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Analysis of the oil, price and currency factor of economic growth in Azerbaijan

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Economics View project
ANALYSIS OF THE OIL, PRICE AND CURRENCY FACTOR OF ECONOMIC GROWTH IN AZERBAIJAN

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Abstract. The article examines the main macroeconomic indicators of the Azerbaijani economy, including GDP, GNI, CPI, exchange rate, fixed assets, investments, etc. Using statistical data of 2000–2016, the main factors influencing oil production and dependence on oil prices are determined, and econometric equations (models) are established and evaluated. In addition, the same macroeconomic indicators, combined with oil production factors and oil prices, created a complex regression equation that reflects the dependence of manat on the dollar and the CPI. Meanwhile, all the data were compared both with the previous year, and with the base year (2000=100). The statistical significance of the regression and correlation parameters in the models was calculated using the EViews 9, PASW Statistics 18 and Gretl software packages for each parameter (Sig. p<0.001, p<0.01, p<0.05) for each parameter. An economic interpretation of obtained results is provided.

Keywords: CPI, GDP, GNI, exchange rate, econometric models

I. Introduction

In general, as in the whole world, the calculation of macroeconomic indicators in Azerbaijan and the identifying factors that influence them are of great importance, and significance of this research is emphasized. The key issue is found out how the economic development of the state, estimated by Gross Domestic Product (GDP), Gross National Income (GNI), Consumer Price Index (CPI), exchange rate, volume of investments, etc. depends from accurately selected and properly assessed impacting factors. At this time, many tools of economic, statistical and
econometric analysis can be used. The economic development of the world economy and its position in the world economy are determined by goods, services and resources that have a definite and relative advantage over the world market. From this point of view, Azerbaijan exports to the world market a hydrocarbon (oil and oil products), its richest natural resource. Naturally, its economy depends on market positions, market supply and world market prices for these products. As in these countries, the exchange rate of the national currency of Azerbaijan's manat depends on the world cost of these resources and the volume of production in Azerbaijan.

2.1. Literature review

Classic theories claim the economic development of any country has been influenced by physical and human capital (Solow 1956; Romer 1986; Lucas 1988). Besides those basic drivers of development, economic development is affected by array of other factors, such as institutional, legal, demographic, geographical, social and economic and political factors (e.g. Barro, 1999, 2003; Sachs and Warner, 1997; Burnside and Dollar, 2000, Easterly and Wetzel, 1989; Barro, 1990; Barro and Sala–i–Martin, 1992; Tvaronavičienė, Razminienė 2017; Mishenin et al., 2018; Mishenin et al., 2018; Kiseľáková et al., 2018).


2.2. Influence of currency rate to macroeconomic indicators

By De Grauwe and Schnabl (2008) the impact of the economic growth rates of the fixed exchange rate in 18 states of Southeast and Central Europe in 1994–2004 was examined with the help of the Dollar (1992), Easterly and Levin (1997), De Grauve and Schnabl 2008) examined the relationship between economic growth and the exchange rate. After the World War II, many countries in the world have initially introduced a more aggressive economic policy to increase the real GDP (Crafts, 2000). Mlambo and Oshikoya reviewed macroeconomic developments in Africa in terms of real GDP growth and the real exchange rate. Many economists studied macroeconomic indicators, e.g. inflation in GDP (Dunis and Triantafyllidis 2003, Wadhwani, 1986), the exchange rate (Goudie and Meeks, 1991). Ismikhan M. (2003) used inflation to determine the index of macroeconomic instability in Turkey, the ratio of external debt to GDP, the rate of budget deficit to GDP and the exchange rate. At the same time, Sánchez–Robles (2006) concluded that one of the factors causing macroeconomic instability in Spain in 1962 – 1995 is inflation. Kaneko and Lee (1995) outlined 8 factors among the factors affecting stock markets between the US and Japan, including oil prices, inflation and exchange rate fluctuations.

International financial shocks or crises depend on the exchange rate of economic systems and macroeconomic indicators (Dornbusch, 1976, Frankel, 1979, Bilson, 1981, Fama, 1984, Olivei, 2002, Campa and Goldberg, 2005, Cunado and De Gracia, 2005, Gehrke and Yao, 2013, Chang and Su, 2014, Gehrke and Yaob, 2014, Audzei and Brázdik, 2015). At the same time, when analyzing the effect of exchange rate fluctuations (Blomberg et al., 2005), it was concluded that in economic systems with a huge manufacturing industry, there are some changes in the exchange rate and the choice of currency.

Faia and Iliopoulos (2010) reviewed exchange rate relations and noted that an optimal fiscal policy requires a stable exchange rate to move from fixed rates. Parveen et al. (2012) reported that inflation is a key factor affecting
the exchange rate, while Macdonald and Ricci (2004) found that real commodity prices rose 1% due to an increase of about 0.5% of the real exchange rate. Khan et al. (1996) stressed the importance of the exchange rate in determining inflation growth. Choudhri and Khan (2002), Hyder and Shah (2005), Feenstra (1989); Olivey (2002) and Kampa and Goldberg (2005) studied the relationship between inflation and exchange rate both at the exchange rate and at the exchange rate.

