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The Impact of Monetary Policy on Economic Growth in Ukraine

Introduction

The government and central bank can maintain economic growth through their actions taken in two areas: monetary policy and fiscal policy. Monetary policy influences economy through monetary factors: money supply, inflation, credit, etc. Since 2014, the Central Bank of Ukraine has officially switched to inflation targeting. Inflation targeting regime consists in public disclosure of target inflation rate and central banks' policy to reach it.

Monetary policy decisions are made with inflation forecasting taken into account. The main monetary instrument and operational tool for keeping up a monetary regime is the interest rate. If the projected inflation rate exceeds the target, then central bank conducts a policy of "expensive money". Conversely, with a lower projected inflation rate than the target level, a policy of "cheap money" is conducted. Ultimately, by changing the interest rate, the central bank supports economic activity.

However, there are other monetary factors that also influence the economy: bank credits, external debt, and the exchange rate of the national currency. The case of Ukraine is interesting in terms of these factors' influence on the economy, because not all of these factors were market driven. The UAH/USD exchange rate was actually fixed over some time and did not depend on the current account balance. Inflation was long not targeted, the central bank struggled with it after its actual disturbances.

Ukraine moved to inflation targeting in 2014, and this step has led to a significant transformation of monetary policy. Maintaining the exchange rate on an objective level had to be cancelled as the National Bank's reserves had been already exhausted by that time. Since 1996, when the Ukrainian currency

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hryvnia was adopted, the interest rate has not shown to be the effective tool of monetary policy and, therefore, it was not applied by the National Bank of Ukraine in carrying out inflation policy and stimulating economic development. On the other hand, Ukraine has experienced since then some economic growth and increase of GDP, in spite of all turbulences. So, the question is whether there is any link between monetary policy and economic growth in Ukraine. Has monetary policy exerted any influence on economic growth in Ukraine in the period 2006–2019?

1. Literature review

A number of research papers are dedicated to the impact of monetary policy on economic growth of various countries (Khalid 2005, Amarasekara 2008, Nouri and Samimi 2011, Fasanya, Onakoya, and Agboluaje 2013, Kamaan 2014, Precious and Palesa 2014, Agbonlahor 2014, Noman and Khudri 2015, Alavinasab 2016, Ahmad, Afzal, and Ghani 2016). A variety of monetary policy tools were studied to see whether their impact on economic growth is essential or not, positive or negative.

Correlation matrix, multiple linear regression models and trend analysis were applied to examine the impact of fiscal and monetary policies on economic growth in Bangladesh (Noman and Khudri 2015). The authors collected data on an annual scale from the period of 1979/80 to 2012/13. The research results show that narrow money, broad money, exchange rate, government revenues, and government expenditures have a positive correlation with real GDP, but the inflation rate and the interest rate on deposits, on the contrary, have a negative impact on real GDP. The study findings show that such variables as the exchange rate, interest rate, inflation rate, and government revenue and expenditure do affect economic growth.

Similarly, the study by Alavinasab (2016) examined the impact of monetary policy on economic growth in Iran over the period 1971–2011. The study findings showed that economic growth in Iran was influenced by money supply, exchange rate, and inflation rate. The estimated error-correction model (ECM) indicated that money supply and exchange rate, in the short run, significantly influenced economic growth.

Another study by Nouri and Samimi (2011) examined the relationship between money supply and economic growth in Iran by applying the ordinary least squares (OLS) technique. Using the data for the period from 1974 to 2008, the authors found that there existed a positive and significant relationship between money supply and economic growth.

Alike, another study (Fasanya, Onakoya, and Agboluaje 2013) examined the impact of monetary policy on economic growth in Nigeria. The researchers used time-series data covering the period of 1975 to 2010. The authors explored the effects of stochastic shocks of each of the endogenous variables using ECM,

which proved the existence of the long run relationship among the monetary variables (such as inflation rate, exchange rate, and external reserve) on the one hand and output growth on the other. The mentioned variables are significant monetary policy instruments that ensured economic growth.

Khalid (2005) examined the relationship between economic growth, inflation, and monetary policy in Pakistan. In particular, the paper studied inflation targeting as a monetary policy tool to achieve economic stability. It provided a detailed comparison of some emerging economies and Pakistan's economic performance in terms of inflation targeting experience.

Ahmad, Afzal, and Ghani (2016) focused mainly on the importance of monetary measures in ensuring economic growth of Pakistan. The study used annual time-series data covering the period of 1973 to 2014, employing the augmented Dickey–Fuller (ADF) unit root test to check the stationarity of variables. The empirical findings indicated a long-run relationship among the tested variables, namely money supply and exchange rate, which, in turn, positively influenced economic growth.

Precious and Palesa (2014) studied the functions fulfilled by monetary policy in promoting economic growth in the South African economy over the period 2000–2010. Similarly to other research (Ahmad, Afzal, and Ghani 2016), the paper again employed the augmented Dickey–Fuller and Phillips–Perron unit root tests to check stationarity in the time series. The Johansen co-integration and error correction mechanism were applied to identify the long-run and short-run dynamic relations among the variables. The study proved the existence of a long-run relationship between the monetary variables and economic growth.

Amarasekara (2008) analyzed how interest rate, money supply growth and changes in the nominal exchange rate influence real GDP growth and inflation, using monthly data for Sri Lanka for the period 1978–2005. The author used a vector autoregressive framework and employed both recursive and structural specifications. The results showed that when the financial institutions use money supply and exchange rate as policy indicators, the impact on GDP growth contrasts with the findings verified.

Agbonlahor (2014) studied empirically the impact of monetary policy on economic growth in the United Kingdom. The research used time-series data of the period 1940–2012. The impacts of each of the endogenous variables have been investigated using the vector error correction model (VECM). The study showed a long-run relationship among the monetary variables and it confirmed their impact on economic growth.

