THE OIL BOOM IN AZERBAIJAN AND MODELING OF ECONOMIC GROWTH IN POST-OIL ERA

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ABSTRACT

The objective of this research is to assess the oil boom and stable economic growth for post-oil era taking into account the existing realities of Azerbaijan. Economic stability is reflected in the economic functions of the state. Achieving economic stability means achieving economic growth and reducing unemployment. Researchers have tried to explain the reasons behind the development of countries in the world and to understand the differences in development using economic growth models. In economic literature, economic growth models are classified on a variety of basis [http://www.undp. org/content/ dam/azerbaijan /docs/publications/ sustainable development/]. The models are classified into two major groups, namely traditional economic growth models and modern economic growth models [Taban, S. (2008)]. Traditional economic growth models are, in essence, divided into classical models of economic growth (Smith, Malthus, Ricardo) and models named after Karl Marx, Joseph Schumpeter, John Meynard Keynes. Modern economic growth models are based on neo-Keynesian economic growth models (Harrod-Domar economic growth model, Samuelson-Hickson multiplier, and accelerator model) and neo-classical economic growth model (Solow model). Economic growth models are also characterized by their other features. As macroeconomics is divided into two major parts, modern economic growth models are also divided into two parts: Short-Run and Long-Run [Andrew B. Abel, Ben S. Bernanke, 2008]. In the short term, economic growth models study the causes and outcomes of emerging economies and the components of sustainable economic growth. Long-term models study the causes of equilibrium in the long run. In this research, the equilibrium state of the economic growth was assessed for Azerbaijani conditions. The marginal propensity to consume and invest, as well as marginal productivity of capital was determined in real terms. Then, the sustainable growth rate of the economy for the post-oil era was determined. Thus, economic growth problems in Azerbaijan were studied for the post-oil era on a scientific basis. This research is aimed to contribute to improving the effectiveness of the country's macroeconomic policy.

Keywords: oil boom, post-oil era, economic growth, natural capital, macroeconomic equilibrium.

JEL classification: F43, O47, C53, Q43

1. INTRODUCTION

Oil production and exports play an important role in economic development as well as economic growth of oil-producing countries. No one can doubt that the oil prices, as the energy carriers, affect the individual and global development trends of countries. However, world oil prices have fallen significantly in recent years, and it is less likely that oil price will rise to its previous high levels. On the other hand, oil is a non-renewable resource and in some countries, including in Azerbaijan, the volume of oil extraction is declining. From this point of view, the study of economic growth problems for the post-oil era in oil-producing countries increases in significance. Consequently, developing economic growth models in the context of Azerbaijan's current economy for the post-oil era is a crucial problem.

It should be noted that the main problem underlying economic growth models is income distribution. An effective division of income between consumption and savings creates a balanced and sustainable economic growth. Contemporary researchers believe that human capital is the main driving force behind economic growth. Investing in physical capital increases productivity (eg, Keynesian investment multiplier), whereas the knowledge gained through investment in human capital provides increased yields through the transfer of retained knowledge. According to many researchers, the development of human capital determines the quality of administrative institutions. In countries with high human capital, the possibility of democratic governance and the level of protection of private property increases while the corruption declines [Acemoglu D., Johnson S., Robinson J. A., Yared P., 2005].

Gorkhmaz Imanov, Yadulla Hasanli (2014) carried out forecasting analysis showing that the utilization of hydrocarbon resources is subject to normal distribution in Azerbaijan. It was determined that the peak period of oil extraction is far behind and will gradually go downwards. All these factors require consideration in studying the balanced economic growth problem for the post-oil era in Azerbaijan.

It is very important to note that preliminary study of the economic growth problems in “oil boom” and post-oil era in the case of Azerbaijan was discussed at the International Conference on Economic Modeling in EcoMod2016 [https://ecomod.net/conferences/ecomod2017?tab= downloads)].

Analysis of and research on macroeconomic processes using growth models helps to evaluate the results of the economic activity, eliminate negative events, develop economic policy and make predictions based on economic theories. Economic growth is a part of the economic development processes.

2. THEORETICAL-METHODOLOGICAL ASPECTS

The development of modern economic growth models is primarily based on the use of mathematical and statistical methods. The indicators are aggregated, and the economy is analyzed in the form of a single organism. Thus, the economic growth reflects the amount and the share of the country's gross domestic product for a certain period of time.