2.3. Oil price and economic increase


Moreover, Lőschel and Ulrich (2009) concluded that the change in oil prices between 1973 and 2008 affected the German labor market and led to an increase in unemployment. In most research in which change of oil price in industrialized countries was studied, it was concluded that GDP growth rate and salary was decreasing during the oil crisis, which leads to inflation. However, the results of Blanchard and Gali (2008) were completely opposite, which meant that Japan's GDP did not decrease with the impact of oil price shock, but rather increased and could not find the reason. Tian (2010) also studied the impact of oil prices on Japan's GDP in 1984–2007.

Francois and Mignon (2008) drew attention to the relationship between oil prices and macroeconomic performance in the three OECD countries, oil importing countries and oil exporting countries.

Nagy and Al–Awadi, Mohammad (2001) concluded that, as a major oil exporter between 1984 and 1988, the impact of oil prices on Kuwait's economy was highly dependent on oil and key macroeconomic indicators. Philip and Akinye (2006) published articles in Nigeria during the period 1970–2003 at real oil prices, the consumer price index, the real exchange rate, the five – step model reflecting real GDP, the real exchange rate of fluctuations in prices on oil and investigated the impact on money supply, inflation and said that, along with oil prices, the impact of money supply and the real exchange rate on its influence also affects economic activity. Oil prices have concluded that the impact on inflation and production is low. Marcel (2011) noted that the change in oil prices in Indonesia between 1990–2008 and 1998–2008 was heavily dependent on the impact of consumption and investment in the public sector, and Afia (2008) found that oil prices in Pakistan have a non – linear impact on production.

Katsuya (2008) studied the impact of oil prices and monetary and credit shocks on the level of real GDP and inflation in Russia in 1997–2007. He also noted that the impact of monetary shocks on the economy is stronger than the shock of oil prices. This contradicts the report of Hamilton and Henry (2004). The situation in Iran was
somewhat different. According to Mohammad and Gunther (2008), Iran's main revenues are oil exports, its price fluctuations are strong in the economy, macroeconomic indicators and GDP. That is, the positive impact of rising oil prices on the economy has a negative impact.

Turning to one of the industrialized countries, Hilde (2009) found that Norway's economy responded to higher oil prices with an increase in aggregate wealth and aggregate demand. Moreover, the impact of oil price fluctuations on the economy of South Korea and macroeconomic indicators that are gradually developing and in accordance with the developed economy of the IMF were analyzed by Rumi et al., (2010). Considering the impact of oil prices on the economy and the strategic importance of these changes, he observed his influence on industrial production and interest rates and came to the conclusion that the stock market is more likely to be affected, but only to quickly adjust the balance.

Determining the impact of oil price fluctuations on China's economic activity and macroeconomic performance in recent years, Jing He (2005) found that, based on an analysis of macroeconomic indicators for 1999–2004, as oil prices depend on China's price system and, in general, price of imported oil product of economic system, the higher price is, the more negative influence is to it and economic activity.

Though it is noted that many economists reported on the impact of the above oil prices on many macroeconomic indicators in their work, but the impact of these prices on the exchange rate (Cunado and De Gracia, 2005), oil prices and exchange rates were clearly contradictory. Hutchison (1993), Hamilton (2008), Inenez – Rodriguez and Sanchez (2005) investigated the impact of oil prices on the exchange rate for the economy. Chaudhuri and Daniel (1998), Amano and Norden (1998), Rautava (2007), Dawson (2007), Al–Mulli et al. (2010), Ito (2010), Ghosh (2011) studied the relationship between exchange rates and oil prices in individual countries and concluded that there was a close relationship between them.

3. Results

3.1. Macroeconomic review

GDP in the period of oil boom 2014 reached to its high level. In that year it reached to 59014.1 million manat and increased by 27.7 times compared to 1995, 12.5 times compared to 2000, 4.7 times compared to 2005, 1.3 times compared to 2010. This indicator in dollars was as following: increased by 31.2 times compared to 1995, 14.3 times compared to 2000, 5.7 times compared to 2005, 1.5 times compared to 2010, 75234.7 million dollars. For certain reasons GDP in manat decreased by 7.9% compared to 2014 in 2015 and increased by 2 % compared to 2014 in 2016. However, this indicator was different in dollars: it decreased by 30.6 % compared to 2014 in 2015 and by 49.8 % compared to 2014 in 2016 (Fig.1).
As far as we know GDP increased by 5.1% in 2012 compared to previous, 6.2% in 2013 compared to previous, 1.4% in 2014 compared to previous, decreased by 7.9% in 2015 compared to previous and increased by 11.1% in 2016 compared to previous.
If we take a look at indicators of gross domestic income last 15 years it is clear that salary of employees reached to 10965.0 million manat in 2015, it was 22.7 times as much as in 1995, 10.7 times as much as in 2000, 3.9 times as much as in 2005, 1.6 times as much as in 2010, 1.0 times as much as in 2014.

However, decrease in rate of exchange of local manat 2 times caused to decrease in amount of salary of employees, production and import taxes, salary of the rest world, the whole composition of gross domestic income except of production of main funds by 1.2‒20.1% in 2015 (Fig.2).