Kamaan (2014) employed a different approach in measuring the effect of monetary policy on economic growth in Kenya. The results from his study indicated that one standard deviation shock proxied by the CBR in monetary policy has a negative and insignificant effect on the aggregate output in the first two months; later, during next four months, it tends to affect it positively but still insignificantly. However, one standard deviation shock of the interbank rate to

inflation is positive and significant for the first two and a half months; the effect continues to be positive but insignificant up to the sixth month.

It is necessary to mention that Noman and Khudri (2015), Alavinasab (2016), Nouri and Samimi (2011), Fasanya, Onakoya, and Agboluaje (2013), Khalid (2005), Ahmad, Afzal, and Ghani (2016) used linear regression models to analyze the impact of monetary factors on economic growth, but linear regression is not the best method to analyze time series data. Vector autoregressive model or vector error correction model is better for this purpose. Also, the researches above mentioned did not consider loans to business as an essential tool of monetary policy. For developing countries external debt is very essential factor that influences economic growth, so it should be considered as well. So, we may say, that there is a lot of issues to be taken into account in order to evaluate the impact of monetary policy on economic growth, and the mentioned researchers did not cover all the scope of monetary factors that influence economic growth.

2. Research methodology

Ukraine's economy is classified as a small open economy. This study aims to find influence of monetary policy on economic growth, measured by GDP. The basis of our study is a model based on the "new neoclassical synthesis". Models based on this theory assume an optimization behavior of economic agents. The most important equations are: new-Keynesian Phillips curve, IS-curve, key interest rate rule, parity of interest rates. New Keynesian macroeconomic models are based on the neoclassical theory of the real business cycle, which assumes that rational agents make optimistic decisions today, with a view to the future. Individuals are thought to be inclined to distribute their consumption over time, so in good times they save money for consumption in the future and in bad times they reduce investment to support today's consumption. Keynesian beliefs about the inefficiency of economic markets have complemented real-life business models with important assumptions. For example, firms operate under imperfect competition and have a monopolistic power to set prices for their goods and services in accordance with production costs as well as margins, which in turn may depend on demand. At the same time, given the empirical evidence, it is assumed that prices are not flexible and cannot change instantly – revaluation can take both time and cost. Those firms that are still overestimating their products also take into account future uncertainty about their price. Therefore, the Phillips neo-Keynesian curve makes it possible to reproduce and rationalize the impact of money on the real economy in the short term. For example, changes in individuals' preferences for consumption today, which may similarly be triggered by a change in the interest rate for tomorrow, are not offset by an immediate change in prices, and thus excess demand may increase production until prices balance supply and demand.

In this particular case, we assume that GDP is a function of the amount of money, exchange rate, interest rate, inflation rate (we consider consumer price index and producer price index separately), loans provided to business, and external debt:

$$GDP = f(M3, EXR^{UAH/USD}, EXR^{UAH/EUR}, IR, CPI, PPI, L, ED) \quad (1)$$

Explicitly, we define the equation (1) as follows:

$$GDP = \beta_0 + \beta_1 M3 + \beta_2 EXR^{UAH/USD} + \beta_3 EXR^{UAH/EUR} + \beta_4 IR + \beta_5 CPI + \\ + \beta_6 PPI + \beta_7 L + \beta_8 ED + \varepsilon_i \quad (2)$$

where:
GDP – real gross domestic product,
M3 – amount of money (M3 monetary aggregate),
$EXR^{UAH/USD}$ – exchange rate UAH/USD,
$EXR^{UAH/EUR}$ – exchange rate UAH/EUR,
IR – interest rate (central bank basic rate),
CPI – consumer price index,
PPI – producer price index,
L – loans to business,
ED – external debt,
β_0 – constant,
β_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8 – coefficients,
ε_i – error term.

The model was estimated using quarterly time series data covering the period of 1st quarter 2006 – 2nd quarter 2019, and the data were sourced from the Database of National Bank of Ukraine, State Statistics Service of Ukraine and UNCTAD.

3. Estimation and results

Data used in this research is time series data. The first step is to analyze whether time series are stationary. If time series are stationary we may use vector auto-regressive model (VAR); if series data are not stationary we use vector error correction model (VECM).

Stationarity test

We employed unit root test to examine the existence of the long-run relationship among variables, with stationarity analysis, by using augmented Dickey–Fuller test. The results are given in Table 1.

Table 1 shows that all series are stationary at first difference accept CPI and PPI that are stationary at the variable level. It means that a combination of two or more series of data reveals a long-run relationship. Thus, we can construct a VAR model.

Table 1
Unit root test results using ADF procedure

Variables level	ADF stats	Prob.	Variables first difference	ADF stats	Prob.	Results
GDP	–0.36011	0.0918	dGDP	–1.11860	1.234e–007	I(1)
M3	–0.31276	0.1228	dM3	–1.25969	3.227e–009	I(1)
$EXR^{UAH/USD}$	–0.09135	0.7434	$dEXR^{UAH/USD}$	–1.00884	1.584e–006	I(1)
$EXR^{UAH/EUR}$	–0.09685	0.7347	$dEXR^{UAH/EUR}$	–1.09768	1.831e–007	I(1)
IR	–0.18632	0.4313	dIR	–0.85799	2.856e–005	I(1)
CPI	–0.84973	2.914e–005	–	–	–	I(0)
PPI	–0.86008	4.011e–005	–	–	–	I(0)
L	–0.10814	0.6477	dL	–1.09801	1.536e–007	I(1)
ED	–0.16813	0.4590	dED	–1.02843	7.428e–007	I(1)

Source: own estimation.

