

higher in Argentina than Turkey. In 2007, however, unemployment is 1.4 percent higher in Turkey than Argentina.

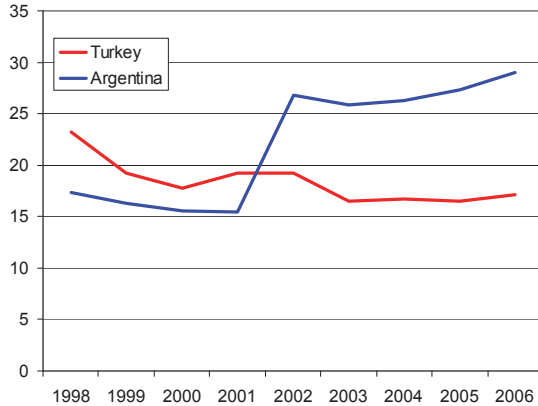


Figure 20. Gross domestic savings (% of GDP)

Source: World Bank World Development Indicators

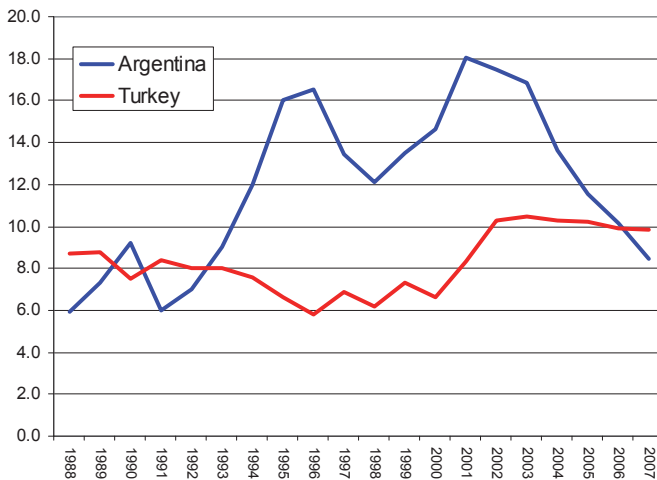


Figure 21. Unemployment rate (%)

Source: World Bank World Development Indicators

Although inflation in Argentina is moderate, it is considerably higher than those of the 1990s (figure 22). Inflation increased from 4 percent in 2004 to 11 percent in 2006 and was 9 percent in 2007. There is a debate between orthodox and heterodox economists over whether current level of inflation constitutes a problem. The orthodox approach promotes a monetary policy known as “inflation targeting” and keen to keep inflation as low as possible regardless of what happens to production and

employment. The heterodox approach suggests that a moderate level of inflation is in fact preferable because it allows relative prices to adjust more easily when prices are sluggish downward. So far inflation has been kept under control by ad hoc policies such as price controls of basic goods, export taxes (to reduce the domestic price of exportables) and arbitration in wage negotiations. Wage demands and profits are contained due to fear of unemployment and return to instability. However managing industrial relations between business and labor is not an easy task in the long run (Grugel and Riggiozzi 2007). Keeping inflation under control may not be so easy without a long-term strategy. Perhaps a more worrying aspect of inflation debate in Argentina is the alleged manipulation of the inflation figures by altering the statistical methodology in January 2007 to mask relatively high inflation figures. Cibils (2008) suggests that while the official inflation rate for 2007 is 8.5 percent alternative estimations suggest that it could be between 12 to 24 percent. The manipulation of inflation also makes it difficult to know the current levels of poverty as poverty calculations are sensitive to the level of inflation. If inflation is higher than the government figure, it is reasonable to assume that poverty must also be higher. The underestimation of inflation also has relevance to public debt as “41 percent of public debt has interest payments indexed to the official CPI” (Weisbrot 2008).

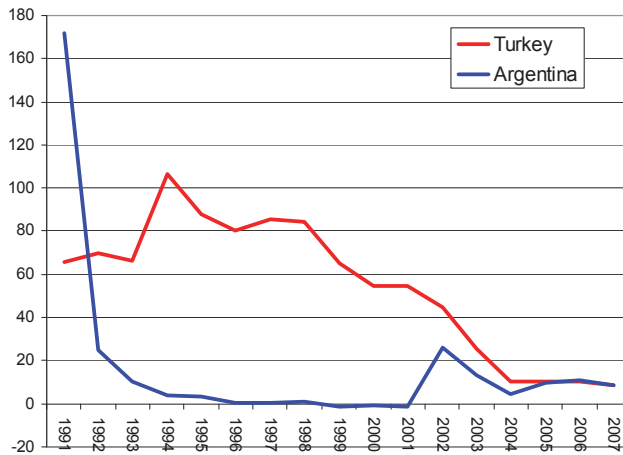


Figure 22. Inflation, consumer prices (annual %)

Source: World Bank World Development Indicators

Inflation in Turkey has been successfully brought under control due to tight monetary policies adopted by the independent central bank and inflation targeting policies. Inflation went down from 54.4 percent in 2001 to 8.8 percent in 2007. Although controlling inflation has clearly been the most successful aspect of the post-2001 crisis adjustment period, the cost of this achievement and whether inflation will remain low in the long run is still subject to a debate.

