

DO MONETARY AND FISCAL POLICY VARIABLES MATTER FOR THE ECONOMY IN POLAND?

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Abstract: Decisions taken by the economic authorities within the monetary and fiscal policy influence each other and thus affect the economy of a given country. The literature on the subject indicates that it is essential for the economy that the monetary and fiscal authorities cooperate with each other. However, such coordination of actions of economic authorities is not easy to achieve because the central bank seeks to ensure price stability, while the government strives to maintain high economic growth and a low unemployment rate. In addition, it should be emphasized that the decisions of economic authorities are made at various stages of the business cycle, which may also affect a degree of coordination of monetary and fiscal policy (policy mix). The aim of the article is to identify the relationship between economic variables in the monetary and fiscal policy and thus variables describing the economy in Poland in 2000 - 2018. Particular attention is paid to the following economic variables: GDP per capita, unemployment rate, General Government debt and deficit, investment rate, the main interest rate of the central bank or inflation. The article verifies the hypothesis that variables from the monetary and fiscal policy statistically significantly interact with each other and thus influence the economic variables in Poland. The research methods were based on statistical analyzes. The contribution of this article consists in presenting a role of monetary and fiscal policy in influencing the Polish economy in the years 2000 - 2018.

Keywords: economy, fiscal policy, monetary policy, policy mix

1 Introduction

The combination of monetary and fiscal policy functions in the economic literature as the notion of policy mix. Many authors indicate a significant impact of policy mix on the economy and this group includes, among others: M. Buti, A. Sapir (1998), R. Clarida, J. Gali, M. Gertler (2000), A.H. Hughes, P. Mooslechner, M. Schuerz (2001), R. Beetsma, X. Debrun (2004), L. Onorante (2004), Woroniecka-Leciejewicz (2011) and L. Krus, I. Woroniecka-Leciejewicz (2017). While analyzing the influence of monetary and fiscal policy on the economy it must be emphasized that the aim of monetary policy is an inflation target that is to maintain a stable level of prices, whereas fiscal policy aims at the highest possible economic growth and low unemployment. It appears that in the context of economic theory objectives of economic authorities may counteract each other. For instance, the central bank that decreases inflation, often simultaneously increases unemployment, which is a problem that the government tries to combat. In turn, increased government expenditure, which may generate a budget deficit, results in growth of global demand, which then causes demand inflation.

Monetary policy and fiscal policy play an important role in the economy. They also have an impact on a number of economic variables and influence each other. In the face of the recent financial crisis, which turned into a debt crisis, it was observed that fiscal and monetary authorities had been working together to revive economic activity. The aim of the article is to identify the relationship between economic variables in the monetary and fiscal policy and thus variables describing the economy in Poland in 2000 - 2018. The article verifies the hypothesis that variables from the monetary and fiscal policy statistically significantly interact with each other and thus influence the economic variables in Poland.

2 Literature Review

B. Kopeć (2015) examined whether impact of a specific policy translated into the macroeconomic situation, or whether some central bank or government actions were not reflected in the economy. The analysis comprised determination of a dominant option of economic policy understood in such a way that within business cycles a level of interest rate or budget deficit was changing more extensively. In order to set a dominant option of economic policy the author used a pendulum model, in which

economic policy was perceived as a synthetic indicator of effects of fiscal and monetary policy. Monetary policy was determined as a standardized indicator of a level of long-term interest rate, whereas fiscal policy as a standardized indicator of a deficit level. As a result, it was observed that what is of crucial importance in the course of economic policy is business cycle and its phase in which the economy is.

J. Jakóbiak (2013) stresses that within the area of internal compliance of policy mix special importance belongs to an issue of stability of individual elements of policy mix as well as the whole policy mix, which is additionally correlated with the reliability of actions of fiscal and monetary authorities. Moreover, monetary and fiscal policy are conducted within diverse time frames, which means that adjustments of monetary policy to volatile conditions occur in a continuous manner and economic entities react to monetary signals in a moderately delayed manner, whereas adjustments of fiscal policy are of jumping character and reactions of entities to fiscal impulses show bigger delays. It is assumed that fiscal delays mainly reduce the effectiveness of policy mix.