Co-integration test

Engle–Granger test was used in our study for estimating the co-integration among variables (assuming that GDP is dependent variable and M3, $EXR^{UAH/USD}$, $EXR^{UAH/EUR}$, IR, CPI, PPI, L, ED are independent variables). The results are presented in Table 2.

Table 2
Engle–Granger test results

Variables	Coefficient	*t*-statistics	Prob.
Const	1.65001e+06	2.307	0.0257**
M3	0.512674	3.263	0.0021***
$EXR^{UAH/USD}$	–120.717	–0.728	0.4700
$EXR^{UAH/EUR}$	269.671	2.019	0.0494**
IR	–1973.770	–0.473	0.6383
CPI	–492.717	–0.571	0.9547
PPI	–15745.100	–2.578	0.0133**
L	–0.286914	–2.227	0.0310**
ED	–0.156845	–0.118	0.9059
p-value	–	–	0.1063

Note: significant at ** 0.05, *** 0.01.

Source: own estimation.

With *p*-value equal 0.1063, we cannot reject the null hypothesis at a 5% level of significance and we conclude that variables are not co-integrated.

Normality test

Normality test showed that our model has problems with normality distribution of model residuals. But it is actually not a case because it is difficult to get normally distributed data of economic parameters.

Residuals are normally distributed for GDP (*p*-value = 0.4752), IR (*p*-value = 0.093), PPI (*p*-value = 0.2026), L (*p*-value = 0.9100), ED (*p*-value = 0.7133). For M3 (*p*-value = 0.0067), $EXR^{UAH/USD}$ (*p*-value = 0,0004), $EXR^{UAH/EUR}$ (*p*-value = 0.0049), CPI (*p*-value = 0,0200) residuals are not normally distributed. Trying to reach normal distribution, we created dummy observations for the variables (M3, $EXR^{UAH/USD}$, $EXR^{UAH/EUR}$, CPI) in the periods in which observations are outliers. After running the model, the results haven't changed.

Figure 1
Residuals distribution normality test

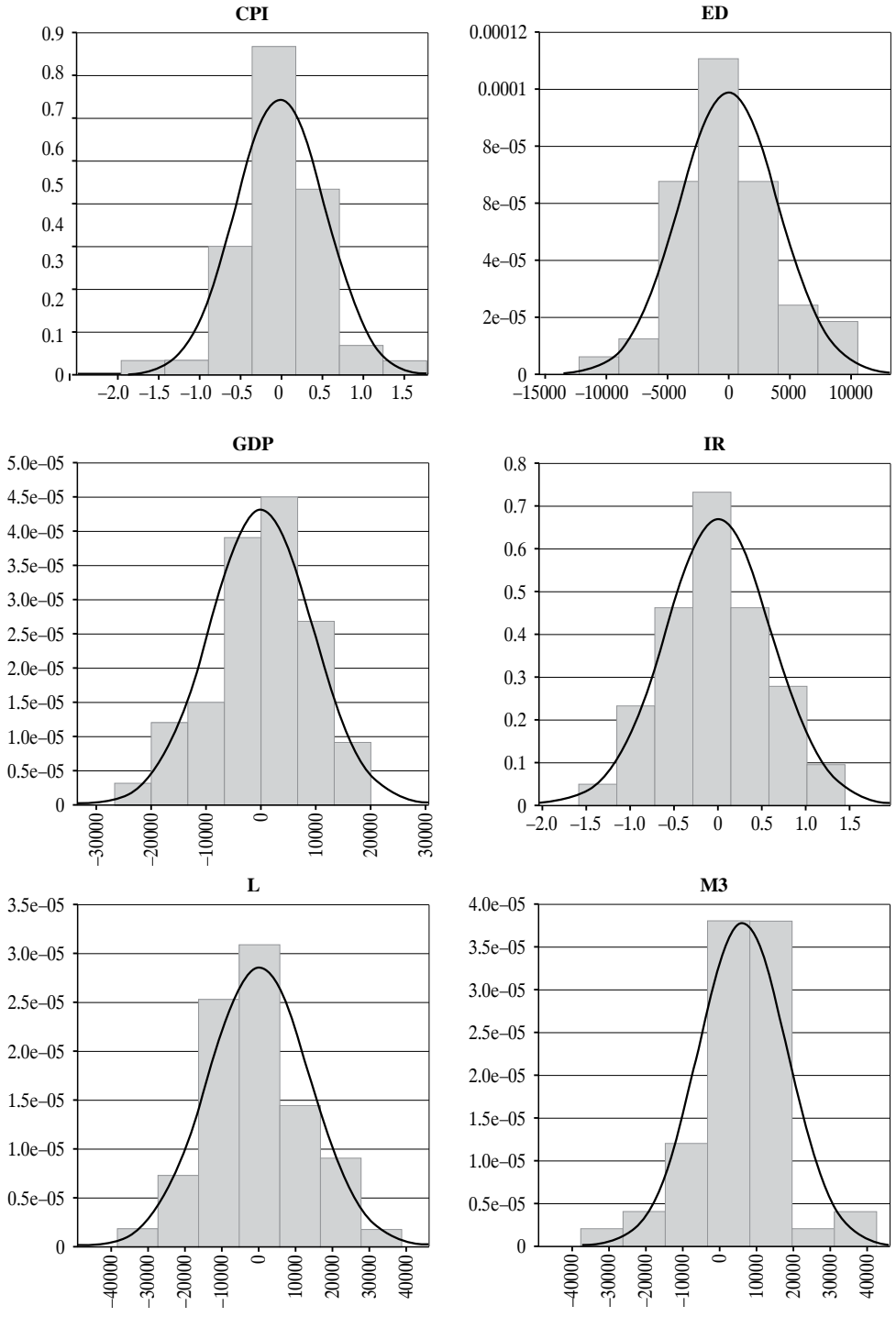
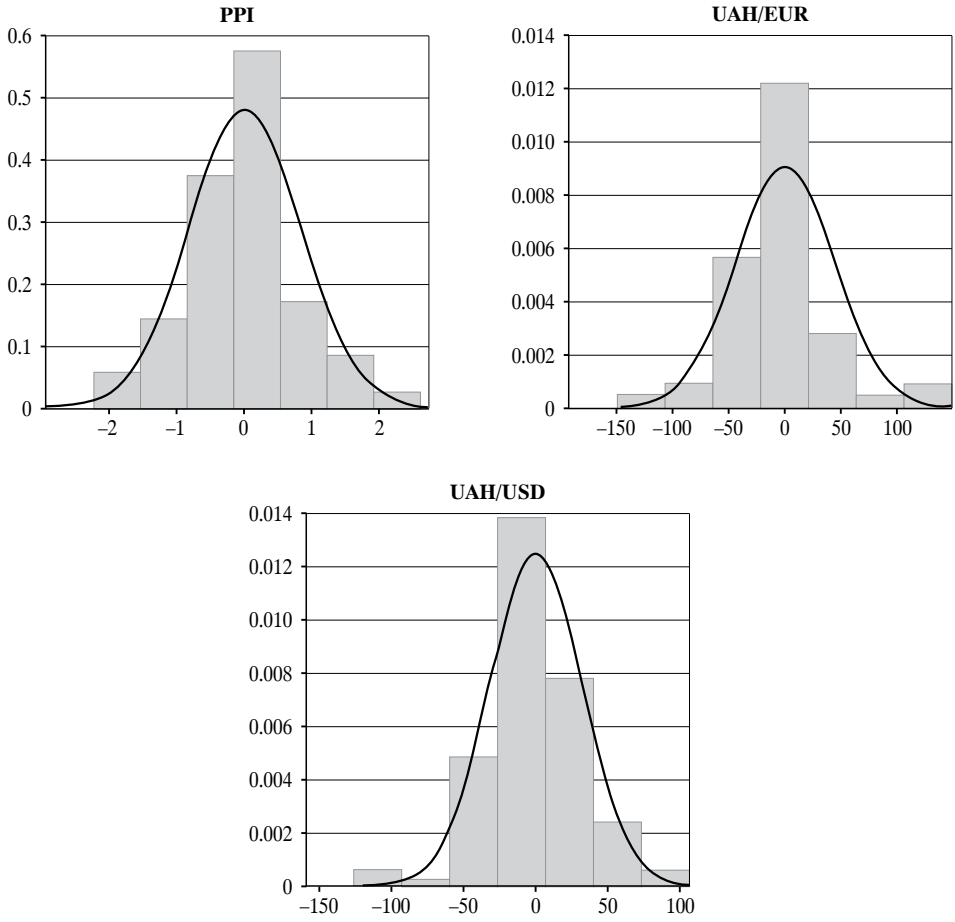


