1st differences	
Oil price	-1.218797	Do not reject	-6.018894	Reject
Oil export	-0.996640	Do not reject	-5.494626	Reject
GDP	-1.533727	Do not reject	-4.297313	Reject
Budget expenditures	-1.383332	Do not reject	-10.67768	Reject
Budget revenues	-1.387403	Do not reject	-5.806700	Reject
FDI in oil	-2.429744	Do not reject	-7.979706	Reject

Unit root tests (ADF-statistics is given in parentheses)

Turkey

ADF TEST. HO: the variable has a unit root (Lag=0)				
	Levels		1st differences	
Oil price	-1.541483	Do not reject	-7.672129	Reject
Oil export	-0.818895	Do not reject	-4.983263	Reject
GDP	-0.623193	Do not reject	-4.327252	Reject
Oil import	-0.308037	Do not reject	-6.178324	Reject
Budget expenditures	-0.583619	Do not reject	-5.683008	Reject
Budget revenues	-0.742772	Do not reject	-6.018894	Reject

ADF TEST. HO: the variable has a unit root (Lag=1)				
	Levels		1st differences	
Oil price	-1.541483	Do not reject	-7.672129	Reject
Oil export	-0.818895	Do not reject	-4.983263	Reject
GDP	-0.623193	Do not reject	-4.327252	Reject
Oil import	-0.170533	Do not reject	-6.178324	Reject
Budget expenditures	-1.850170	Do not reject	-4.394275	Reject
Budget revenues	-0.328428	Do not reject	-6.487203	Reject

Regression results. (t-statistics is given in parentheses)

Table 2.1A Static model, Azerbaijan

Dependent variables	Independent variables			
	Constant	log(oipr)	Time trend	R-squared
log(gdp)	5.305480 (14.45422)***	0.460870 (4.090499)***	0.047487 (13.60382)***	0.961024
log(expo)	2.202842 (7.173886)***	1.136665 (11.52555)***	0.043843 (10.20265)***	0.966519
log(brev)	3.646948 (7.346623)***	0.358028 (2.178146)***	0.068890 (9.837632)***	0.966256
log(bexp)	3.746288 (6.208340)***	0.346403 (1.732766)***	0.066166 (7.235899)*	0.929554
log(fdi)	4.642522 (5.890072)***	0.467293 (1.799916)***	0.009516 (0.638961)**	0.323943

Table 2.2A Dynamic model, Azerbaijan

Dependent variables	Independent variables					
	dLOG(OIPR(-1))	dLOG(OIPR(-2))	dLOG(OIPR(-3))	dLOG(OIPR(-4))	C	R-squared
dlog(gdp)	0.350389 (1.761022)**	0.325642 (0.210757)*	-0.073029 (-0.459623)	-0.123466 (-0.807432)	0.034202 (0.437404)	0.282826
dlog(expo)	0.651509 (3.044122)***	0.303982 (1.768647)**	-0.231695 (-1.503189)	0.128486 (0.980232)	0.100825 (1.263249)	0.651311
dlog(brev)	-0.048945 (-0.286722)	0.445180 (3.193125)***	-0.053688 (-0.374864)	0.053019 (0.291464)	0.046946 (0.5451)	0.023633
dlog(bexp)	-0.284239 (-0.876018)	0.760614 (2.835686)***	-0.080572 (-0.318595)	-0.146174 (0.7520)	0.030376 (0.8339)	0.132646
dlog(fdi)	-0.153576 (-0.722803)	0.311577 (1.694037)	-0.285004 (-1.346042)	0.085753 (0.0338)**	0.210130 (1.27438)	0.060243

Table 2.1B Static model, Turkey

Dependent variables	Independent variables			
	Constant	log(oipr)	Time trend	R-squared
log(gdp)	3.324360 (6.502976)***	0.439875 (3.567791)***	0.086846 (8.996426)***	0.849312
log(expot)	-6.725246 (-5.762837)***	1.126219 (4.218174)***	0.243642 (8.009181)***	0.889646
log(impot)	-0.533319 (0.4282)	0.357985 (0.0259)**	0.153554 (0.0000)***	0.908009
log(texp)	3.192295 (11.82608)***	0.163229 (1.343943)	0.111038 (10.05075)***	0.990196
log(trev)	4.778871 (9.137883)***	-0.725495 (-2.708462)**	0.191018 (7.054572)***	0.971682

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Table 2.2B Dynamic model, Turkey

Dependent variables	Independent variables			
	dLOG(OIPR(-1))	dLOG(OIPR(-2))	C	R-squared
dlog(gdpt)	0.095069 (0.467555)	0.172447 (1.120070)	0.050855 (0.377310)	0.092789
dlog(expot)	0.214133 (0.962587)	-0.073968 (-0.355108)	0.027039 (0.138430)	0.064982
dlog(impot)	-0.328518 (-1.128832)	0.167532 (0.831567)	0.012436 (0.084662)	0.091373
log(texp)	0.221799 (1.699372)	0.158171 (0.1301)*	0.094441 (5.628735)***	0.646732
log(trev)	-0.479751 (-1.720532)	0.324604 (1.429326)	0.152833 (3.822000)*	0.510561

*** Significant at 1% level

**   Significant at 5% level

*   Significant at 10% level

Table 3

Comparative impact of the world oil prices on Turkey's and Azerbaijan's macroeconomic variables

	Sign		Amplitude larger	
	Same	Different	for Azerbaijan	For Turkey
GDP	✓		✓	
Oil exports	✓		✓	
Budget expenditures	✓		✓	
Budget revenues		✓		✓

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