Economic stability is reflected in the economic functions of the state. The achievement of economic stability means achieving economic growth and reducing unemployment. Researchers have tried to identify the driving forces behind the development of countries around the globe and understand differences in their development using economic growth models. In economic literature, the economic growth models are classified on a variety of bas [http://www.undp.org/content/dam/azerbaijan/docs/publications/sustainabledevelopment/]. Generally, they are grouped into two major categories, namely traditional economic growth models and modern economic growth models [Taban, S. 2008]. Traditional economic growth models include classic economic growth models (Smith, Malthus, Ricardo) and models named after Karl Marx, Joseph Schumpeter and John Meynard Keynes. Modern economic growth models include neo-Keynesian economic growth models (Harrod-Domar economic growth model, Samuelson-Hickson multiplier, and accelerator model) and neo-classical economic growth model (Solow model). The modern economic growth models are also divided into two parts: Short-Run and Long-Run [Andrew B. Abel, Ben S. Bernanke. 2008]. In the short term, economic growth models examine the causes and outcomes of events emerging in the economy. The long term economic growth models study the components and ways of sustaining economic growth.

If the steady-state growth in a number of economic growth models is explained using exogenous factors, then in Romer's and Lucas's models the economic growth has been modeled endogenously on the basis of technology and innovation. These models, along with the short-term analysis and forecasting, have enabled us to explore long-term economic fluctuations.

The fluctuations in the economic growth and its continuing prolongation led to the creation of the first long-term, wavelike economic growth model of English economist U. Cevan. Initially, the wave of economic growth was explained by price dynamics, but later the economic growth was linked with the rate of debt. The "multiplier and accelerator interaction models" of Nobel Prize winners in economics Paul Samuelson and Hicks, have for the first time given an analytical explanation of the upward and downward trends in economic growth.

Existing economic growth models have certain deficiencies. Causes of economic growth levels among countries have not been fully explained in the assessment of economic growth models. However, each economic growth model allows the analysis certain aspects of economic growth for individual economies.

3. NEO-KEYNESIAN ECONOMIC GROWTH MODELS

Domar-Harrod's economic growth model is considered to be neo-Keynesian growth model. The early stage of this model was established by English economists Evsey Domar and Roy Harrod. The simplest form of the economic growth model is E. Domar's model. The Domar's model is based on the fact that there is an abundance of supply in the labor market, which implies the stability of the price level. Harrod's economic growth model consists of three parts: Fundamental Equality of Growth, Guaranteed Growth and Natural Growth. In general, when considering the model, it can be shown that if the actual and guaranteed growth takes a cyclical form, then it will result in chronic unemployment. Harrod's model presumes the periodic instability of the market economy. E. Domar figured out a balanced growth equilibrium, independently, in line with Harrod's first guaranteed growth equilibrium. In the Domar model, it is assumed that investment plays a dual role in the economy: First, it creates production tools and then it creates demand by the multiplier effects. Domar shows that in order for growth in demand to be in line with the growth of productive forces, investment should be equal to the product of return on investment and the rate of savings in the steady state growth situation. R.F. Harrod's "guaranteed" growth rate assumes full capitalization but not full-fledged employment. Harrod has also brought the concept of "natural" growth rate to the discussion. Natural growth is explained as the maximum rate allowed by population growth and technical progress. Harrod considered a steady increase in production and labor productivity, which is sustained by the ever-growing population as the only factor of growth. As a third factor, he specifically mentioned the savings of capital. This specific tenet of Harrod was of particular importance. Harrod noted that the market economy was not self-regulating, and the state control was essential for its regulation. At present, the western countries have no economic development basis for growth because productivity per capita is high at the expense of scientific and technical achievements. The constant fluctuation of the economy's balance is considered to be one of the factors that hampers the implementation of the Domar-Horrod model. For this reason, the Harrod-Domar model is widely used in the analysis of short-term economic growth. Domar model, which is considered as a simple Keynesian model of economic growth, is as follows:

$$\frac{\Delta \text{REAL\_GDP}_t^s}{\text{REAL\_GDP}_{t-1}^s} = \sigma * S_y \quad (1)$$

In this formula, $\frac{\Delta \text{REAL\_GDP}_t^s}{\text{REAL\_GDP}_{t-1}^s}$ is economic growth in period t, σ is a value of productivity of capital and S_y refers to a collection norm. $\Delta \text{REAL\_GDP}_\text{t}$ is the growth rate of real GDP in period t and REAL_GDP_{t-1} is the aggregation of real GDP in period (t-1).