Figure 1 cont.



Source: own elaboration.

VAR model

According to calculations, we have VAR model with lag length 4. For every equation we present variables that are significant according to its *p*-values. Granger test seeks to answer the question: "do changes in M3 cause changes in GDP?". If changes in M3 cause changes in GDP, lags of M3 should be significant in the equation for GDP. And so on for other variables.

Hypothesis H0 states that there is no Granger causality. If *p*-value is less than 0.05, we can reject the H0, so there is a causality. Tables 3–11 present the information about causality among variables.

Table 3
VAR(4) eq. 1: GDP

Specification	Coefficient	St. error	*t*-statistics	*p*-value
GDPc_4	1.02444	0.15816	6.477	<0.0001***
$EXR^{UAH/EUR}$_2	273.306	102.016	2.679	0.0189**
CPI_1	12482.9	5806.40	2.150	0.0510*
R-squared adj.	0.994235	–	–	–
Rho	–0.152620	–	–	–
DW	2.216375	–	–	–

Note: significant at * 0.1, ** 0.05, *** 0.01.

Source: own estimation.

Table 4
VAR(4) eq. 2: M3cur

Specification	Coefficient	St. error	*t*-statistics	*p*-value
no significant influence	–	–	–	–
R-squared adj.	0.995156	–	–	–
Rho	–0.082680	–	–	–
DW	1.961337	–	–	–

Source: own estimation.

Table 5
VAR(4) eq. 3: $EXR^{UAH/USD}$

Specification	Coefficient	St. error	*t*-statistics	*p*-value
const	−8880.64	3732.790	–2.379	0.0334**
GDP_2	−0.000999	0.000470	–2.126	0.0533*
GDP_4	−0.001312	0.000548	–2.396	0.0323**
M3_1	−0.002375	0.001033	–2.300	0.0386**

Table 5 cont.

Specification	Coefficient	St. error	*t*-statistics	*p*-value
M3_2	0.003032	0.001437	2.109	0.0549*
$EXR^{UAH/USD}$_2	−1.47809	0.611319	−2.418	0.0310**
IR_2	81.74510	29.86260	2.737	0.0169**
CPI_1	46.36330	20.10500	2.306	0.0382**
ED_4	0.011740	0.004151	2.828	0.0142**
R-squared adj.	0.995180	–	–	–
rho	−0.280358	–	–	–
DW	2.544562	–	–	–

Note: significant at * 0.1, ** 0.05.

Source: own estimation.

Table 6
VAR(4) eq. 4: $EXR^{UAH/EUR}$

Specification	Coefficient	St. error	*t*-statistics	*p*-value
const	–16509.0	5135.85	–3.214	0.0068***
IR_1	−88.8372	38.5875	–2.302	0.0385**
IR_2	120.330	41.0872	2.929	0.0117**
CPI_3	61.3697	28.4879	2.154	0.0506*
R-squared adj.	0.991770	–	–	–
rho	−0.122984	–	–	–
DW	2.235766	–	–	–

Note: significant at ** 0.05, *** 0.01.