Let’s have a look at the economic operation account of the rest world. As this operation is related to oil export and world price of oil the maximal indicator of the study 2011 was recorded. Export of goods and service in foreign trade account of goods and service reached to 29388.3 million manat in 2011, it was 42.3 times as much as in 1995, 15.5 times as much as in 2000, 3.7 times as much as in 2005, 1.2 times as much as in 2010, but decreased by 2.5% in 2012, 5.1% in 2013, 13.2% in 2014, 30.01% compared to 2015, foreign trade balance reached to 16846.4 million manat in 2011 (in 1995 import was 446.5 million manat more than export), it was 199.1 times as much as in 2000, 13.3 times as much as in 2005, 1.17 times as much as in 2010, however, decreased by 11.1% in 2012, 23.5% in 2013, 40.3% in 2014, 90.03% in 2015 compared to 2011. The reason for decrease in the balance was the increase in the import of goods and service in a row.

Analyzing the socio-economic situation in the country, it is obvious that the trend towards GDP growth slowed down the rapid growth in 2011. But actual final consumer spending continued to grow in the aggregate. Almost 61.2% of actual final consumption expenditure and gross crop in 2012 increased by 12.3% compared to 2011 due to GDP and net exports growth of 38.8%, and in 2013, 60.3% of the growth rate of 14.4% compared to 19.9% in 2014 due to GDP growth and 39.7% of net exports, compared with 9.2% in 2014, GDP growth was 80.1%, and net exports decreased by 6.6% in 2015 to 100.0% of net exports. Considering the dynamics of GDP growth, it can be argued that the decline in GDP since 1987 slowed in 1995‒1996. The 1987‒1989 level was at the level of 2005‒2006 with the level of 1990‒1991. In 2005, the level of 1992 reached its level in 2003, from 1993 to 2001, to the level of 1994, and since 1998 this growth has been sustainable (Table 1).

### Table 1. Dynamics of gross domestic product

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Deposits of the population also continued to grow during the period of economic development. But for some reason, this growth has been observed in recent years with fluctuations. Thus, in 2014 compared to 2013, 32.5% of growth was 12.5% in foreign currency and 67.5% in national currency. In 2015, an increase of 31.7% compared with 2014 was due to an increase in deposits in foreign currency. 56.7% growth in 2.9 times in foreign currency offset the decline in savings in the national currency, and 43.3% led to an increase in overall economy of the population. The decrease of 21.7% in 2016 compared to 2015 was due to a decrease in savings in foreign currency. A significant increase in deposits in national currency allowed covering 4.7% of deposits in foreign currency. The above – mentioned price remains for oil, as our economy is oriented to export of raw materials, and manat is directly connected with the psychological factor.
Investments from all sources (including foreign investments) in 2009 amounted to 21.5% in national currency, 19.7% in US dollars, 21.9% of foreign investments in manat, 20.2% in US dollars, 21.1% %, a decrease of 19.5% in US dollars, 8.5% in national currency in 2015, 30.0% in US dollars, an increase in foreign investment by 19.9% in US dollars, 8.5% in dollars, domestic investment decline of 29.8% and a decrease in the dollar rate by 45.5% is due to a sharp drop in oil prices by 2‒3 times. The increase in manat in 2016 and in 2015 may be due to a change in the exchange rate.

Credit investments into the economy also rapidly increased by 2015. Thus, reaching to 21730.4 million manat in 2015, it increased by 46.6 times, 15.1 times in 2005, 2.3 times in 2010, reaching to 5279.3 million manat in 2000 short – term credits increased by 15.7 times in 2000, 5.8 times in 2005, 2.1 times in 2010, and reaching to 16433 in 2015 long – term credits increased by 126.5 times in 2000, 31.1 times in 2005, 2.5 times in 2010. However, the decrease in 2016 occurred. Credit investments decreased by 25.5%, short – term credit by 35.5%, long – term credit by 21.1%. 25.5 decrease in gross credit investment is due to decrease in short – term credits 65.5% and long – term credits 34.5%.

Table 2. Major capital investments in the oil and non – oil sector

<table>
<thead>
<tr>
<th>Gross</th>
<th>Oil sector</th>
<th>Non – oil sector</th>
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<tbody>
<tr>
<td>thousand manat</td>
<td>Net weigh, in percent</td>
<td>thousand manat</td>
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<tr>
<td>2000</td>
<td>967821.1</td>
<td>100.0</td>
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<tr>
<td>2001</td>
<td>1170820.3</td>
<td>100.0</td>
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<td>2002</td>
<td>2106976.7</td>
<td>100.0</td>
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<tr>
<td>2003</td>
<td>3786366.7</td>
<td>100.0</td>
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<tr>
<td>2004</td>
<td>4922755.9</td>
<td>100.0</td>
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<tr>
<td>2005</td>
<td>5769876.3</td>
<td>100.0</td>
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<tr>
<td>2006</td>
<td>6234483.7</td>
<td>100.0</td>
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<tr>
<td>2007</td>
<td>7471189.9</td>
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<tr>
<td>2008</td>
<td>9944153.8</td>
<td>100.0</td>
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<tr>
<td>2009</td>
<td>7724944.8</td>
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<tr>
<td>2010</td>
<td>9905665.8</td>
<td>100.0</td>
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<tr>
<td>2011</td>
<td>12799061.3</td>
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<tr>
<td>2012</td>
<td>15407274.4</td>
<td>100.0</td>
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<tr>
<td>2013</td>
<td>17850815.7</td>
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<td>2014</td>
<td>17618601.1</td>
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<td>2015</td>
<td>15957082.2</td>
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Gross foreign investments in 2016 increased by 10.9 times compared to 2000, by 2.1 times compared to 2005, by 2.1 times compared to 2010, financial credits in 2016 increased by 8.3 times compared to 2000, by 3.1 times compared to 2005, decreased by 35.5% compared to 2010, investment to oil industry in 2016 increased by 10.3 times compared to 2000, by 1.5 times compared to 2005, 1.9 times compared to 2010, investment to invested joint and foreign enterprises in 2016 increased by 14.5 times compared to 2000, 7.5 times compared to 2005, 2.9% times compared to 2010, other investments increased by 3.9 times compared to 2005 and decreased by 49.8% compared to 2010. But since 2012, these investments began to decline.