T.J. Sargent and N. Wallace (1981) developed the "theory of unpleasant monetarist arithmetic" based on the idea that at the time of occurrence of the fiscal dominance, the monetary authorities are no longer able to keep inflation under control, regardless of the used strategy. Hence the conclusion is that the central bank's decisions regarding the conduct of monetary policy are affected by fiscal policy, among other things hindering the process of stabilizing the price level in the economy, which is the main objective of the central bank. In the short term stabilization of the economy turns out to be a difficult task due to the differences in goals or preferences of the central bank and fiscal authorities. The optimal solution for both authorities is to agree on their actions and decisions.

Generally, the government seeks to achieve the planned economic growth and the central bank strives to hold inflation at some numerically specified level (so-called inflation targeting). The policy governed by fiscal authorities and priorities of the central bank greatly influence the decisions of the central bank concerning the conduct of monetary policy. In turn, the choice of a kind of fiscal policy depends on pursuing monetary policy and priorities of a government within the budgetary policy (Woroniecka-Leciejewicz, 2011). The monetary - fiscal interactions and their implications are examined using models based on the game theory (Bennett, Loayza, 2001, p. 66). K. Kuttner (2002) emphasizes that the coordination of fiscal and monetary policies strongly influences economy and at the same time they are interrelated. Analysis of the models based on game theory indicates that the coordination of these policies would be beneficial for the economy. The harmonization of these two policies limits sources of conflict, leads to the minimization of costs of maintaining price stability and contributes to the greater stability of the financial system. The use of these models allows to observe problems arising from the conflict of monetary and fiscal authorities.

For many economists, coordinated monetary policy and fiscal policy are one of the best policy mix options. A lack of such coordination was criticized, for instance, by Nordhaus (1994). The IS-LM analysis shows that the combinations of economic policies are less important than the total level of aggregate demand that can be influenced by a fiscal policy, a monetary policy and a combination thereof. Many studies attribute the significant role of the central bank, for example, US Federal Reserve in maintaining macroeconomic stability in the country to the insufficient flexibility of a fiscal policy as a stabilization tool. In the neo-Keynesian models a fiscal policy is assumed to produce a demand shock that should be offset by the monetary authorities (Kuttner, 2002).

Relevant conclusions in the context of this research were also presented by I. Woroniecka- Leciejewicz (2015) indicating that under the influence of changes in the central bank and government priorities, the optimal fiscal and monetary responses change and as a result the Nash equilibrium shifts (equilibrium as a choice of policy mix). When the fiscal authorities plan a higher growth rate, the optimal budgetary response becomes more expansive. Additionally, a change in the priorities of the monetary authorities like permitting a higher level of inflation, causes a shift in the optimum monetary strategies resulting in more expansive monetary policy.

I. Woroniecka- Leciejewicz conducted a study of decisive interactions and mutual conditions between monetary and fiscal authorities based on simulation research using fiscal-monetary game, in which strategies of fiscal and monetary policy are different in terms of restrictiveness or expansiveness. While analyzing the game it was assumed that an increase of interest rate *ceteris paribus* results in a decreased rate of economic growth and decreased inflation; additionally, increased budget deficit *ceteris paribus* results in increased inflation. Another assumption was that increased budget deficit *ceteris paribus* causes an increased GDP growth rate. Moreover, attention was focused on two cases: the first one when monetary authorities strive to minimize inflation and fiscal authorities try to maximize a GDP growth rate and the other case where monetary and fiscal authorities determine their own objectives that they want to achieve while determining a desired inflation target and planned dynamics of GDP. A logistics function used in the study to determine dependence between economic growth and inflation and instruments of fiscal and monetary policy enabled to note that possibilities of decreasing inflation by using increasingly restrictive monetary policy are limited, similar to possibilities of boosting economic growth by means of increasingly expansive fiscal policy. It was observed that impact of a fiscal instrument (i.e. budget deficit) on a GDP growth rate can be characterized by a growing logarithmic function, yet, to a certain range of fluctuations of instrument values. Both, increasingly expansive fiscal policy limits boost of economic growth, as well as increasingly restrictive fiscal policy has limited possibilities to influence dynamics of production. A similar situation occurs in a case of exerting influence of budget deficit on inflation. In turn, together with an increased interest rate decrease of GDP growth is observed from a maximum at extremely expansive monetary policy to the lowest one when an interest rate reaches an extremely high level. Similarly, together with an increased interest rate inflation reduction is observed from extremely high at highly expansive monetary policy to extremely low at highly restrictive one (Woroniecka-Leciejewicz, 2013, pp. 8, 29-38).