As we can see, the productivity of capital and collection norm are the main parameters of the model. During the experimental assessment, they are placed in the following equations:

$$\text{REAL\_SAVING}_t = S_y * \text{REAL\_GDP}_t \quad (2)$$

$$\Delta\text{REAL\_GDP}_\text{t} = \sigma\,(K_t - K_{t-1}) = \sigma * \text{REAL\_INVEST}_t \quad (3)$$

Here $\Delta\text{REAL\_GDP}_\text{t}$ is the growth in period t. REAL_INVEST_t is investment in main capital and REAL_GDP_{t-1} the gross domestic product in period (t-1). $\text{REAL\_SAVING}_\text{t}$ is the total of aggregation with real prices; K_t and K_{t-1} represent the amount of capital in t and (t-1) periods and REAL INVEST_t is the real investment in period t.

The main result of the model is that production, investment, and capital growth rate are equal to each other in the case of dynamic balanced economic growth, which means:

$$\frac{\Delta\text{REAL\_GDP}_\text{t}}{\text{REAL\_GDP}_{t-1}} = \frac{\Delta\text{REAL INVEST}_t}{\text{REAL INVEST}_{t-1}} = \frac{\Delta \text{K}_\text{t}}{K_{t-1}} \quad (4)$$

If we consider technical advancements in accordance with the Domar model, dynamic balance is the main feature of economic growth.
We can write economic growth in Harrod model as the following.

$$\frac{\text{REAL\_GDP}_t - \text{REAL\_GDP}_{t-1}}{\text{REAL\_GDP}_{t-1}} = \frac{S_y}{\alpha - S_y} \quad (5)$$

Here, $\alpha -$ is an accelerator. We can determine the accelerator by the following equation.

$$\text{REAL INVEST}_t = \alpha * (\text{REAL\_GDP}_t - \text{REAL\_GDP}_{t-1}) \quad (6)$$

It was called a guaranteed growth rate by R.Harrod. We can say that this growth rate guarantees the use of existing production capacities at their maximum rates.

As mentioned in Domar model, aggregate demand in Harrod model is determined through a multiplicator.

$$\text{REAL\_GDP}_t^D = \frac{INVEST_t}{S_y} = \frac{\alpha * (\text{REAL\_GDP}_t - \text{REAL\_GDP}_{t-1})}{S_y} \quad (7)$$

Here, REAL_GDP_t^D is the value of GDP in period t. If $\frac{\alpha}{S_y} > 1$, aggregate demand will exceed the aggregate supply.

4. INFORMATION BASE OF THE RESEARCH

The study covers the period 2000 to 2017. By evaluating the neo-Keynesian economic growth models for the Azerbaijan's economy, the dynamic and steady states of economic growth were determined during this period. All of the indicators of the study were used in real terms, and the year 2000 was chosen as the base year for this purpose. The data for the economic indicators in the assessment were used from the website of the Statistical Committee of the Republic of Azerbaijan (stat.gov.az) and the website of the National Bank of Azerbaijan (cbar.az). Econometric assessments were made in the E-views7 software package.

5. EVALUATION OF KEYNESIAN TYPE DOMAR AND HARROD MODELS IN THE ECONOMY OF AZERBAIJAN

First, it was important to assess the balanced economic growth rates for Domar, and then Harrod models during the period of the oil boom (2000-2013) when both oil prices and production were high and in the post-oil era of 2014-2017 when oil prices declined sharply and oil production was reduced.

In order to evaluate the Domar model, it was necessary to find the parameters of the savings norm and the marginal productivity of capital. In order to to do that, econometric evaluation was conducted between 2000 and 2013 for the Azerbaijan Republic.

The following results were obtained from the implementation of the Domar’s model in the Eviews7 program for the real indicators for the period covered in the study for the economy of the Republic of Azerbaijan.