Conclusion

It is clear from the above evidence that economic recovery in Argentina has been in a better shape and more sustainable than Turkey. Although both countries will inevitably face the negative impacts of the global crisis, the impact is likely to be more severe for Turkey. The early signs support this prediction. During the May-June 2006 turbulences Turkey was amongst the hardest hit middle income countries (Onaran 2007). The IMF estimates that Turkish economy will shrink by 5.1 percent in 2009 and this follows the dismal 1.1 percent growth rate in 2008. The decline in the Argentinean economy will be limited to 1.5 percent in 2009 and this follows from a much superior growth rate of 7 percent in 2008. In terms of growth rates in 2008 the CIA World Fact Book ranks Turkey as the 175th out of 217 countries and ranks Argentina as the 30th.

The current economic policies in Turkey resemble Argentina's policies during the 1990s. Although Turkey has adopted flexible exchange rate policies and reformed its financial sector during the post-2001 crisis period, high interest rates, large capital inflows, overvalued exchange rates, soaring imports, increased external debt, tight fiscal policies, privatization policies and jobless-growth are familiar characteristics of the Turkish economy to pre-2001 crisis characteristics of Argentina. Therefore such flawed policies could not have been sustained in the long run with or without the world economic crisis. Many economists expected Turkey to experience another financial crisis before the world financial crisis.

For sure not everything is seamless in Argentina and flawed in Turkey. Despite all the positive signs, Argentina's heterodox experience has been ad hoc and there is not consensus over what has or should replace neo-liberalism. Although a more proactive role for the state has been envisaged, there is a lack of clarity over the precise role of the state and a lack of development program. There appears no clear long term strategy to deal with issues such as inflation, energy, and income distribution (Cibils 2008). Inflation figures are likely to be manipulated, thus may not show the true poverty levels. Despite Argentina is rich in oil and natural gas, it is facing an acute energy shortage due to the underinvestment in the energy sector resulting from privatization policies during the 1990s (Lowenthal 2006). Argentina also faced a devastating drought in 2008 and 2009 which killed millions of livestock and hit the agricultural sector and exports severely. The favorable terms of trade due to high export prices are unlikely to continue perpetually. Although unemployment fell from 18 percent in 2001 to 8.5 percent in 2007, many new jobs are in non-unionized, low-paid and temporary without standard benefits of full time jobs. Grugel and Riggiozzi (2007) note that almost half of total employees have no social insurance and unemployment amongst young people remains very high.

The banking sector reforms and the creation of the Independent Banking Supervision Institution in Turkey after the 2001 crisis helped the Turkish banks to face the world crisis in favorable conditions. Although the financial sector in Turkey remains

lucrative, the problems in the real sector are likely to influence the financial sector. The impact of the global financial crisis on Turkey economy will likely to come from its impact on the real sector rather than the financial sector. Turkey has been able to attract foreign capital due to high interest rates and policies such as the law on repatriation of capital that relaxed the foreign exchange shortage. However such temporary emergency measures are unlikely to keep the economy above water interminably.

In conclusion there can be very little doubt that Argentina's heterodox policies have been a lot more successful compared to Turkey's orthodox policies. Policies in Argentina have been experimental but very imaginative. It may not be possible or even desirable for Turkey to imitate Argentinean experience single-mindedly but Argentinean experience provides some valuable lessons. Turkey must now look beyond the failed policies of the orthodoxy and adopt more pragmatic policies to address its structural and long lasting problems. Turkey must reject the straitjacket imposed by the IMF and adopt new strategies according to its specific circumstances. The Argentinean experience as well as a large literature on developing countries show that no pre-determined set of policies will serve all countries equally well, be it orthodox or heterodox. The development process is a non-linear and complex process and no simple rules can be advised to developing countries.