Source: own estimation.

Table 7
VAR(4) eq. 5: IR

Specification	Coefficient	St. error	*t*-statistics	*p*-value
GDP_4	–2.69994e–05	1.01988e–05	–2.647	0.0201**
$EXR^{UAH/USD}$_1	0.016718	0.007868	2.125	0.0534*
IR_4	–1.268270	0.434142	–2.921	0.0119**
CPI_1	0.795464	0.374398	2.125	0.0534*
CPI_2	0.999174	0.396583	2.519	0.0256**
PPI_4	–0.578563	0.258672	–2.237	0.0435**
ED_1	–0.000303	0.000116	–2.611	0.0215**
ED_4	0.000208	7.73019e–05	2.686	0.0187**
R-squared adj.	0.958472	–	–	–
rho	–0.418776	–	–	–
DW	2.737369	–	–	–

Note: significant at * 0.1, ** 0.05.

Source: own estimation.

Table 8
VAR(4) eq. 6: CPI

Specification	Coefficient	St. error	*t*-statistics	*p*-value
GDP_4	–2.00953e-05	9.37256e-06	–2.144	0.0515*
CPI_3	0.780868	0.354341	2.204	0.0462**
R-squared adj.	0.605932	–	–	–
rho	–0.333027	–	–	–
DW	2.472086	–	–	–

Note: significant at: * 0.1, ** 0.05.

Source: own estimation.

Table 9
VAR(4) eq. 7: PPI

Specification	Coefficient	St. error	*t*-statistics	*p*-value
const	152.883	96.8809	1.578	0.1386
GDP_2	–4.76858e-05	1.21939e–05	–3.911	0.0018***
GDP_3	3.26418e–05	1.46964e–05	2.221	0.0447**
GDP_4	–6.59150e–05	1.42142e–05	–4.637	0.0005***
CPI_1	1.11573	0.521806	2.138	0.0521*
PPI_2	–0.498408	0.230917	–2.158	0.0502*
PPI_4	–0.910178	0.360516	–2.525	0.0254**
ED_1	–0.000377	0.000161	–2.337	0.0361**
R-squared adj.	0.516329	–	–	–
rho	–0.340568	–	–	–
DW	2.657281	–	–	–

Note: significant at: * 0.1, ** 0.05, *** 0.01.
Source: own estimation.

Table 10
VAR(4) eq. 8: L

Specification	Coefficient	St. error	*t*-statistics	*p*-value
no significant influence	–	–	–	–
R-squared adj.	0.983694	–	–	–
rho	–0.337221	–	–	–
DW	2.629451	–	–	–

Source: own estimation.

Table 11
VAR(4) eq. 9: ED

Specification	Coefficient	St. error	*t*-statistics	*p*-value
CPI_2	5765.280	2670.02	2.159	0.0501*
R-squared adj.	0.972583	–	–	–
rho	–0.346359	–	–	–
DW	2.567178	–	–	–

Note: significant at: * 0.1.
Source: own estimation.

It is hard to figure out the causality directions using only coefficients from the tables above. Impulse response functions may be a much more useful tool to see the influence of independent variables on dependent one.

Responses GDP to shocks

When analyzing GDP responses to shocks in independent variables we will try to figure out whether or not GDP undergoes any changes after changes in M3, $EXR^{UAH/USD}$, $EXR^{UAH/EUR}$, IR, CPI, PPI, L, and ED.

We can see that there is a long-run relationship between independent variables and GDP. All impulse functions cause long-term disturbances in GDP, starting from the very first period, i.e. immediate response GDP to the shock. GDP positively reacts to the shock in the amount of money (M3). This reaction