Tab. 1: **Statistical features of S_y parametres of econometric assessment**

Dependent Variable: REAL_SAVING				
Method: Least Squares				
Date: 05/02/17 Time: 02:47				
Sample (adjusted): 2000 2013				
Included observations: 13 after adjustments				
Convergence achieved after 18 iterations				
MA Backcast: 2000				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
REAL_GDP	0.205133	0.049011	4.185458	0.0019
AR (1)	0.754837	0.210021	3.594099	0.0049
MA (1)	0.888579	0.158206	5.616610	0.0002
R-squared	0.696393	Mean dependent var		3104.692
Adjusted R-squared	0.635672	S.D. dependent var		787.7870
S.E. of regression	475.5051	Akaike info criterion		15.36581
Sum squared resid	2261051.	Schwarz criterion		15.49618
Log-likelihood	-96.87774	Hannan-Quinn criteria.		15.33901
Durbin-Watson stat	1.471227			
Inverted AR Roots	.75			
Inverted MA Roots	-.89			

REAL_SAVING = 0.205133092015 * REAL_GDP + [AR (1) =0.754837146075, MA(1)= 0.888578691287,BACKCAST=2001,ESTSMPL="2001 2013"] (8)

Where REAL_SAVINGS is the real volume of savings and REAL_GDP is the real volume of GDP (year-end figures in billions of local currency). The numbers in brackets below the model's parameters are the t-statistics of the corresponding parameters. As indicated in Model (8) savings norm is equal to $S_Y = 0.205133092015$.

As seen in Appendix 1, t-statistics has statistical significance. Standard errors of parameters are significantly lower than the values of parameters found by least squares method (excluding the constant coefficient). It is seen more clearly in Student's t-statistics and corresponding p-values (Appendix 1). This fact is also indicative of the change in the value of the coefficient of marginal propensity to save.

Assessments and tests made for the model (8) are enough to consider this model to be adequate. These tests are given in appendix 1.

Let's now assess the marginal productivity of capital based on real data:

$$\Delta REAL\_GDP_t = \sigma * REAL\_INVEST_t \qquad (9)$$

Where $\Delta REAL\_GDP_t$ is the change in GDP at time t, $REAL\_INVEST_t$ is the investment at time t and σ is marginal productivity of capital. Following regression was obtained by using real data in E-Views program that covered the period between 2000 and 2015 (Appendix 2):

D(REAL_GDP) = 0.242165079471*REAL_INVEST (10)
(s.e.) (0.065306)
(t-statisics) (3.708145)

Here D represents growth. t refers to the t-statistic and s.e. refers to the standard error in the econometric model. The value of marginal productivity of capital (σ) equals 0.242165079471.

Model outputs are included in Appendix 2. Based on the model output and tests, it can be stated that the model is sufficiently adequate for the real economy. t-statistics is close to 3.708145, which indicates its statistical significance. The probability that σ coefficient is erroneous is 0.21% and so the model can be considered to be adequate. Coefficient of determination has no meaning as there is no constant parameter in this model. Therfore, both parameters which are important for the Domar model can be assessed. Let's calculate the dynamic rate of equilibrium state of economic growth for years 2000 and 2013.

$$\frac{\Delta REAL\_GDP_t^S}{\mathrm{REAL\_GDP_{t-1}^S}} = S_Y * \sigma = 0.205133092015 * 0.242165079471 = 0.064995$$

Thus, the rate of growth was found to be 0.064995 or 6.5%
Hence, it can be concluded that the annual real growth rate of GDP in Azerbaijan should be 6.5% during the oil boom in order to maintain long-term equilibrium between aggregate demand and aggregate supply. In other words, in accordance with the Domar model equilibrium state economic growth rate is 6.5%. By the condition of the Domar model, the state of equality of the growth rate of GDP to the growth rate of investments and capital is the most important aspect of the dynamic equilibrium state economic growth.

The period after 2014, when the oil prices and production of oil declined is considered the transition period to a post-oil era in Azerbaijan. Having looked at the statistical information, one can identify that savings norm has reduced to approximately 0.1 ($S_Y = 0.1$), whereas σ the marginal productivity of capital has gone down to 0.2.

Thus, during the transition period to the post-oil era the equilibrium state economic growth in Azerbaijan based on the Domar model can be described as indicated:

$$\frac{\Delta REAL\_GDP_t^s}{REAL\_GDP_{t-1}^s} = S_Y * \sigma = 0.1 * 0.2 = 0.02, \text{ in other words } 2\%.$$

Let's now take a look at the realization of the Harrod model for the economy of the Azerbaijan Republic covering the years between 2000 and 2013. Real data has yielded the following results in Eviews program (Appendix 3)

$$REAL\_INVEST = 1.95418472519 * D\ (REAL\ GDP) \qquad (11)$$
$$\text{t-statistic} \qquad (4.80829)$$

Where, Real_INVEST is the real volume of investment and Real_GDP is the real volume of GDP. Coefficient of determination has no meaning as there is no constant parameter.