Despite the foregoing, it can be said that the experience of developed foreign countries proves that only market principles for regulating socio ‒ economic processes can not guarantee a high level of prosperity for all its participants. As it turns out, the income of various groups of the population in market systems depends on their production factors, their availability, supply and demand for these factors. This is a fair market regulation.
However, in terms of social justice, the crisis of the market system of social and economic regulation was hidden here.

3.2. Econometric analysis

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<th>Table 3. Econometric models</th>
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<td>CPI</td>
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<td>Initial Income</td>
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<td>GDP – euro</td>
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<td>GDP Per Person – manat</td>
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<td>GDP Per Person – dollar</td>
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<td>GDP Per Person – Euro</td>
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<td>GNI – manat</td>
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<td>GNI Per Person – manat</td>
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Note: 1. (t – stat); 2. * p<0.05; ** p<0.01; *** p<0.001.
Let’s look through econometric model established in order to determine dependence of main macroeconomic indicators on oil formation and oil price (Fig.3.). Compared with previous years, models show that the model has economic sense and is statistically significant, which reflects the dependence of gross domestic product on oil and gas prices, oil prices and oil production. These models also fluctuated $0.80191 < R^2 < 0.85230$. Coefficients $p < 0.05; p < 0.01; p < 0.001$. It can be attributed only to the level of GDP per capita, either in dollars or in euros. Thus, here also $0.80383 < R^2 < 0.85366$ and the coefficients $p < 0.05; p < 0.01; p < 0.001$. Then the models of dependence on gross national income, both in manats, and in dollars and euros, depend on oil prices and oil production. It is true that $R^2$ is slightly lower and $0.750158 < R^2 < 0.808995$. However, there were statistically significant indicators of oil and
Oil production. p<0.05; p<0.01; p<0.001. Such a case can be attributed to the models of the price of oil and oil dependence of the gross national income, both in manats, in dollars and in euros per capita. These models also have economic and statistical significance. These models are slightly lower than the gross domestic product $R^2$, which ranges from 0.75367<$R^2$<0.81142. In these models, the coefficients of oil and oil production are statistically significant p<0.05; p<0.01; p<0.001. In the primary population income model is p<0.05; p<0.01; p<0.001 and $R^2$=0.417973. There is no doubt about the economic significance and statistical significance of the CPI, neither key assets, nor investment models for oil prices, and dependence on oil production. In these models are responded p<0.05; p<0.01 p<0.001 in separately. From this point of view, a less important factor was removed from the model. Here $R^2$ is very low. Thus, the models indicated the dependence of oils and oil prices on fixed assets were 0.43241<$R^2$<0.51507. It is slightly more difficult to look at oil prices and oil dependence models. Here, p<0.001 condition is not satisfied at all, p<0.05 and p<0.01 are satisfied individually. From this point of view, a less important factor was removed from the model. Here $R^2$ is very low. Thus, the models for the dependence of prices on oil and base oils were 0.22211<$R^2$<0.29921. CPI depends on oil prices and p<0.001 for fixed quantities. The condition p<0.01 is not satisfied in full. p<0.05 is satisfied once. In these models, $R^2$ is very small (0.20879<$R^2$<0.22712). US dollar and euro exchange rates in US dollars are based on oil prices and oil production dependence models at p<0.001 for a fixed amount, but only once in the price of oil. The condition p<0.01 is separated. Although the dependence models at the exchange rate of the dollar are 0.26081<$R^2$<0.22815, the exchange rate of the manat for the euro cannot be related to oil prices and dependence on oil production (Table 3). But this is not so. Like all macroeconomic indicators, the manat exchange rate for both the dollar and the euro depends on oil prices and oil production (perhaps even more). Simply, the Central Bank for a long time maintained a stable exchange rate (with intervention) in the foreign exchange market and did not allow its natural fluctuations.