Figure 2
Responses GDP to shocks

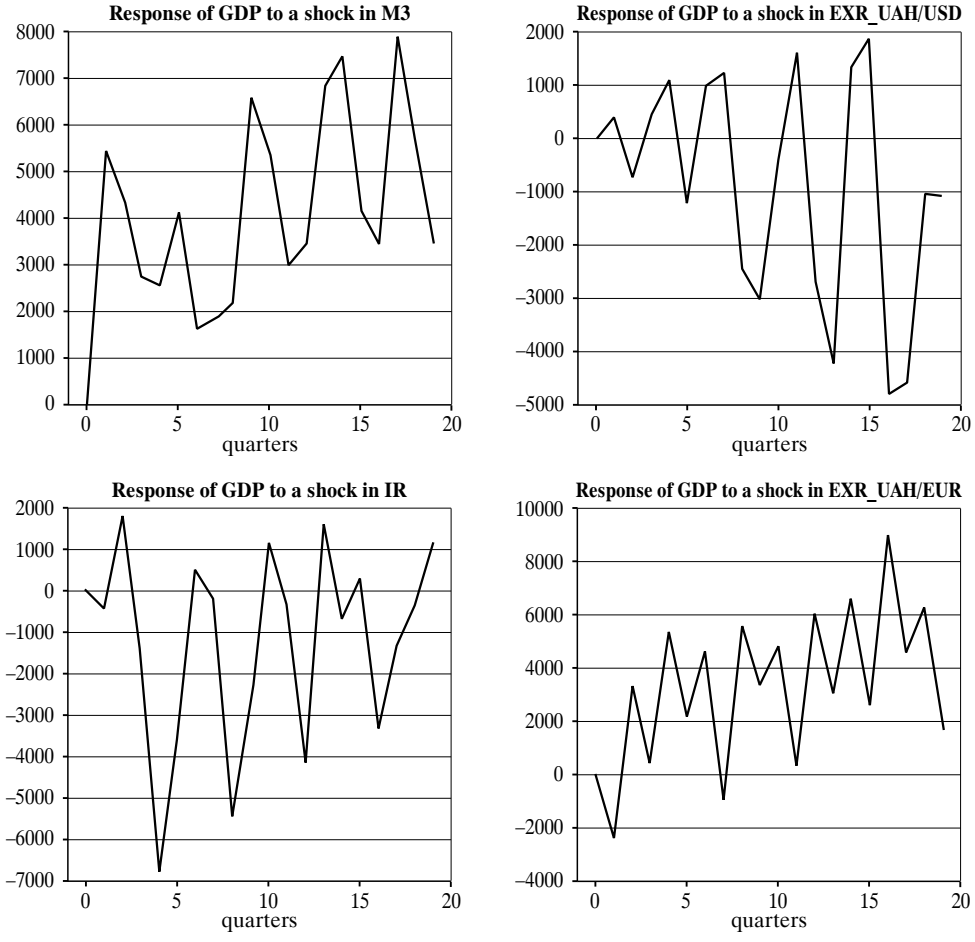
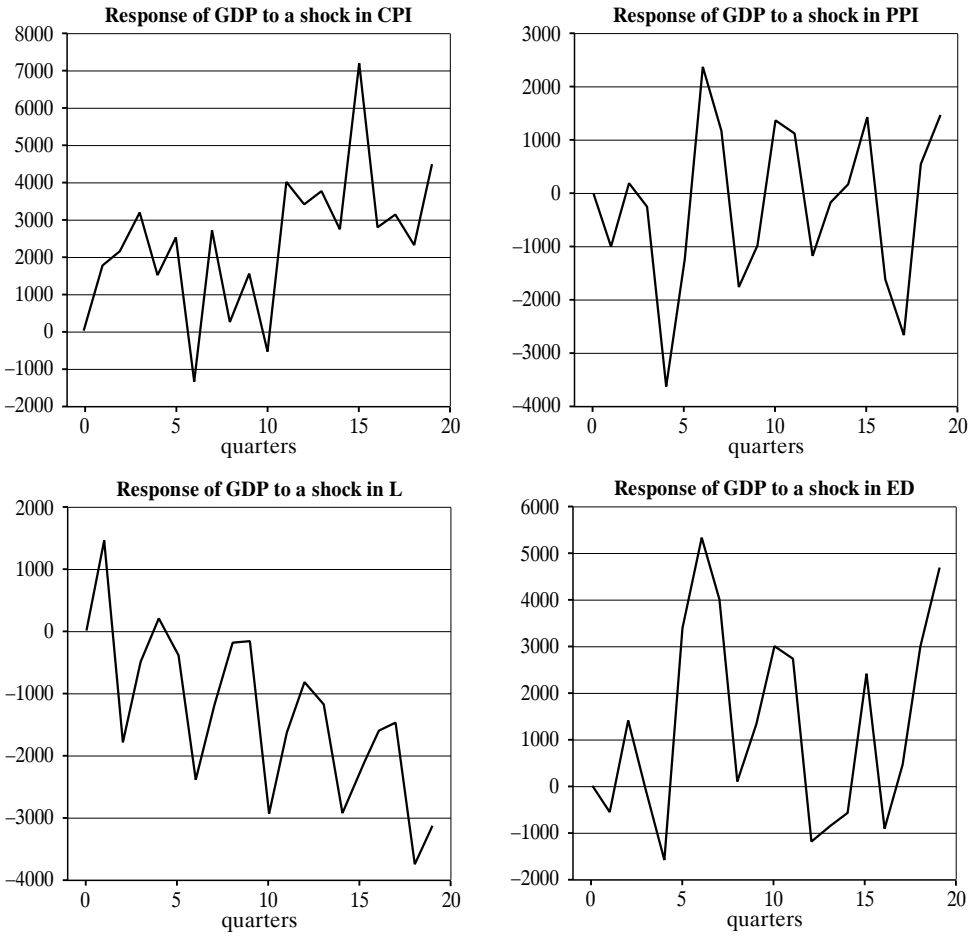


Figure 2 cont.



Source: own elaboration.

is predictable, because increase in money supply stimulates economic activity and economic growth.

Changes in the exchange rate UAH/USD have negative impact on GDP in the long-run, but in the first period the effect is positive. This is because depreciation of Ukrainian currency in the short-run improves the current account, but in the long-run it worsens terms of trade. So, it leads to an increased inflation due to more expensive imported goods and services. Ukraine is a small open economy that highly depends on foreign market prices, so an increase in prices of imported goods may cause a rise of domestic prices.

A shock in the interest rate causes a decrease in the rate of economic growth. This may be explained by the policy of inflation targeting. The Central Bank of Ukraine uses interest rate to control inflation. According to this policy, an increase in interest rates will decrease inflation rate, but it will also hamper economic activity, by decreasing the liquidity in the market. Shortage of money may cause a fall in the aggregate economic activity.