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Katarzyna Kalinowska¹

A VAR ANALYSIS OF THE EXPENDITURES-SIDE EFFECTS OF PASSIVE FISCAL POLICY IN POLAND IN 2004-2012

Abstract

In this paper the methodology to assess the effectiveness of automatic stabilizers is applied to Polish quarterly data for 2004-2012. The methodology is based on the separation of permanent from cyclical components of public expenditures and estimation the effect of stabilizers in private consumption and output. In European Monetary Union, without the possibility of monetary policy, passive fiscal policy is the only instrument that the authorities are able to use to dampen the effects of business cycle at national level. The paper presents the analysis of the effectiveness of fiscal policy in Poland based on the structural VAR approach. The analysis show a positive response of industrial production and private consumption to expenditure shocks. It is worth underlying that reaction of industrial production to cyclical component of government expenses is more significant than the reaction of private consumption. In both cases both variables response to public spending is immediate and it takes place in first quarter.

JEL Classification Code: E62, E63, E21, E23, C32.

Keywords: automatic stabilization, private consumption, industrial production, vector autoregression.

Introduction

The idea that governments can reduce output fluctuation by allowing fiscal stabilizers work is not new. It was broadly studied not only theoretically but also empirically in the 1950s and 1960s. The rational expectations revolution in the 1970s

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(Lucas, 1975, p.35), Ricardian Equivalence theorem and the Lucas critique which implies that it is not possible to determine the effectiveness of passive fiscal policy because we do not know what changes their removal would cause in the dynamic structure of the economy (Lucas, 1975, p.30) - changed the direction of economic research on the automatic stabilizers effectiveness and measures. High levels of budget deficits and public debts as a share of GDP in the USA and European Communities countries in the 1980s and 1990s and implementation the new set of rules and constraints on national fiscal policies described by the provisions of Stability and Growth Pact (GSP) and Maastricht Treaty in European Monetary Union (EMU) countries, brought about the new interest in the subject. Without the possibility of using monetary policy in EMU, fiscal policy was the only tool to smooth the output fluctuations on the national level. Under GSP, EMU members should perform in consolidating their public finance hence automatic stabilizers remain the only stabilization instruments.

Automatic stabilizers can be defined as certain categories of government revenue and expenditure which react automatically to the business cycle without any economic officials' decisions and in doing so they counteract fluctuations in aggregate demand.

The purpose of these thesis is to study the effectiveness of automatic stabilizers on the expenditure side in Poland for period 2004-2012. The paper uses quarterly data on Polish government expenditures, sold production in industry and individual consumption expenditure in the household sector taken from GUS (Polish Central Statistical Office). The VAR study of the effects of automatic stabilizers on the expenditure side showed a positive response of sold production in industry and individual consumption expenditure in the household to expenditure shocks.

The paper is structured as follows: the first section starts with theoretical approach to automatic stabilizers and showing the factors which determine their effectiveness. Section two briefly reviews the literature on the subject. Section three describes the methodology to estimate the effectiveness of fiscal stabilizers on expenditure side in Poland in 2004-2012.

Automatic stabilizers effectiveness determinants

Most economists agree that, notwithstanding the stage of business cycle, tax rates and discretionary spending level in relation to GDP should be stable. If governments followed this rule, automatic stabilizers would be the only tools of countercyclical policy.

Fiscal policy instruments are defined as automatic stabilizers when they meet the following requirements:

- they need to be sensitive to changes in output and unemployment and they must fluctuate in business cycle duration;

- they need to smooth GDP and consumption fluctuations and thus lead to economic stabilization;
- they need to have such construction that discretionary fiscal policy would not be able to restrict their stabilization function;
- they need to influence the government budget balance procyclicality – they tend to increase budget surplus in boom and budget deficit during crisis;
- they need to act automatically - they do not require any action on the part of the government to enact any new laws (Krajewski, 2005, p. 188).

According to OECD methodology, the automatic stabilizers are the following components of fiscal policy:

- income taxes,
- social security contributions,
- corporate taxes,
- direct taxes,
- unemployment benefits (OECD, 1999, p. 137).

The impact of automatic stabilizers may, at varying degrees, be reinforced by other mechanisms to operate to smooth the business cycle. Macroeconomic determinates which affect the direction and impact of automatic stabilizers are presented in table 1.