I. Woroniecka – Leciejewicz (2015) conducted also an analysis of effects of instruments of policy-mix on the economy using a dynamic macroeconomic model. In this study instruments of monetary policy – real interest rate and of fiscal policy – budget deficit in relation to GDP, influence the economy, as well as a pace of GDP growth and inflation. Moreover, a simulation was conducted for two variants of policy mix in a presented dynamic macroeconomic model, namely: an expansive and a restrictive one. In this model it was assumed that economic authorities strive to minimize deviations, respectively GDP growth and inflation, from desired values. Therefore, it was assumed that for every monetary strategy fiscal authorities choose an optimum fiscal strategy minimizing the square of the deviation of GDP growth from a desired value; in turn, monetary authorities choose optimum monetary strategy for every fiscal strategy minimizing the square of the deviation of inflation from a desired value i.e. inflation target. Conducted simulations present effects observed in time that are evoked by a change in macroeconomic policy stance to more expansive or restrictive. As a result, a new state of balance in product market and money market is noted and results of simulation enable to observe in which direction and to what extent the main variables changed i.e. production, investments, public finance and inflation.

Summing up the discussion on the impact of monetary and fiscal policy on the economy it must be added that policy mix has a

particular sense in the extraordinary conditions such as the financial crisis. Fiscal and monetary policies have influence on macroeconomic stability. The lack of appropriate policy mix was one of the reasons of the recent financial crisis and lead to many adverse effects on the economy. Both these policies are used by economic authorities in order to achieve its macroeconomic objectives. That is why this issue is so essential and should not be marginalized by authorities (Stawska, Grzesiak, 2014).

3 Analysis of Relationships Between Monetary and Fiscal Policy Variables

The discussion on the impact of monetary and fiscal policy on the Polish economy in the period between 2000-2018 started with the presentation of crucial, in the context of the paper objective, variables from the area of fiscal and monetary policy.

Table 1 contains data from monetary policy area in Poland between 2000-2018. The National Bank of Poland while realizing a strategy of direct inflation target observes inflation indicators in Poland. Table 1 shows Consumer Price Index – a month ending a period – December of the previous year = 1. Inflation in Poland in the analyzed period remains at a low level (creeping inflation) with the exception of year 2000 when inflation amounted to 8.5%, otherwise it is generally within the inflation target (2.5% +/- 1p.p.), with some exceptions (such as 2004 - inflation of 4.4% - when Poland joined the European Union). The years 2007 - 2008 are a period of intensifying disturbances on global financial markets, hence inflation in 2007 was 4.0% and exceeded the inflation target. Significant signs of price declines were observed in the second half of 2014. Deflation lasted until 2015, mainly due to the fall in oil prices (which reduced production costs and increased corporate profits). In the last three years of analysis (2016-2018) we observe low inflation.