### Table 4. Econometric models

<table>
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<th>const</th>
<th>Oil production</th>
<th>Oil price</th>
<th>$R^2$</th>
<th>F</th>
<th>P – (F)</th>
<th>DW</th>
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<tr>
<td>CPI</td>
<td>54.2635</td>
<td>0.503687**</td>
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<td>0.762184</td>
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<td>0.000043</td>
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<td>(1.044)</td>
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<td>GDP – manat</td>
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<td>GDP – dollar</td>
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<td>2.58616***</td>
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<td>F(2.14)</td>
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<td>(-3.179)</td>
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<tr>
<td>GDP – euro</td>
<td>-224.647*</td>
<td>1.62956**</td>
<td>1.48177**</td>
<td>0.804074</td>
<td>F(2.14)</td>
<td>4.51e-07</td>
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<td>(2.472)</td>
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<td>GDP Per Person</td>
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<td>0.149399</td>
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<td>– manat</td>
<td>(-1.142)</td>
<td>(2.971)</td>
<td>(0.188)</td>
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<td>27.09897</td>
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<td>GDP Per Person</td>
<td>-159.306</td>
<td>2.73844***</td>
<td>0.643697</td>
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<td>0.00107</td>
<td>0.240612</td>
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<tr>
<td>– manat</td>
<td>(-1.166)</td>
<td>(5.206)</td>
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<td>10.88539</td>
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<tr>
<td>GDP Per Person</td>
<td>43.433</td>
<td>2.00077***</td>
<td>0.420523</td>
<td>F(1.15)</td>
<td>0.004866</td>
<td>0.272945</td>
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<tr>
<td>– dollar</td>
<td>(0.2838)</td>
<td>(3.299)</td>
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<td>10.58539</td>
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<tr>
<td>GDP Per Person</td>
<td>319.654***</td>
<td>1.72431***</td>
<td>2.25587***</td>
<td>0.903144</td>
<td>F(2.14)</td>
<td>8.00e-08</td>
<td>0.346882</td>
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<tr>
<td>– dollar</td>
<td>(-3.500)</td>
<td>(3.055)</td>
<td>(4.421)</td>
<td></td>
<td>65.27235</td>
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</table>
The base year 2000 was adopted, and the main macroeconomic indicators, oil production and oil prices dependence for determining established econometric models (Fig. 4). It is clear that the gross domestic product in currency, dollar and euro and oil price growth and oil production in reflects the model's interdependence with some variables have a certain economic meaning and are statistically significant. In these models fluctuated 0.579630×R²<0.875995. The sums were calculated for individual models at p<0.05; p<0.01; p<0.001. This is especially noticeable in the models of the dollar and euro. It can be attributed only to the level of GDP per capita, either in dollars or in euros. Thus, here also 0.42052×R²<0.90314 and the coefficients p<0.05; p<0.01; conditions p<0.001 are satisfied individually, and the strongest dependence is observed in the dollar model (Table 4).

Then the models of dependence on gross national income, both in manats, and in dollars and euros, depend on oil prices and oil production. It is true that the R² limit for these models is somewhat lower, but the upper limit is

<table>
<thead>
<tr>
<th>GDP Per Person – euro</th>
<th>-179.106**</th>
<th>1.35766**</th>
<th>1.28188**</th>
<th>0.837073</th>
<th>F(2.14)</th>
<th>3.05e – 06</th>
<th>0.318880</th>
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<td></td>
<td>(−2.218)</td>
<td>(2.719)</td>
<td>(2.840)</td>
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<tr>
<td></td>
<td>1S= manat</td>
<td>115.999***</td>
<td>0.116276</td>
<td>-0.17910**</td>
<td>0.362403</td>
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<td>(9.666)</td>
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<tr>
<td></td>
<td>1S= manat</td>
<td>125.156***</td>
<td>-0.0973893***</td>
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<td>5.012998</td>
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<tr>
<td>1euro= manat</td>
<td>112.545***</td>
<td>-0.0399842</td>
<td></td>
<td>0.034500</td>
<td>F(1.15)</td>
<td>0.535994</td>
<td>0.475382</td>
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<td>(7.935)</td>
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<td>1euro= manat</td>
<td>116.523***</td>
<td>0.191266**</td>
<td>-0.125600</td>
<td>0.230495</td>
<td>F(2.14)</td>
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<td>(7.677)</td>
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<td>1euro= manat</td>
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<td>1euro= manat</td>
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<td>GNI– dollar</td>
<td>-368.914**</td>
<td>1.67995*</td>
<td>2.70574***</td>
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<td>4.51e – 06</td>
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<td>(−2.732)</td>
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<td>GNI – euro</td>
<td>-213.863*</td>
<td>1.27320</td>
<td>1.67401**</td>
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<td>GNI – euro</td>
<td>-133.994</td>
<td>2.60310***</td>
<td>0.732545</td>
<td>F(2.13)</td>
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<td>GNI – euro</td>
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<td>GNI Per Person – manat</td>
<td>-233.325**</td>
<td>1.70445**</td>
<td>1.60006**</td>
<td>0.836653</td>
<td>F(2.13)</td>
<td>7.68e – 06</td>
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<td>(−2.221)</td>
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<td>(2.440)</td>
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<td>GNI Per Person – dollar</td>
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<td>GNI Per Person – euro</td>
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<td>1.38988**</td>
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<td>-0.207976</td>
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<td>(2.368)</td>
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<td>Investments</td>
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<td>1.86882</td>
<td>0.621462</td>
<td>F(2.14)</td>
<td>11.49219</td>
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<td>(1.860)</td>
<td>(1.277)</td>
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<td>Investments</td>
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Note: 1.(t – stat); 2. *p<0.05; **p<0.01; ***p<0.001;
somewhat lower and is $0.68553 < R^2 < 0.84948$. However, there were statistically significant indicators of oil and oil production. p < 0.05; p < 0.01; conditions p < 0.001 are satisfied on both models on some models and on some models separately. Such a case can be attributed to the models of the price of oil and oil dependence of the gross national income, both in manats, in dollars and in euros per capita. These models also have significant and statistical significance. The upper limit of $R^2$ for these models is slightly higher than the growth model for gross domestic product and is $0.806937 < R^2 < 0.875268$. In these models, the coefficients of oil and oil production are statistically significant p < 0.05; p < 0.01; p < 0.001. On the models of dependence of CPI oil prices and oil production p < 0.05; p < 0.01 p < 0.001 and 0.45552 < $R^2 < 0.73326$. For population incomes, p < 0.05; p < 0.01; conditions p < 0.001 were satisfied on both models on some models and on some models separately and amounted to 0.37867 < $R^2 < 0.57905$. The models of dependence on the basic prices for oil and natural gas and oil prices also have economic meaning and statistical significance. Thus, in the models of the main fund, p < 0.05; the terms p < 0.01 p < 0.001 are satisfied separately. On this point less, significant factor was removed from the model. $R^2$ is rather low here. Thus, in the model on dependence of main funds on oil price and oil production was nearly 0.27215 < $R^2 < 0.52301$. It is observed a bit better situation in the model on dependence of volume of investment on oil price and oil production. Here p < 0.05; p < 0.01; and p < 0.001 conditions were satisfied separately. On this point, less significant model was removed from the factor. $R^2$ is rather in normal level. It was between 0.52301 < $R^2 < 0.621462$. In the model on dependence of dollar rate and euro rate to manat on oil price and oil production p < 0.05; p < 0.01 condition is responded to constant quantity. p < 0.05 and p < 0.01 are satisfied separately. In the model on dependence of manat rate to dollar is 0.03450 < $R^2 < 0.362403$, to euro is 0.00205 < $R^2 < 0.23049$ (Table 4). Consequently, these models also show that the manat does not depend on the dollar and the euro's exchange rate on oil prices and dependence on oil production. In fact, as we have already seen, this is not so. Like all macroeconomic indicators, the manat exchange rate for both the dollar and the euro depends on oil prices and oil production (perhaps even more). Simply, the Central Bank for a long time maintained a stable exchange rate (with intervention) in the foreign exchange market and did not allow its natural fluctuations.