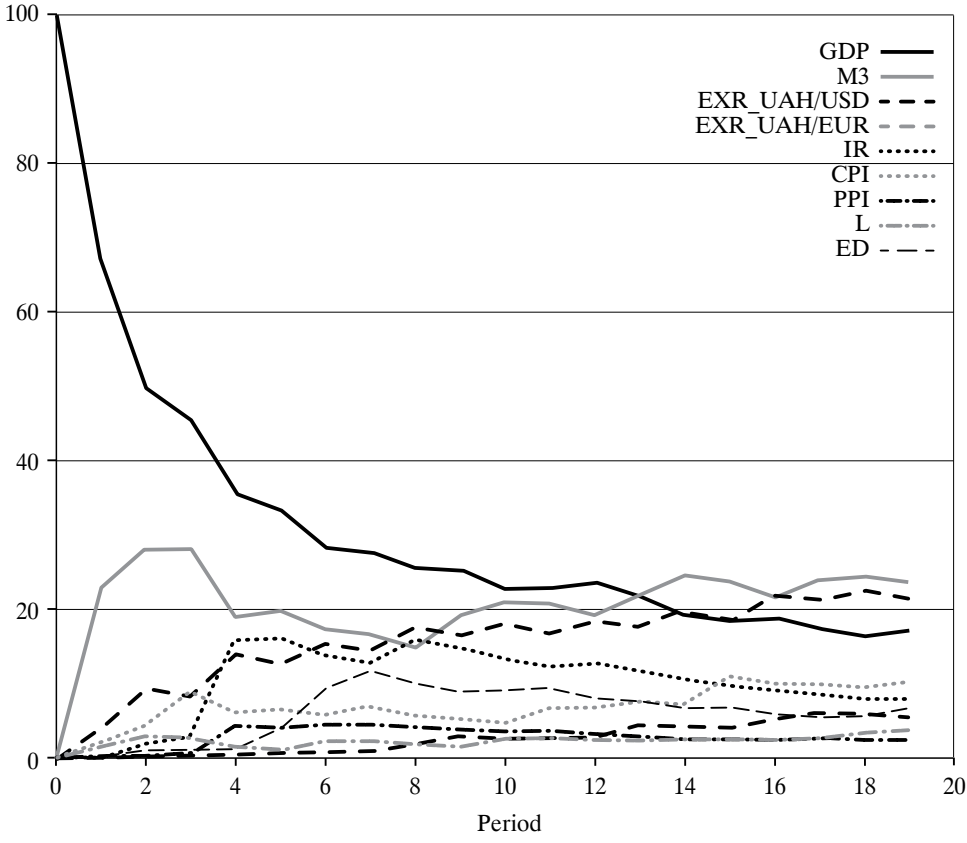
CPI and PPI shocks have a strong impact on GDP because, on the one hand, inflation rate determines the value of GDP in terms of the amount of money needed to produce and sell the output. On the other hand, inflation influences producers' decisions about the production volume as well as consumers decisions as to buy goods and services.

An interesting insight is about the impact of loans to business (L). According to GDP response, loans had negative influence on economic growth, though credit is supposed to improve economic activity.

Variance decomposition

For a more thorough understanding of the relationship between metrics in the VAR model, it is useful to consider the properties of forecast errors and the decomposition of their variances (Figure 3, Table 12).

Figure 3
Variance decomposition of GDP



Source: own elaboration.

Table 12
Variance decomposition of GDP

Period	St. error	GDP	M3	$EXR^{UAH/USD}$	$EXR^{UAH/EUR}$	IR	CPI	PPI	L	ED
1	9146.14	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	11403.1	67.1319	23.0620	0.1365	4.4137	0.1324	2.4081	0.7589	1.7132	0.2434
3	13252.0	50.1037	28.1515	0.4092	9.6996	2.1044	4.4945	0.5777	3.0916	1.3680
4	14129.7	45.6269	28.4967	0.4513	8.6035	3.0986	9.1184	0.5468	2.8297	1.2282
5	18148.3	35.8013	19.2639	0.6529	14.2613	16.0918	6.1896	4.4926	1.7298	1.5169
6	20043.6	33.5251	20.0007	0.9216	12.8494	16.2524	6.6898	4.1080	1.4516	4.2015
7	21678.5	28.7796	17.6611	1.0010	15.5968	13.9525	6.1172	4.7492	2.4530	9.6894
8	22530.7	27.8542	17.0091	1.2331	14.6427	12.9264	7.0692	4.6863	2.5603	12.0188
9	24419.7	25.9055	15.2624	2.0471	17.7909	16.0265	6.0265	4.5245	2.1842	10.2323
10	26359.5	25.4228	19.3951	3.0679	16.7857	14.8744	5.5145	4.0197	1.8787	9.0411
11	27740.8	23.0789	21.2701	2.7821	18.1927	13.6239	5.0145	3.8740	2.8233	9.3404
12	28666.6	23.1783	20.9978	2.9478	17.0457	12.7750	6.6487	3.7803	2.9685	9.6578
13	30754.3	23.9297	19.4981	3.3016	18.7116	12.9466	6.9917	3.4286	2.6511	8.5410
14	32231.4	21.8217	22.2239	4.7313	17.9161	12.0555	7.7369	3.1239	2.5420	7.8488
15	34028.7	19.5920	24.7765	4.3978	19.8855	10.8590	7.5853	2.8054	3.0306	7.0680

16	35539.5	18.9315	24.0940	4.3190	18.7385	9.9652	11.0499	2.7412	3.2028	6.9580
17	37960.2	19.1421	21.9305	5.3946	22.0779	9.5090	10.2146	2.5875	2.9862	6.1575
18	39596.1	17.7041	24.1731	6.2977	21.5822	8.8463	10.0110	2.8288	2.8828	5.6739
19	40877.3	16.7231	24.5684	5.9691	22.6124	8.3065	9.7156	2.6765	3.5415	5.8869
20	42042.1	17.2555	23.9018	5.7094	21.5281	7.9357	10.3185	2.6527	3.8905	6.8079

Source: own calculation.

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Decomposition of variance allows us to estimate the proportions of variance caused by the shocks of different variables, and thus it allows us to determine how much of the change in one indicator is explained by the change in another. Figure 3 presents a graphical presentation of the decomposition of the variance of the VAR model variables over 20 periods and Table 13 shows their quantitative measurement.

The variance decomposition calculations show that GDP changes are largely explained by their dynamics in the first periods, but in the long-run other factors have significant influence. In the long-run, GDP depends on the amount of money (ca 23%), UAH/EUR exchange rate (ca 17%), and interest rate (ca 12%). It is curious that GDP is weakly dependent on UAH/USD exchange rate (max 5%), CPI and PPI (both giving 8–14%), loans to business (ca 2%), and external debt (approximately 7%).