Table 1. Determinants of the automatic stabilizers effectiveness

Factor influencing automatic stabilizers effectiveness	Acting
1. Government sector size	The biggest share of government expenditures in GDP, the more symmetric and timely automatic stabilizers impact on the economy which result in shallow recession (Hemming, Mahfouz, Schimmelpfennig, 2002, p. 9, van den Nord, 2000, p. 7).
2. Degree of economy openness	The more open economy, the lower effectiveness of automatic stabilizers in reducing GDP fluctuations (Hemming, Mahfouz, Schimmelpfennig, 2002, p. 11, Buti, Martinez-Mongay, Sekkat, van den Noord, 2003, p. 132).
3. Tax system structure	Progressive taxation structure is more able to act as an automatic stabilizer (van den Nord, 2000, p. 7)
4. The level of economic development	The efficiency of automatic stabilizers is empirically confirmed both in developing and developed countries (Deburn, Kapoor, 2010, p. 5). The more developed economy, the more efficient counter-cyclical fiscal policy (Talvi, Vegh, 2000, p. 22, Alesina, Tabellini, 2005, p. 28).
5. The degree of private consumption and investment sensitivity on disposable income changes	The smaller private consumption sensitivity to disposable income changes, the weaker demand impulse coming from automatic stabilizers. An increase in budget deficit can lead to reduced private sector expenses, because the public will save its excess money in order to pay for future tax increases that will be initiated to pay off the debt. (Barro, 1996, p. 15).
6. Initial level of public debt	Low level of public debt enhances the passive fiscal policy efficiency because consumers do not expect the rise in taxes rates in future. (Hemming, Mahfouz, Schimmelpfennig, 2002, p. 11).

Table 1 continued.

Factor influencing automatic stabilizers effectiveness	Acting
7. Accompanying monetary policy	Automatic stabilizers are more efficient when accompanying by accommodative monetary policy (Hemming, Mahfouz, Schimmelfennig, 2002, p. 11, Perotti, 2002, p. 23).
8. Exchange rate regime	In the case of an open economy automatic stabilizers are thought to be effective with a fixed exchange rate and non-effective with a floating exchange rate (Hemming, Mahfouz, Schimmelfennig, 2002, p. 11).
9. The nature of shock	Automatic stabilizers are more effective in reducing the impact of demand than supply shocks (Barrell, Pina, 2002, p. 26).
10. The type of macroeconomic category affected by shock	As stabilizers work through disposable income, they are most effective in the face of shocks to aggregate demand, and in particular to private consumption than to investment (Barrell, Pina, 2002, p. 26).

Source: Own study.

Alesina and Tabellini point out beyond economic factors that affect the automatic stabilizers effectiveness. They stress the negative relationship between the high level of corruption and efficiency of passive fiscal policy (Alesina, Tabellini, 2005, p. 18). Research carried out by Woo in the group of 96 developed and developing countries in 1960-2001 confirm that the higher level of income and education inequality the smaller smoothing power of automatic stabilizers (Woo, 2005, p. 27).

Review of theory and evidence

In the light of the new research in economics automatic stabilizers are believed to have significant stabilizing effects on the business cycle. Van den Noord examines that in the OECD countries automatic stabilizers reduce the business cycle magnitude by on average 25 percent (van den Noord, 2000, p. 14). According to Barrell and Pina the effectiveness of automatic stabilizers particularly in respect to disposable incomes is smaller. They prove that automatic stabilizers have effect in dampening output fluctuations in EMU by 11 percent (Barrell, Pina, 2003, p. 26). Latest empirical research trying to determine the effectiveness of automatic stabilizers are presented below.

Dolls, Fuest and Peichl used microsimulation models for the tax and transfer systems of 19 European countries and the USA to investigate the extent to which automatic stabilizers cushion household disposable income and household demand in the event of macroeconomic shocks. The analysis referred to two macro shocks macro shocks to income and employment. The first, symmetric shock, caused proportional decline in household gross income, and the latter one, unemployment shock, which affects households asymmetrically. For the income shock, the cushioning effect of automatic stabilizers is in the range of 4-22% in the EU and between 6-17% in the

US. For the unemployment shock, it ranges from 13-30% in the EU, whereas results for the US are between 7-20% and are similar to the values for the

income shock. These results suggest that social transfers, in particular the rather generous systems of unemployment insurance in Europe, play a key role for demand stabilization and explain an important part of the difference in automatic stabilizers between Europe and the US (Dolls, Fuest, Peichl, 2010, p. 4-29).

Darby and Melitz examined the passive fiscal Policy efficiency on the expenditure side. They found out that the cyclical responsiveness of government expenditure on health, retirement benefits, incapacity benefits and sickness pay as well as unemployment compensation in demand and unemployment stabilization (Darby, Melitz, 2008, p. 717). This conclusions go contrary to A. Auerbach i D. Feenberg`s research results. They proved that the unemployment benefit is the most effective tool of passive fiscal policy to stabilize the average output (Auerbach, Feenberg, 2000, p. 37-56).