Table 1: Selected monetary policy variables in Poland

Years	INF_CPI	M3_index	IR_NOM	IR_REAL
2000	8.5	25,9	18.25	8.99
2001	3.6	29,2	14.43	10.45
2002	0.8	29,9	8.28	7.42
2003	1.7	30,6	5.88	4.11
2004	4.4	32,9	6.08	1.61
2005	0.7	37,2	5.15	4.42
2006	1.4	41,8	4.13	2.69
2007	4.0	48,5	4.63	0.61
2008	3.3	56,1	5.54	2.17
2009	3.5	63,5	3.88	0.37
2010	3.1	68,2	3.5	0.39
2011	4.6	74,5	4.13	-0.45
2012	2.4	81,8	4.5	2.05
2013	0.7	86,8	3.21	2.49
2014	-1	92,3	2	3.03
2015	-0.5	100	1.5	2.01
2016	0.8	110,1	1.5	0.69
2017	2.1	117	1.5	-0.59
2018	1.1	125	1.5	0.40

Source: *Central Statistical Office database*. Retrieved 22.09.2019 from <http://stat.gov.pl/wskazniki-makroekonomiczne/>.

The level of inflation is linked to money supply in the economy, hence, table 1 also presents money supply index in Poland between 2000-2018.

Money supply in Poland measured by the broadest aggregate - M3 (2015=100)- in the analyzed period is systematically increasing (Official Webpage of NBP). Now, in Poland, the central bank uses a policy of low interest rates (compared to historical data) which should favor the economy (though not always). Currently (November 2019) the main interest rates of NBP have been not changed since March 2015 (table 1).

In the context of coordination of monetary and fiscal policy variables of crucial importance concern public finance and they include: revenues and expenditures of public finance sector or

General Government deficit and debt. Table 2 shows the revenues and expenditures of the Polish public finance sector and the general government (GG) deficit/surplus and debt in relation to GDP, in the country between 2000 and 2018. The data show that public expenditures were moderate in those years, ranging from 36.4% to 40.9% of GDP. The only years when they rose above the level of 40% were 2007 – 2008 and 2018. The fact that in 2018 they accounted for 40.9% implies that the government refrained from significantly increasing the fiscal burden.

Table 2: Statistical data on public finances in Poland – selected fiscal policy variables

Years	Revenues to GDP	Expenditures to GDP	GG_DEF	GG_DEB
2000	36.4	39.2	-3	36.5
2001	37.4	42.3	-4.8	37.3
2002	37.6	43.3	-4.8	41.8
2003	37.8	43.2	-6.1	46.6
2004	37.1	41.6	-5.1	45
2005	38.6	41.6	-4	46.4
2006	39.3	41.4	-3.6	46.9
2007	40.8	40.7	-1.9	44.2
2008	40.1	41.7	-3.6	46.3
2009	39.3	43.0	-7.3	49.4
2010	38.1	44.0	-7.3	53.1
2011	38.7	42.3	-4.8	54.1
2012	39.6	42.0	-3.7	53.7
2013	39.3	42.2	-4.1	55.7
2014	39.3	41.6	-3.7	50.4
2015	38.2	40.6	-2.7	51.3
2016	37.7	40.2	-2.2	54.2
2017	39.0	39.7	-1.5	50.6
2018	40.9	40.7	-0.4	48.9

Source: Central Statistical Office database. Retrieved 22.09.2019 from <http://stat.gov.pl/wskazniki-makroekonomiczne/>.

The general government deficit in Poland proved particularly vulnerable to the crisis, rising to 7.3% of Polish GDP in 2009 and in 2010 (it is notable that the deficit is one of the main measures of fiscal policy). A crisis usually reduces tax revenues and causes budget expenditures to increase (in Poland, particularly high increases in expenditures were noted in 2009 and 2010), thus raising the amount of public debt (table 2).

Table 3 presents the results of correlations between variables in the field of monetary and fiscal policy. All the variables were transformed into first differences, yielding stationary series. We note a significant negative correlation between the unemployment rate and GDP per capita and between the unemployment rate and inflation. According to A. Okun who was the first economist who studied the empirical relationship between unemployment and economic growth using data on the United States – the correlation between them was negative. Thus, increases in unemployment tend to be correlated with lower than normal growth in real GDP (Okun, 1962). Analyzing in more detail the negative relationship between the

unemployment rate and inflation, we can cite the Philips curve, reformulated by E. Phelps and then criticized even by Friedman. Friedman's criticism can be read as an attempt to replace the known negative correlation between inflation and unemployment with the negative correlation between the unemployment rate and the trajectory of inflation, known as the "accelerationist" position (Friedman, 1968).

