Motivation. Most countries wish to have a significant influence in the world. After the collapse of the Soviet Union all the economic relations were destroyed. For this reason it is actually for Ukraine to solve the complex of theoretical and practical problems that require the creation of conditions for the development of economic sectors, businesses and the whole country. Therefore, in order to control, to manage and to evolve the attractiveness of the domestic economy of Ukraine it is important to develop effective relations between major economic processes.

Description of the issue. In this research the standard method of least squares (LS) was used for estimation the macroeconomic models of Ukrainian economy. [1, p. 55] The F-test for analysis the model adequacy was also used, it was proven the significances of the coefficients, the model stability due to Chow-test and the absence of the multicollinearity between factors. [7]

This article presents the following variables in the prices of the first quarter of 2002. The research sample is 2002-2010 with quarterly frequency. All the factors are measured in UAH: value of export and import of Ukraine, the value of import and export duties in Ukraine, the value of consumption and savings in Ukraine, the net export value in Ukraine and the value of investment in Ukraine. [4]

Stationary processes in economics are extremely rare. Dickey - Fuller test has found that these time series are not an exception. With a help of Seasonal Adjustment (seasonal smoothing) option in EViews cyclic seasonal fluctuations in the time series were moved away and the main trend components were extracted. In order to achieve stationary time series the unit weights of variables in GDP were used in the models.

The cumulative index was used in order to model the variable inflation. This method implies the calculation of the inflation for each quarter as the ratio of current period to the previous period (the reference period in the research is the first quarter of 2002).

The dynamics of variables, which are used in the models

Researcher should have some idea about the behavior of model’s main factors for the correct analysis. For this purpose, the dynamics of model factors were analyzed on the basis of the State Committee of Statistics and Statistical Yearbook of the National Bank of Ukraine. This part of the article also examines the situation of Ukrainian economy, which suffered from serious trials of the crisis effects in 2008.

Export of Ukraine (2002-2010)

The growth of the export in 2002, which numbered 126.55 billion UAH, was the result of the accretion of food, fuel-energy complex and metallurgy. In 2003, due to the rise of the world prices of the key goods of Ukrainian export, as well as the buildup of import volumes, the rate of foreign trade turnover increased. The export of goods and services in 2003 amounted to 147.75 billion UAH, which is
16.8% increase over the previous year. In 2004 the export grew by a record 30% and amounted to 191.68 billion UAH. The decrease of the export of machine-building goods caused the decline (about 8.4%) of the export growth rate in 2005. The export growth by 2.2% in 2006 was the result of uplift in prices of metallurgical products, machine-building and chemical goods. The export increased by 12.1% in 2007 due to preserved raw product high prices and demand for domestic machine-building goods.

The financial crisis in Ukraine took place in the third quarter of 2008. Despite the proliferation of crisis features, the export was growing the first three quarters and declined sharply only in the fourth quarter. As a result, the export grew by 9.7% in 2008 owing to rising prices of basic commodities of Ukrainian export. Consequently, the deteriorating economic environment caused the fall of the export level by 17.3% in 2009. The main reason is the drop of export prices. The situation improved in 2010: the volume of the export grew by 18.7%.

**Import of Ukraine (2002-2010)**

There was a growth of the import in 2002, but at a slower pace than in the previous period. The increase in import volumes by 21.1% in 2003, which numbered 141.11 billion UAH, was owing to the import of machine-building goods, equipment, vehicles and agricultural commodities of foreign production. 2004 year was characterized by an import increase by 19.3%, which amounted to 168.33 billion UAH. Strong import growth in 2005 was mainly due to the import of chemical and engineering goods. The sharp rise in energy prices, activation of investment demand, growth of incomes and increasing consumer crediting contributed the import increase by 33.5%. Upward trend in the import also took place in 2006-2007 (10.3% and 18.9% compared with previous periods respectively).

Monthly import volumes declined in November - December 2008 as a result of the financial crisis, but the annual import increased by 14.2%. As a consequence, the import volume fell by 26.8% and numbered 189.23 billion UAH in 2009. The reason is the reduction of the domestic demand and rising prices for imported goods. The import increased by 20.3% in 2010.