### Table 5. Comparative to the previous year

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<th>Model</th>
<th>const</th>
<th>Consumer Price Index</th>
<th>IS= manat</th>
<th>Oil production</th>
<th>Oil price</th>
<th>$R^2$</th>
<th>F</th>
<th>P – (F)</th>
<th>DW</th>
</tr>
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<td><strong>Initial Income</strong></td>
<td>−17.5030</td>
<td>1.6575***</td>
<td>−0.237386*</td>
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<td>(−1.1512)</td>
<td>(4.394)</td>
<td>(−1.805)</td>
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<td>(0.569)</td>
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<td><strong>GDP– Manat</strong></td>
<td>−105.595***</td>
<td>1.13132***</td>
<td>0.05577</td>
<td>0.54534***</td>
<td>0.36262*</td>
<td>0.92369</td>
<td>F(4. 12)</td>
<td>1.29e – 06</td>
<td>1.742967</td>
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<td>(−3.589)</td>
<td>(3.202)</td>
<td>(4.328)</td>
<td>(4.988)</td>
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<td><strong>GDP – dollar</strong></td>
<td>−72.6404</td>
<td>1.10451*</td>
<td>−0.31778**</td>
<td>0.620103***</td>
<td>0.544644**</td>
<td>0.91631</td>
<td>F(4. 12)</td>
<td>2.23e – 06</td>
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<tr>
<td><strong>GDP Per Person – manat</strong></td>
<td>101.469**</td>
<td>1.08882***</td>
<td>0.0607734</td>
<td>0.538748***</td>
<td>0.360213**</td>
<td>0.92441</td>
<td>F(4. 12)</td>
<td>1.22e – 06</td>
<td>1.719496</td>
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<tr>
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<td>(−3.545)</td>
<td>(3.153)</td>
<td>(0.505)</td>
<td>(5.041)</td>
<td>(5.151)</td>
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<tr>
<td><strong>GDP Per Person – Dollar</strong></td>
<td>−69.3647</td>
<td>1.06253*</td>
<td>−0.500444**</td>
<td>0.612458***</td>
<td>0.539937***</td>
<td>0.91630</td>
<td>F(4. 12)</td>
<td>2.23e – 06</td>
<td>1.534900</td>
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<td>(−1.662)</td>
<td>(2.120)</td>
<td>(2.864)</td>
<td>(3.949)</td>
<td>(5.322)</td>
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<tr>
<td><strong>GNI – manat</strong></td>
<td>−129.538***</td>
<td>1.49903***</td>
<td>0.124326</td>
<td>0.411032***</td>
<td>0.292460**</td>
<td>0.90689</td>
<td>F(4. 11)</td>
<td>26.78688</td>
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<td>(−3.116)</td>
<td>(3.851)</td>
<td>(0.517)</td>
<td>(3.417)</td>
<td>(3.642)</td>
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<tr>
<td><strong>GNI – dollar</strong></td>
<td>−132.305***</td>
<td>1.56792***</td>
<td>−0.179092</td>
<td>0.503294***</td>
<td>0.446029**</td>
<td>0.89402</td>
<td>F(4. 11)</td>
<td>23.19862</td>
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<td>(−2.343)</td>
<td>(2.966)</td>
<td>(0.548)</td>
<td>(3.801)</td>
<td>(4.089)</td>
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<tr>
<td><strong>GNI Per Person – manat</strong></td>
<td>−126.124***</td>
<td>1.45418***</td>
<td>0.131599</td>
<td>0.406219***</td>
<td>0.290310**</td>
<td>0.90785</td>
<td>F(4. 11)</td>
<td>27.09518</td>
<td>2.191801</td>
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<td>(−3.107)</td>
<td>(3.826)</td>
<td>(0.561)</td>
<td>(3.459)</td>
<td>(3.702)</td>
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<tr>
<td><strong>GNI Per Person – dollar</strong></td>
<td>−128.822***</td>
<td>1.52166***</td>
<td>−0.167989</td>
<td>0.497355***</td>
<td>0.442098**</td>
<td>0.89422</td>
<td>F(4. 11)</td>
<td>23.24943</td>
<td>1.887957</td>
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<td>(−2.323)</td>
<td>(2.930)</td>
<td>(0.523)</td>
<td>(3.100)</td>
<td>(4.127)</td>
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<tr>
<td><strong>Funds</strong></td>
<td>131.547***</td>
<td>−0.461149**</td>
<td>−0.001065</td>
<td>0.131672**</td>
<td>0.125283**</td>
<td>0.72949</td>
<td>F(4. 12)</td>
<td>0.002107</td>
<td>2.676491</td>
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<tr>
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<td>(9.309)</td>
<td>(−2.718)</td>
<td>(−0.048)</td>
<td>(2.508)</td>
<td>(4.433)</td>
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<tr>
<td><strong>Investments</strong></td>
<td>158.301</td>
<td>−1.54914</td>
<td>0.684843</td>
<td>−0.195161</td>
<td>0.743396**</td>
<td>0.41014</td>
<td>F(4. 12)</td>
<td>0.145770</td>
<td>1.236891</td>
</tr>
</tbody>
</table>