There were also significant and negative correlations between GG debt and inflation rate as well as between GG deficit and unemployment rate (GG deficit occurs in calculations with a minus sign - hence this should be taken into account in the interpretation of the negative correlation indicator). In relation to this first correlation (GG debt and inflation rate), one can indicate the Aizenman and Marion (2011) study, who calculate that the persistent inflation rate of 5% will significantly contribute to stabilizing US public finances. On the other hand, in the case of the second correlation, i.e. the relationship between GG deficit and the unemployment rate, the I.Ostoj study led to interesting conclusions, which indicated that as a result of the recent financial crisis (2008-2009), the reduction of public expenditure aimed at reducing the public finance imbalance in most countries in the EU, usually did not concern funds to combat unemployment (Ostoj, 2013).

A negative correlation also occurred in the analyzed period between the real NBP reference rate and GDP dynamics. Research on the monetary policy transmission mechanism in Poland indicates that the reaction of economic activity to a change in the short-term interest rate is the strongest and the fastest in the recovery phase of the economy, and the slowest and the weakest in the recession. The maximum reaction of the annual GDP dynamics occurs about half a year after the change in the interest rate - the GDP growth rate decreases between 0.1 percentage points and 0.3 percentage point (Chmielewski et. al., 2018).

In turn, we notice a significant, positive correlation between the inflation rate and GDP per capita. In the theory of economics and practice, the view is that high inflation and deflation adversely affect the dynamics of long-term economic growth. In turn, there are also views such as F.A. von Hayek and others about the beneficial, stimulating effect of slow inflation processes on the economic growth rate, however, only in the short term (Von Hayek, 2006).

A positive, significant correlation in the considered period also occurred between the M3 money supply and GDP per capita and between the investment rate and GDP per capita. According to M. Friedman, there is a relationship between the money supply and nominal income, however, this relationship is disturbed by the lags of reaction between variables. The increase in income is reflected primarily in production, only in the longer term in prices. The level of money supply influences production in the short term, while in the long-term - production is determined by real factors such as investments or savings (Bernanke, 2002).

Table 3: Pearson's correlation ratios between selected monetary and fiscal policy variables in Poland (2000-2018)

Variable	d_GDP_per capita_r	d_GDP_%	d_Unemp	d_INV	d_M3_r	d_INF	d_IR_r	d_DEF	d_DEB
d_GDP_per capita_r	1.00	0.60	-0.82	0.78	0.65	0.72	-0.33	0.51	-0.48
d_GDP_%		1.00	-0.42	0.45	0.13	0.59	-0.67	0.39	-0.23
d_Unemp			1.00	-0.74	-0.66	-0.51	0.02	-0.53	0.52
d_INV				1.00	0.50	0.43	-0.04	0.42	-0.53
d_M3_r					1.00	0.32	0.15	0.24	-0.20
d_INF						1.00	-0.66	0.28	-0.16
d_IR_r							1.00	0.05	-0.20
d_DEF								1.00	-0.45
d_DEB									1.00

Source: developed by the author with the GRETL software package

The next part of the article discusses regression results obtained for monetary and fiscal policy variables (the real GDP per capita, the rate of unemployment, the investment rate and real NBP reference rate in Poland). Regressions were carried out to highlight statistically significant dependencies, between selected variables from the monetary and fiscal policy. Prior to regression analysis, variables were tested for stationarity with the ADF test (Dickey-Fuller test), as well as for normality. Variables were transformed into first differences, yielding stationary series and variables with a near-normal distribution. To perform the analysis, data spanning the years 2000-2018 were sourced from the website of the Polish Central Statistical Office and Eurostat.

Table 4 shows the regression results for the dependent variable: the first differences of the real GDP per capita in Poland [d_GDPpercapita_r] and independent variables: the first differences of the unemployment rate in Poland [d_UNEM], the first differences of the real investment rate in Poland [d_INV_r], the first differences of the NBP real reference rate [d_IR_r] and the first differences of the real GDP per capita lagged by one year [d_GDPpercapita_r_1].