**Net export of Ukraine (2002-2010)**

Despite the rise of prices of the key goods of Ukrainian export on foreign markets and the import increase in our country, the trade surplus fell from 10 billion UAH in 2002 to 6.6 billion UAH in 2003. The positive balance increased in 3.5 times in 2004 compared with the previous period and amounted to 23.36 billion UAH. 2005 year was characterized by a fall in the trade surplus by 86.9% owing to reduced volumes of export machine-building goods and high growth in the import of chemical and engineering products. Negative balance of trade appeared in 2006, which amounted to 10.83 billion UAH. It also increased in 2.3 times in 2007. As the result of crisis in 2008 Ukrainian trade deficit reached a peak and numbered 37.72 billion UAH. Borrowed funds abroad and on the domestic scene were involved in order to cover this deficit. The gap between import and export was reduced by 83% in 2009. The deficit increased again and reached 11.76 billion UAH in 2010.
Investment in Ukraine (2002-2010)

Ukraine was invested 46.49 billion UAH in 2002. Investment in Ukraine increased by more than 20% and amounted to 56.3 billion UAH in 2003. 2004 was characterized by an increase in investment by 12.8%, compared with the previous period. After the Orange Revolution the level of investment was steadily growing by 23-33%, which was caused by the growth of Ukrainian economy, its transparency and the accession to the WTO.

Despite the political crisis in 2007, there was registered a record inflow of foreign capital: annual investments increased by 32.5% compared with the previous period and amounted to 125.88 billion UAH. Investment in Ukraine grew up till the third quarter in 2008, but the annual growth was only 4.9% compared with the previous period. Liquidity problems of the global financial system led to a significant outflow of investment. For example, the fall of investments in the economy was by more than 50% in 2009. There was a revival of the situation in 2010, investments increased by 24.1%, but Ukraine hasn’t reached pre-crisis levels of investment yet.

Consumption in Ukraine (2002-2010)

Consumption in Ukraine was increasing during the period 2002-2008 due to rising incomes, a significant increase in consumer credit in the economy, inflating the mortgage bubble. Obviously, a significant growth of income and consumption led to higher prices. The approach of the financial crisis had a significant impact on consumer opportunities in the country, as early as 2009 incomes fell by 7.9% compared to 2008, that was actually stopped by consumer and mortgage lending. The first shoots of improvement were observed in 2010. Due to recovery of the market, consumption increased by 5.9%, but the lack of bank lending in such circumstances just leads to an import growth, which creates new risks for monetary stability.

Savings in Ukraine (2002-2010)

The population accumulated the part of income to 17.41 billion UAH in 2002, but this figure dropped to 10.4% and amounted to 15.55 billion UAH in 2003.

The next year population was saving 26.69 billion UAH, which is 71.7% more than in the previous period. The following 2005 year Ukrainians gained even more, savings increased by 31.2% and numbered 35.02 billion UAH. In 2006 we observe a decrease of savings by 13.4%. Next year despite economic growth and enrichment of Ukrainians, savings fell again by 5.2% and numbered 29.42 billion UAH.

Due to the significant devaluation of national currency (50%) in 2008, there was a savings reduction to 25.47 billion UAH, which is 13.4% lower than the previous period. The next period (2009-2010) population began to invest money again owing to savings increase by 35.5% and 78.5% respectively.

The growth of the price index based on first quarter 2002 (2002-2010)

The deflation was associated with a reduction in food prices, a stable exchange rate and strong fiscal policy in 2002. The next year inflation kept at 108.2% due to decrease in agricultural production,
higher prices on imported grain and communal public services. Inflation held on 112.3% in 2004. Rising fuel prices, inflation expectations, growing incomes and, consequently, increasing demand led to a growth in the general price level. Inflation stood at 110.3% in 2005. The following year inflation processes accelerated once again, driven by an increase in energy costs (gas price growth). Due to the economic growth in 2007 and the political instability in the country, annual inflation was 116.6%, but it hasn’t really affected on steady increase in Ukrainians’ incomes.

The following year inflation processes accelerated: 122.3% compared to 2007 - 116.6%, as a result of growth in food prices in the previous period. 37 countries around the world faced the threat of food crisis in 2007, which emerged as a result of growth of food and oil prices, conflicts and natural disasters (droughts, floods, climate differences). There was also an increase of social payments, salary growth of public sector employees and raising tariffs of communal public services in the third quarter of 2007. As a result, 2008 year was characterized by rapid inflation.

2009 year was characterized by slow growth of the CPI: 112.3% compared to 2008 - 122.3%. The low aggregate demand due to decline in population incomes and salaries, the stabilization of exchange rate in the second part of 2009 were the main factors, which slowed down the inflation during the year. 2010 year was also marked by a slowdown in inflation: 109.1% compared to 2009 - 112.3%. During the investigated period (2002-2010) the prices increased by 263%.

Analysis.

Creating the models of interrelations between macroeconomic indicators of Ukraine

This part of the paper presents six models that characterize the economy of Ukraine. Owing to these models we are able to define the relations between macroeconomic indicators of Ukraine and to develop the appropriate macroeconomic policies.