Note: 1. (t – stat); 2. *p<0.05; **p<0.01; ***p<0.001.
Now let’s look at the macroeconomic indicators of the past year, the consumer price index, the US dollar rate, the price of oil and dependence on oil production. In the model of population dependencies, only CPI (p<0.001) and $1/pounds (p<0.05) were statistically significant, and R²=0.777502. The gross domestic product – only 1 US dollar/manat in the manat model is statistically insignificant, and the other three factors are statistically significant (p<0.001) and R²=0.777502. The group of the domestic product is the consumer price index in the dollar model (p<0.05) (p<0.01), the price of oil (p<0.001) and oil production (p<0.001) are statistically significant, and R²=0.91631. The gross domestic product – $ per man for manat – is statistically unimportant and statistically significant (p<0.001) and R²=0.92441. Gross domestic product – dollar CPI (p<0.05) and other remaining factors are statistically significant (p<0.001) and R²=0.899402. $1/manat for gross national income per person is statistically insignificant, other factors are statistically significant (p<0.001) and R²=0.90786. The gross national income per person – US $1/manat in the dollar model is statistically insignificant, other remaining factors are statistically significant (p<0.01) and R²=0.90786. In the basic fund model, 1 dollar/manat is statistically insignificant, the price of oil (p<0.001) and other remaining factors are statistically significant (p<0.05) and R²=0.72949. However, in the investment model, the price of oil (p<0.01) is statistically significant, and the remaining factors are statistically insignificant and R²=0.41014 (Table 5).