Table 4: Regression results for dependent variable (Y): d_GDPper capita_r and independent variables: (X₁): d_UNEM and (X₂): d_INV; (X₃): d_IR_r and (X₄): d_GDPper capita_r_1

Variable	Coefficient	Standard error	t-Student	p-value
Const.	529,365	127,448	4,154	0,0013***
d_UNEM	-139,774	54,1386	-2,582	0,0240**
d_INV_r	0,0155983	0,00631889	2,469	0,0296**
d_IR_r	-131,939	35,3799	-3,729	0,0029***
d_GDPpercapita_r_1	0,306713	0,118200	2,595	0,0234**
Selected regression statistics and analysis of variance: N= 17 observations from 2002–2018				
SD of the dependent variable = 1080,373; Standard error of residuals 572,5141				
R-square = 0,863881				
F(4, 12) = 19,03954 p-value for F test 0,000039				

*** means that p – value < 0.01; ** means that p – value < 0.05; * means that p – value < 0.10

Source: developed by the author with the GRETL software package

In the years 2000–2018 the real GDP per capita responded statistically significantly to the unemployment rate in Poland [d_UNEM], the real investment rate in Poland [d_INV_r], the NBP real reference rate [d_IR_r] and the real GDP per capita lagged by one year [d_GDPpercapita_r_1]. The probabilities of the unemployment rate, the real investment rate, the NBP real reference rate and the real GDP per capita lagged by one year having a statistically significant influence on the real GDP per capita are 95%, 95%, 99% and 95% respectively (table 4). The negative value of the coefficient (-139,774) for the unemployment rate indicates that the relationship was consistent with the economic theory (table 4). The coefficient for the NBP real reference rate (-131,939) is negative - meaning that the Polish GDP per capita decreased following rises in the NBP real reference rate in 2000 – 2018. In turn, the coefficients for investment and GDP per capita delayed by one year are positive and amount to: (0,0155983, 0,306713) respectively. A positive indicator indicates that along with the rise of the investment and GDP per capita lagged by 1 year, GDP per capita increased in the discussed period.

The regression results lead to a conclusion the unemployment rate, the real investment rate, the NBP real reference rate and the real GDP per capita lagged by one year as variables related to monetary policy and fiscal policy statistically significantly determined the GDP per capita in Poland from 2000 to 2018. Based on these analyses we can confirm the hypothesis that variables from the monetary and fiscal policy statistically significantly interact with each other and thus influence the economic variables in Poland. Thus, we have achieved the purpose of this article and identified the relationship between economic variables in the monetary and fiscal policy and thus variables describing the economy in Poland in 2000 - 2018.

4 Conclusions

Proper cooperation of monetary and fiscal authorities as two independent decision makers responsible for two main areas of economic policy remains a crucial condition of meeting its objectives. Special focus is put on the relevance of development of efficient coordination mechanisms in order to achieve stability of a level of prices and permanent economic growth (Marszałek, 2006).

However, there are numerous factors distorting the coordination of monetary and fiscal policy and thereby, influencing effectiveness of economic policy. Factors that have impact on

effects of policy mix on the economy include, for instance, diverse objectives and preferences of economic authorities, delays in implementation of fiscal and monetary policy as well as internal and external economic impulses such as financial crises. In this article particular attention was paid to the following economic variables: GDP per capita, unemployment rate, General Government debt and deficit, the main interest rate of the central bank or investment. It was also noted that decisions of economic authorities were strongly influenced by the financial crisis that contributed to a higher rate of unemployment, slower economic growth, decreased revenues and higher expenditures of the public finance sector, as well as to larger public deficit and debt. Furthermore, an attempt was made to identify the relationship between economic variables in the monetary and fiscal policy and thus variables describing the economy in Poland in 2000 - 2018. Finally, it was confirmed that variables from the monetary and fiscal policy statistically significantly interact with each other and thus influence the economic variables in Poland.

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