The model (1) shows an inflation index:

\[
\text{inflation}_t = 0.823 \cdot \text{inflation}_{t-2} + 1.46 \cdot \varepsilon_{t-1} + 0.076 \cdot \text{trend}; \quad R^2 = 0.99
\]  

(1)

- inflation\_t - inflation in Ukraine;
- inflation\_t-2 - lagged variable of the inflation in Ukraine;
- \varepsilon_{t-1} - lagged variable of the model’s residuals;
- trend - trend variable;

This regression shows the dependence of the price index (PI) on the previous two quarters value, the dependence of the PI on the trend and on residuals of the previous period. It should be noted, that the dependence of the inflation on its previous period value indicates the inertness of this process. It means that, basically, expectations of the political situation in the country are the crucial factors in the inflation, but not the economic processes. Previous value of the inflation affects our expectations, which in turn influence on wages and prices.
In addition, the dependence of the PI on its trend indicates non-stationary process. It means that these time series contain a trend component, which indicates the presence of long-term trends in the investigated range. The tool MA or moving average (moving average) was also used in the model (1). [6, p. 50] It applies using lagged values of residuals in order to improve the forecast and makes it possible to analyze external shocks on the dependent variable.

The model (2) was created in order to define dependencies of the export on other macroeconomic factors:

\[
\Delta \text{export\_in\_gdp}_t = 25.107 \cdot \Delta \text{export\_duty\_in\_gdp}_{t-1} + 0.769 \cdot \Delta \text{import\_in\_gdp}_{t-1} - 0.199 \cdot \Delta \text{import\_in\_gdp}_{t-3}; \quad R^2 = 0.75
\]  

(2)

\[
\Delta \text{export\_in\_gdp}_t - \text{the differences of the export share in GDP;}
\]

\[
\Delta \text{export\_duty\_in\_gdp}_{t-1} - \text{lagged variable of the differences of the export duty share in GDP;}
\]

\[
\Delta \text{import\_in\_gdp}_t - \text{the differences of the import share in GDP;}
\]

\[
\Delta \text{import\_in\_gdp}_{t-3} - \text{lagged variable of the differences of the import share in GDP;}
\]

The model (2) expresses the dependence of the differences of the export share in GDP on the differences of the import share in GDP, its previous three quarters value and the previous period differences of the export duty share in GDP. The model (2) shows that the growth of the differences of the export duty share in GDP will increase the growth of the differences of the export share in GDP by 25.107 points the next quarter, and the growth of the differences of the import share in GDP causes an increase of the differences of the export share in GDP by 0.769 points, and three quarters later will cause the reduction of the differences of the export share in GDP by 0.199 points.

Let us consider the model (3) of the import of Ukraine:

\[
\Delta \text{import\_in\_gdp}_t = 11.212 \cdot \Delta \text{import\_duty\_in\_gdp}_t + 0.665 \cdot \Delta \text{export\_in\_gdp}_t - 0.229 \cdot \Delta \text{export\_in\_gdp}_{t-1}; \quad R^2 = 0.80
\]  

(3)

\[
\Delta \text{import\_in\_gdp}_t - \text{the differences of the import share in GDP;}
\]

\[
\Delta \text{import\_duty\_in\_gdp}_t - \text{the differences of the share of the import duty in GDP;}
\]

\[
\Delta \text{export\_in\_gdp}_t - \text{the differences of the export share in GDP;}
\]

\[
\Delta \text{export\_in\_gdp}_{t-1} - \text{lagged variable of the differences of the export share in GDP;}
\]

The model (3) expresses the dependence of the differences of the import share in GDP on the differences of the share of the import duty in GDP, on the differences of the export share in GDP and on its previous period value. The regression (3) shows that the growth of the differences of the share of the import duty in GDP causes the growth of the differences of the import share in GDP by 11.212 points, and the increase of the differences of the export share in GDP causes the increase of the differences of the
import share in GDP by 0.665 points, and the following quarter it will cause the decrease of the differences of the export share in GDP by 0.299 points.

The model investment (4) shows:

\[ \Delta \text{investment}_t = -0.462 \cdot \Delta \text{investment}_{t-1} - 0.971 \cdot \Delta \text{net}_{t} - 1.161 \cdot \Delta \text{consumption}_t - 0.585 \cdot \Delta \text{net}_{t-1} ; \quad R^2 = 0.89 \]  

- \( \Delta \text{investment}_t \) - the differences of the investment share in GDP;
- \( \Delta \text{investment}_{t-1} \) - lagged variable of the differences of the investment share in GDP;
- \( \Delta \text{net}_t \) - the differences of the net export share in GDP;
- \( \Delta \text{net}_{t-1} \) - lagged variable of the differences of the net export share in GDP;
- \( \Delta \text{consumption}_t \) - the differences of the consumption share in GDP;
- \( \Delta \text{consumption}_{t-1} \) - lagged variable of the differences of the consumption share in GDP;

This model shows the dependence of the differences of the investment share in GDP on its previous period values, on the differences of the net export share in GDP, on the differences of the consumption share in GDP and on their lagged variables.