As seen in equation (11) the accelerator is $\propto = 1.95418472519$. Also, t-statistic = 4.080956 is a very strong value. Thus, it can be concluded that GDP growth has a big impact on investment growth, which is also statistically significant. The fact that the value of the accelerator is more than 1 indicates that the volume of GDP is prone to increase.

Thus, the outcome of the Harrod model during the oil boom period of economic growth of Azerbaijan is as follows:

$$\frac{REAL\_GDP_t - REAL\_GDP_{t-1}}{REAL\_GDP_{t-1}} = \frac{S_y}{\propto - S_y} = \frac{0.205133}{1.95418472519 - 0.205133} = 0.117282$$

Thus, in accordance with Harrod model, the equilibrium and "guaranteed," economic growth rate is 11.7%. In other words, an 11.7%. annual growth rate allows the full use of production resources by providing an equilibrium between aggregate demand and aggregate supply.

Having analyzed outcomes for Azerbaijan economy through Domar and Harrod models, we can state that the equilibrium state growth rate in the first model is less than the growth rate in the second model.

It should be noted that based on real statistical data, the GDP growth rate in Azerbaijan has been faster than the equilibrium and the "guaranteed" rate of growth, which has impeded the non-oil sector.

For the post-oil period, more precisely for the most recent 2 years, on average the marginal propensity to consume (S_y) and accelerator ($\propto$) values went down to 0.1 and 1.8, respectively. The rate of growth can be determined as follows [Yadulla Həsənli, 2003]:

$$\frac{REAL\_GDP_t - REAL\_GDP_{t-1}}{REAL\_GDP_{t-1}} = \frac{S_y}{\propto - S_y} = \frac{0,1}{1.8 - 0,1} = 0.037037 \qquad (12)$$

Thus, during the transition to a post-oil era, in accordance with Harrod model “guaranteed rate of growth in Azerbaijan must be equal to 3.7%.

6. DISCUSSION OF OUTCOMES

The rate of short-term balanced economic growth was determined for oil boom and post-oil era based on the evaluation of the equality of aggregate demand and supply. In accordance with both the Domar and Harrod models, the rate of balanced economic growth during the post-oil era was lower than in the oil boom period. As shown in Domar model, the rate of dynamic balanced economic growth was 6.5 during the oil boom, and it was 2% during the post-oil era. According to the Harrod model, the guaranteed growth rates were 11.7 and 3.7 respectively in the two eras. The GDP growth rate between 2000 and 2013 was 12%, and it was 0.9% between 2014 and 2017. As we see, GDP growth rate was higher than the rate of guaranteed balanced growth during the oil boom, but it was lower in the post-oil era. A higher rate of balanced growth of Domar model as compared to the guaranteed growth rate was a result of the the difference between the value of productivity of capital and the accelerator.

In accordance with Domar model, the balanced growth rate is $\sigma * S_y$, but in accordance with the Harrod model guaranteed growth rate is $\frac{S_y}{\alpha - S_y}$

$$\sigma = \lim_{\Delta Y \to 0} \frac{\Delta REAL\_GDP}{\Delta K} \approx \frac{\Delta REAL\_GDP}{\Delta K}$$

or

$$\Delta K_t = \frac{1}{\sigma} \Delta REAL\_GDP_t,$$

$$REAL\_INVEST_t = (K_t - K_{t-1}) = \Delta K_t = \frac{1}{\sigma} \Delta REAL\_GDP_t.$$

If we compare this equality with the equality in Harrod model, $INVEST_t = \alpha * (REAL\_GDP_t - REAL\_GDP_{t-1})$, we have $\frac{1}{\sigma} = \alpha$. In other words, the value of productivity of capital is opposite of the accelerator. The growth rate of the Domar model.

$$\sigma^* S_y = \frac{1}{\alpha} S_y \ , \quad 0< S_y <1,$$

In accordance with the Harrod model, the growth rate is

$$\frac{1}{\alpha - S_y} S_y \ , 0< S_y <1$$

If we compare the two models, because $\frac{1}{\alpha} < \frac{1}{\alpha - S_y}$ we can infer the following inequality $\frac{1}{\alpha} S_y < \frac{1}{\alpha - S_y} S_y$.