Conclusion

The purpose of the study was to determine the impact of monetary factors (money supply, UAH/USD exchange rate, UAH/EUR exchange rate, interest rate, consumer price index, producer price index, loans issued to the economy, external debt) on economic growth in Ukraine. The results obtained should be considered with some caveats in mind. During the analyzed period, the central bank's policy was not consistent. Until 2014, there was no inflation targeting in Ukraine, so the actions of the central bank were aimed not at achieving a certain inflation rate but at combating the effects of inflation. For this reason, the relationship between inflation and GDP can only be established by statistical methods, since there is no economic basis for their correlation. From 2014 to 2019, the central bank targets inflation and this influences business activity and the economy through inflation expectations. As a result of variance decomposition of GDP, we see that in the long run, the impact of inflation on GDP increases by increasing the impact of CPI.

The effect of the UAH/USD exchange rate on economic growth is quite insignificant, although the vast majority of Ukrainian exports and imports are made in US dollars. Such a low degree of influence may be explained by the fact that up to 2014, the UAH/USD exchange rate was actually fixed, not floating. Thanks to central bank reserves, exchange rate stability of the hryvnia was maintained, while a constant current account deficit was experienced. In this case, GDP growth rates did not reflect the actual national currency depreciation. Only after 2014, when the central bank's policy has changed, the exchange rate is determined on the basis of market conditions. According to our calculations, the impact of the exchange rate on GDP will increase in the long run.

The key interest rate of the central bank, which has been used as an inflation targeting tool since 2014, has also had insignificant impact on economic growth. According to Taylor's rule, an increase in the interest rate has a negative effect on economic growth. However, in Ukraine this mechanism of influence was

rather weak. The reason for this was the inefficiency of the central bank interest rate as a tool to influence inflation expectations in the period up to 2015.

What is interesting, loans to businesses have had an insignificant effect on economic growth. This can be explained by the fact that before 2015 the majority of loans granted by the banking system were issued to related parties and very often these loans were not repaid. This has led to a crisis in the banking system and the liquidation of about 100 banks. In this case, the loan was not a form of financing the economy, but a way of withdrawing capital abroad by bank owners.

According to the research results, the central bank can be encouraged to strengthen its credit channel for its impact on the economy, as it is essential in promoting economic growth. Inflation targeting policies should also be pursued, as price stability and exchange rate stability are prerequisites for improving economic agents' expectations. A stable macroeconomic environment (including consistent and independent monetary policy) is a prerequisite for economic growth in Ukraine.

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THE IMPACT OF MONETARY POLICY ON ECONOMIC GROWTH IN UKRAINE

Abstract

This study examines the impact of monetary policy on economic growth in Ukraine between 2006 and 2019. After the stationarity and co-integration tests, a vector-autoregressive model (VAM) was used to estimate the impact of monetary factors on economic growth in Ukraine. The research results show that GDP changes are largely explained by its own earlier dynamics, but in the long-run real GDP quite strongly depends on the money supply, exchange rate against euro, and basic interest rate. At the same time GDP is weakly dependent on the exchange rate against US dollar, CPI and PPI, the volume of loans to business and external debt. The authors explain their findings and compare them with several other empirical studies on the subject concerning some other countries.

Key words: monetary policy, economic growth, Ukraine
JEL: E52, O42

WPŁYW POLITYKI PIENIĘŻNEJ NA WZROST GOSPODARCZY UKRAINY

Streszczenie

Artykuł analizuje wpływ polityki pieniężnej na wzrost gospodarczy Ukrainy w latach 2006–2019. Po wykonaniu testów stacjonarności i kointegracji zastosowano model autoregresyjny (VAM) do oszacowania wpływu czynników pieniężnych na wzrost gospodarczy Ukrainy. Wyniki badania pokazują, że zmiany PKB są w dużym stopniu objaśnione jego własną wcześniejszą dynamiką, ale długookresowa dynamika realnego PKB dość znacznie zależy od podaży pieniądza, kursu walutowego względem euro i bazowej stopy procentowej. Jednocześnie dynamika PKB zależy w małym stopniu od kursu walutowego względem dolara USA, wskaźników inflacji, wolumenu kredytów dla przedsiębiorstw i długu zagranicznego. Autorzy wyjaśniają otrzymane wyniki i porównują je z innymi badaniami empirycznymi w tym przedmiocie dotyczącymi niektórych innych krajów.

Słowa kluczowe: polityka pieniężna, wzrost gospodarczy, Ukraina
JEL: E52, O42

ВЛИЯНИЕ ДЕНЕЖНОЙ ПОЛИТИКИ НА ЭКОНОМИЧЕСКИЙ РОСТ УКРАИНЫ

Резюме

В статье анализируется влияние денежной политики на экономический рост Украины в 2006–2019 гг. После проведения тестов стационарности и коинтеграции авторы использовали авторегрессионную модель (VAM) и провели расчеты влияния денежных факторов на экономический рост Украины. Результаты исследования показывают, что изменения ВВП в большой степени определяются его собственной предыдущей динамикой, однако в долговременной перспективе динамика реального ВВП серьезно зависит от предложения денег, валютного курса к евро и базовой процентной ставки. Гораздо меньшая степень зависимости наблюдается в отношении таких факторов, как курс национальной валюты к доллару США, показатели инфляции, объемы кредитов для предприятий и величина внешнего долга. Авторы объясняют полученные результаты и сравнивают их с другими эмпирическими исследованиями в этой области, касающимися некоторых других стран.

Ключевые слова: денежная политика, экономический рост, Украина

JEL: E52, O42