The inverse ratio of the growth of the investment shares to its previous values is caused by the behavior of stock market participants, who follow the same strategy that leads to significant volatility.

The inverse ratio of the differences of investment shares in GDP to the differences of the share of net exports in GDP is explained by the following situation: if the more investments come, the national currency becomes more revalued at a fixed differences rate. It stimulates the growth of import and, consequently, the trade balance deficits increases.

Now let us consider the relations between investment in Ukrainian economy and consumption of the population. Based on the theoretical point of view, the more society consumes today, the less it saves, and, consequently, there is a lower level of investment.

Let us consider the model (5) of the savings in Ukraine:

\[ \Delta^2 s_{t} = 0.938 \cdot \Delta^2 s_{t-4} + 0.174 \cdot \Delta^2 \text{export}_{t-2} - 0.973 \cdot \varepsilon_{t-1} ; \quad R^2 = 0.92 \]  

- \( \Delta^2 s_t \) - the dual differences of savings;
- \( \Delta^2 s_{t-4} \) - lagged variable of the second differences of savings.
- \( \Delta^2 \text{export}_{t-2} \) - lagged variable of the second differences of export;
- \( \varepsilon_{t-1} \) - lagged variable of the model’s residuals;

The model (5) reflects the relations between the savings and its previous period values, direct ratio of second differences of the savings to the previous two quarter value of second export differences. The
tool MA or moving average (moving average) was also used in the model. It uses lagged values of model residuals in order to improve the current forecast. [6, p. 50] The second variable differences are defined as a variation direction of variable dynamics. Direct ratio of the savings and the export acceleration is explained by the following situation: formula of GDP shows that the export growth causes the rise of GDP. Then appears a psychological law of J.M. Keynes: the growth of an income leads to an increase of consumption, and the savings share is grows even more rapidly. [2, p. 177] However, it does not happen immediately, only after a while: the model reaction time on the changing market conditions is two quarters.

Model (6) describes the consumption of the population in Ukraine:

$$\Delta \text{consumption} \_ \text{in} \_ \text{gdp} \_t = -0.847 \cdot \Delta \text{net} \_ \text{export} \_ \text{in} \_ \text{gdp} \_t - 0.728 \cdot \Delta \text{investment} \_ \text{in} \_ \text{gdp} \_t - 0.936 \cdot e_{t-1}; \quad R^2 = 0.92; \quad (6)$$

- $\Delta \text{consumption} \_ \text{in} \_ \text{gdp} \_t$ - the differences of the consumption share in GDP;
- $\Delta \text{net} \_ \text{export} \_ \text{in} \_ \text{gdp} \_t$ - the differences of the net export share in GDP;
- $\Delta \text{investment} \_ \text{in} \_ \text{gdp} \_t$ - the differences of the investment share in GDP;
- $e_{t-1}$ - lagged variable of the model’s residuals;

The model (6) shows the dependence of the differences on the consumption share in GDP of the differences on the net export share in GDP, on the differences of the investment share in GDP and on the model’s residuals of the previous period.

The model reflects the inverse ratio between the differences of the consumption share in GDP and the differences of the share of net exports in GDP, because the positive value of the net export causes the relocation of some consumer goods from the domestic market on the foreign markets. At the same time the consumption of the population and the state is reduced. There is also an inverse ratio between the differences of the consumption share in GDP and the differences of the investment share in GDP. The economy, which consumes its income almost entirely, invests a little and it is characterized by slow economic growth. The model shows that the growth of the differences of the investment share in GDP per unit leads to the reduce of the differences of consumption share in GDP by 0.728 points. The model also uses MA tools [6, p. 50], which makes it possible to analyze external shocks on the dependent variable.

**Conclusions.** This paper is devoted to the analysis of macroeconomic situation of independent Ukraine, the tendency of its development and the definition of interrelations between the major macroeconomic indicators of Ukraine, which were destroyed after the collapse of the Soviet Union. Six models were created based on data of the period 2002-2010, which let us determine new links between macroeconomic factors of Ukraine. The dynamics of each variable, based on data of the State Committee of Statistics and Statistical Yearbook of the National Bank of Ukraine, were also illustrated. As a result,
the multiple regressions were created by using the method of least squares with the additional analysis of their adequacy and stability.

On the basis of the models analysis there were developed the following recommendations:

1. Owing to the modern conditions of Ukraine development, special attention should be given to anti-inflationary policy of the state. It is essential to develop some controls that are able effectively influence the inflation expectations, which are formed in society.

2. The government should encourage savings of population in order to increase investment in Ukraine. It is important to restore the trust in financial institutions and to focus on reducing of the economy dollarization.

3. Final consumption is one of the most important factors of the economic growth, so it is essential to stimulate processing the main export goods within the state.

**Literature:**