In other words, the rate of guaranteed balanced growth in accordance with the Harrod model must be higher than the rate of balanced growth in accordance with the Domar model. This outcome was reflected in the results of Domar and Harrod models assessmend using the official statistical data on the Azerbaijan's economy.

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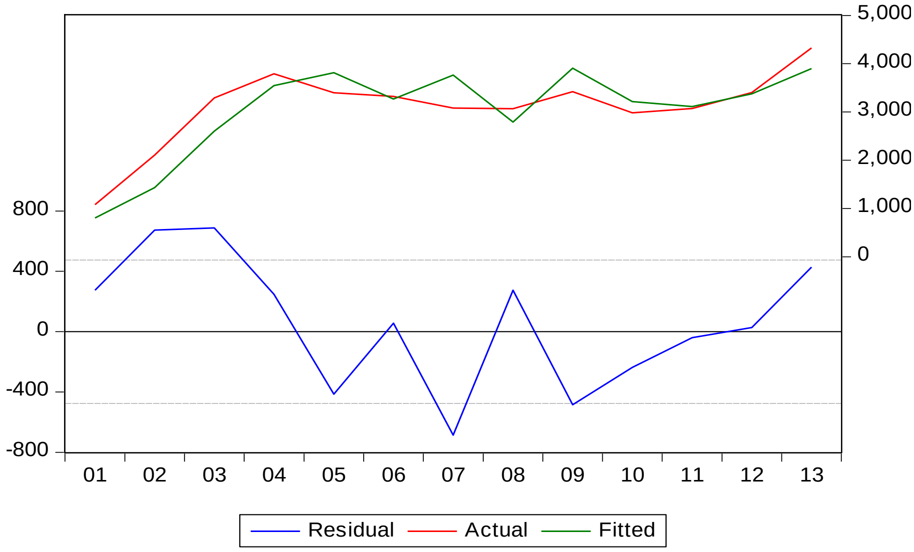
http://www.undp.org/content/dam/azerbaijan/docs/publications/sustainabledevelopment/

Appendıx 1

Estimation Command:
LS(DERIV=AA) R_SAVING REAL_GDP MA (1) AR (1)
Estimation Equation:
REAL_SAVING=C(1)*REAL_GDP+[AR(1)=C(2),MA(1)=C(3),BACKCAST=2001,ESTSMPL ="2001 2013"]
Substituted Coefficients:
REAL_SAVING=0.205133092015*REAL_GDP[AR(1)=0.754837146075,MA(1)=0.888578691287, BACKCAST=2001,ESTSMPL="2001 2013"]

Dependent Variable: REAL_SAVING				
Method: Least Squares				
Date: 07/02/17 Time: 02:47				
Sample (adjusted): 2001 2013				
Included observations: 13 after adjustments				
Convergence achieved after 18 iterations				
MA Backcast: 2000				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
REAL_GDP	0.205133	0.049011	4.185458	0.0019
AR (1)	0.754837	0.210021	3.594099	0.0049
MA (1)	0.888579	0.158206	5.616610	0.0002
R-squared	0.696393	Mean dependent var		3104.692
Adjusted R-squared	0.635672	S.D. dependent var		787.7870
S.E. of regression	475.5051	Akaike info criterion		15.36581
Sum squared resid	2261051.	Schwarz criterion		15.49618
Log-likelihood	-96.87774	Hannan-Quinn criteria.		15.33901
Durbin-Watson stat	1.471227			
Inverted AR Roots	.75			
Inverted MA Roots	-.89			

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	1.652667	Prob. F (1,11)		0.2250
Obs*R-squared	1.698035	Prob. Chi-Square (1)		0.1925
Scaled explained SS	0.504354	Prob. Chi-Square (1)		0.4776
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 07/02/17 Time: 02:50				
Sample: 2001 2013				
Included observations: 13				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	314693.6	119958.8	2.623348	0.0237
REAL_GDP	-10.34300	8.045511	-1.285561	0.2250
R-squared	0.130618	Mean dependent var		173927.0
Adjusted R-squared	0.051583	S.D. dependent var		181384.8
S.E. of regression	176644.6	Akaike info criterion		27.14231
Sum squared resid	3.43E+11	Schwarz criterion		27.22922
Log-likelihood	-174.4250	Hannan-Quinn criter.		27.12444
F-statistic	1.652667	Durbin-Watson stat		2.460090
Prob(F-statistic)	0.225001			