Table 6. Comparative to the base year

<table>
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<tr>
<th></th>
<th>const</th>
<th>Consumer Price Index</th>
<th>1US$= manat</th>
<th>Oil production</th>
<th>Oil price</th>
<th>R²</th>
<th>F</th>
<th>P – (F)</th>
<th>DW</th>
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<tr>
<td>Initial Income</td>
<td>−515.948***</td>
<td>9.69261***</td>
<td>−1.93244***</td>
<td>−1.37796***</td>
<td>−0.08760</td>
<td>0.992180</td>
<td>F(4. 12)</td>
<td>380.63</td>
<td>1.59e – 12</td>
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<tr>
<td></td>
<td>(−7.336)</td>
<td>(23.56)</td>
<td>(−3.343)</td>
<td>(−5.388)</td>
<td>(−0.4938)</td>
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</tr>
<tr>
<td>GDP – Manat</td>
<td>−389.271***</td>
<td>7.71646***</td>
<td>−1.11277***</td>
<td>−0.466062**</td>
<td>0.757964***</td>
<td>0.997031</td>
<td>F(4. 12)</td>
<td>234.434</td>
<td>2.82e – 11</td>
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<tr>
<td></td>
<td>(−13.37)</td>
<td>(28.39)</td>
<td>(−2.909)</td>
<td>(−2.758)</td>
<td>(6.466)</td>
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<tr>
<td>GDP – dollar</td>
<td>−140.727**</td>
<td>6.09753***</td>
<td>−4.95366***</td>
<td>−0.0867180</td>
<td>1.94338***</td>
<td>0.98765</td>
<td>F(4. 12)</td>
<td>359.6716</td>
<td>2.23e – 12</td>
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<tr>
<td></td>
<td>(−1.454)</td>
<td>(10.21)</td>
<td>(−5.903)</td>
<td>(−0.2336)</td>
<td>(7.546)</td>
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<tr>
<td>GDP Per Person – Manat</td>
<td>−434.659***</td>
<td>6.84571***</td>
<td>−3.994044*</td>
<td>−0.679638***</td>
<td>0.019575</td>
<td>0.991728</td>
<td>F(4. 12)</td>
<td>261.5154</td>
<td>1.48e – 11</td>
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<td>(−8.051)</td>
<td>(20.56)</td>
<td>(−1.815)</td>
<td>(−3.270)</td>
<td>(0.1363)</td>
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<tr>
<td>GDP Per Person – Dollar</td>
<td>−98.821**</td>
<td>4.49488***</td>
<td>−3.994044*</td>
<td>−0.679638***</td>
<td>0.019575</td>
<td>0.991728</td>
<td>F(4. 12)</td>
<td>261.5154</td>
<td>1.48e – 11</td>
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<td>(−1.266)</td>
<td>(9.362)</td>
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<td>GNI – manat</td>
<td>−339.455**</td>
<td>7.39100***</td>
<td>−3.66295**</td>
<td>−0.620078</td>
<td>1.55281***</td>
<td>0.987608</td>
<td>F(4. 11)</td>
<td>746.4331</td>
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<td>(−7.136)</td>
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<td>(−2.383)</td>
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<td>GNI – dollar</td>
<td>−441.752***</td>
<td>6.34234***</td>
<td>−1.12544***</td>
<td>−0.379296**</td>
<td>0.608989***</td>
<td>0.997334</td>
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<td>1028.787</td>
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<td>(−7.823)</td>
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<td>(−2.586)</td>
<td>(−2.761)</td>
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<tr>
<td>GNI Per Person – manat</td>
<td>−252.466***</td>
<td>5.61047***</td>
<td>−3.02943***</td>
<td>−0.242597</td>
<td>1.41175***</td>
<td>0.988590</td>
<td>F(4. 11)</td>
<td>238.2718</td>
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<td>(−1.906)</td>
<td>(9.331)</td>
<td>(−2.967)</td>
<td>(−0.7527)</td>
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<tr>
<td>GNI Per Person – dollar</td>
<td>−216.841***</td>
<td>4.52272***</td>
<td>−0.333358</td>
<td>−0.571175**</td>
<td>−0.265129</td>
<td>0.963964</td>
<td>F(4. 12)</td>
<td>80.25022</td>
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<td>(−3.233)</td>
<td>(10.93)</td>
<td>(−0.5734)</td>
<td>(−2.221)</td>
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<td>Investments</td>
<td>−875.857***</td>
<td>11.50900***</td>
<td>0.427209</td>
<td>−2.86754**</td>
<td>1.88358***</td>
<td>0.962509</td>
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<td>(9.087)</td>
<td>(0.2400)</td>
<td>(−3.641)</td>
<td>(3.448)</td>
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</table>

Note: 1.(t – stat); 2. *p<0.05; **p<0.01; ***p<0.001.

Considering the base year 2000, let’s look at the latest models, macroeconomic indicators in comparison with this, the consumer price index, the US dollar rate, oil prices and dependence on oil production. In the population dependence model, only statistical indicators are statistically significant for all factors: CPI, US dollar exchange rate, oil prices and oil production (p<0.001), and R²=0.992180. Gross domestic product is statistically significant, only 1 US dollar (p<0.01) and the remaining three factors (p<0.001) in GDP and R² = 0.99703. Gross domestic product – but dollar oil production is statistically unimportant, the other three factors (p<0.001) are statistically
significant and $R^2=0.93737$. Gross domestic product – price per person – the price of oil was statistically insignificant, provided $p<0.05$ and other factors ($p<0.001$) and $R^2=0.99172$. In gross domestic product, oil production is statistically unimportant, and the remaining factors are statistically significant ($p<0.001$) and $R^2=0.98865$. Gross national income was statistically significant with the condition $\$ 1/pound ($p<0.01$) and other factors ($p<0.001$) and $R^2=0.99632$. Gross national income – dollar oil production was statistically insignificant, provided $p<0.01$ the remaining statistical indicators were statistically significant ($p<0.001$) and $R^2=0.97606$. The gross national income per capita was US $1/manat, and oil production was statistically significant ($p<0.01$) and $R^2=0.99733$. Gross national income per dollar oil production is statistically unimportant, from $1/barrel ($p<0.01$) and other factors ($p<0.001$) and $R^2=0.98859$. It is statistically significant with the condition for oil production ($p<0.01$), CPI factor ($p<0.001$) and $R^2=0.96396$. In the investment model, $\$ 1/manat is statistically insignificant, while the other statistical values are statistically significant ($p<0.001$) and $R^2=0.96251$ (Table 6).

4. Conclusions

It is well known that from the economic and ecological analysis it is clear that at high oil production levels and high oil prices, economic growth and economic growth have reached the highest level. At that time, the exchange rate of the manat was relatively stable (approximately for 10 years it remained at the level of 1 dollar = 0.8 manat). This also created some difficulties in the study. Despite the fact that the exchange rate is a key factor, it was chosen because of its statistical significance in models that affect the dynamics of a number of macroeconomic indicators. Naturally, if there were no hard, and not strict, measures to maintain the exchange rate of manat in the state, and manat moves in a slightly free and regulated mode of navigation, then as a result of the fall in oil prices in 2014–2015, and the indicators obtained as a result of the analysis will be important in future forecasts. The final conclusion is that macroeconomic indicators and the world market are subject to this law, because in the law of demand there are life and economy, and as well as the basic law of microeconomics. In this regard, the use of oil revenues for various sectors of the economy in order to maintain a constant exchange rate, it is necessary to slightly reduce the foreign exchange market and further improve the policy of soft exchange.

References


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