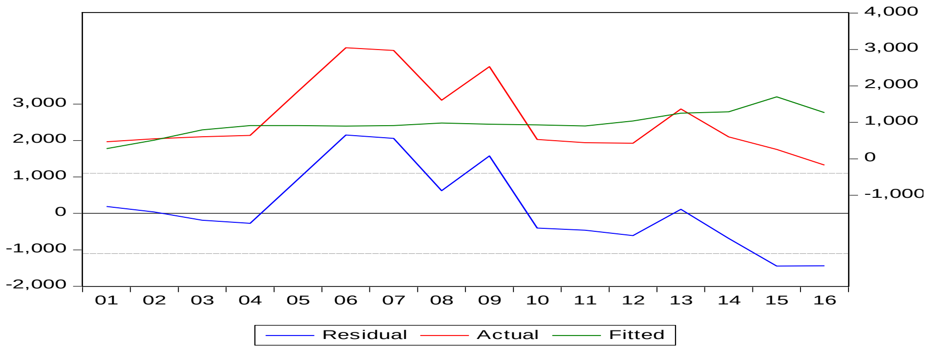


Null Hypothesis: RESID03 has a unit root				
Exogenous: None				
Lag Length: 0 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.568190	0.0152
Test critical values:	1% level		-2.771926	
	5% level		-1.974028	
	10% level		-1.602922	
*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 12				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(RESID03)				
Method: Least Squares				
Date: 07/02/17 Time: 02:48				
Sample (adjusted): 2002 2013				
Included observations: 12 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID03(-1)	-0.774627	0.301624	-2.568190	0.0261
R-squared	0.374480	Mean dependent var		12.69019
Adjusted R-squared	0.374480	S.D. dependent var		549.7592
S.E. of regression	434.8035	Akaike info criterion		15.06732
Sum squared resid	2079595.	Schwarz criterion		15.10773
Log-likelihood	-89.40392	Hannan-Quinn criteria.		15.05236
Durbin-Watson stat	2.014829			

Appendix 2

Estimation Command:
LS D(REAL_GDP) REAL_INVEST
Estimation Equation:
D(REAL_GDP) = C (1) *REAL_INVEST
Substituted Coefficients:
D(REAL_GDP) = 0.242165079471*REAL_INVEST

Dependent Variable: D(REAL_GDP)				
Method: Least Squares				
Date: 05/05/17 Time: 13:57				
Sample (adjusted): 2000 2013				
Included observations: 14 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
REAL_INVEST	0.242165	0.065306	3.708145	0.0021



Appendix 3

Estimation Command:
LS REAL_INVEST D(REAL_GDP)
Estimation Equation:
REAL_INVEST = C (1) *D(REAL_GDP)
Substituted Coefficients:
REAL_INVEST = 1.95418472519*D(REAL_GDP)

Dependent Variable: REAL_INVEST				
Method: Least Squares				
Date: 05/05/17 Time: 14:35				
Sample (adjusted): 2000 2013				
Included observations: 14 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REAL_GDP)	1.954185	0.406420	4.808290	0.0003

Appendix 4

GDP of Azerbaijan between 2000 and 2017 and dynamics of indicators characterizing its growth

Years	GDP (million manats)	GDP growth in percentage in comparison with the previous year	Average Growth	Deflator of GDP in percentage in comparison with the previous year
2000	4718,1	11,1	11,97143	112,5
2001	5315,6	9,9		102,5
2002	6062,5	10,6		103,1
2003	7146,5	11,2		106,0
2004	8530,2	10,2		108,4
2005	12522,5	26,4		116,1
2006	18746,2	34,5		111,3
2007	28360,5	25,0		121,0
2008	40137,2	10,8		127,8
2009	35601,5	9,3		81,2
2010	42465,0	5,0		113,6
2011	52082,0	0,1		122,5
2012	54743,7	2,2		102,9
2013	58182,0	1,3		100,4
2014	59014,1	1,2	0,9	98,7
2015	54380,0	1,2		91,1
2016	60393,6	1,1		114,7
2017	70135,1	0,1		