McKay and Rays, analysing the role of automatic stabilizers as a countercyclical tool, proved that proportional taxes, like the sales tax, the property tax, and the corporate income tax have negligible effect on the volatility of economic aggregates. The progressivity of the personal income tax and transfer payments to the unemployed and those on food stamps have been quite effective stabilizers, contributing to a lower variance of output by 15% and 13% respectively. They also fund that progressivity of the income tax also least to significantly lower average output. Transfer payments, in turn, have a negligible effect on average output, but because they lower precautionary savings, they raise the variance of consumption substantially (McKay, Rays, 2013, p. 35).

Estimating automatic stabilization on the expenditure side

Basing on the latest research on the passive fiscal policy effectiveness, the empirical part of the paper focuses on verification the hypothesis that unemployment benefits are effective and timely tools to stabilize the level of output and consumption in Poland and thus lead to smoothing the business cycle. Cyclical component of budget expenditure was selected as unemployment compensation – government expenditures which grow during crisis and go down in time of boom. Government expenditures caused by Keynesian unemployment calculated as follows:

- the level of cyclical unemployment was estimated using Hodrik-Prescott filter,
- then the level of cyclical unemployment for each period of time (the gap between actual value and trend) was multiplied by the number of unemployed eligible to receive the unemployment benefits,
- to estimate the level of cyclical component of budget expenditures, above value was multiplied by the amount of unemployment benefit.

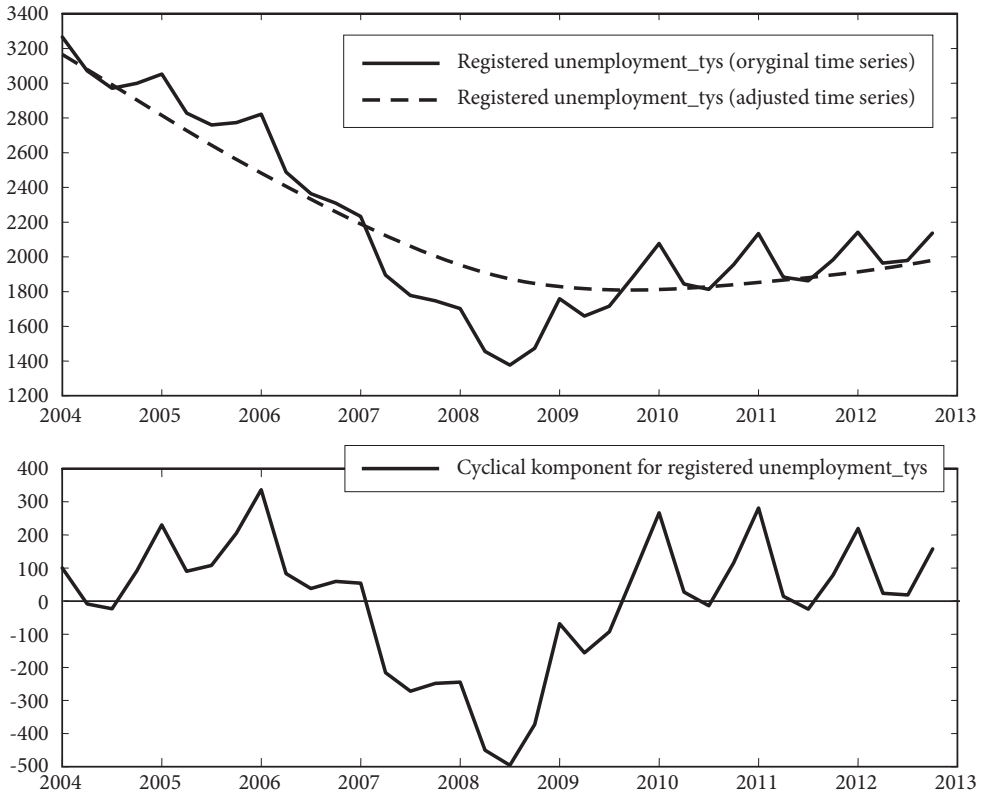


Figure 1. The level of unemployment in Poland in 2004-2012.

Source: Own calculations based on source data from GUS („Annual macroeconomic indicators 2007”).

As can be seen, the worst situation on the Polish labor market, reflecting the biggest increase of unemployed over the trend line (335 thousands) was in the first quarter of 2006. It is worth underlying that the level of unemployment hadn't reached that point even in the time of economic downswing after 2008. Despite the fact that Polish economy performed in crisis, it didn't affect the labor market conditions significantly. In subsequent quarters the rate of Keynesian unemployment gradually went down and reached its lowest point in the third quarter of 2008 at the level of 500 thousand below the trend line. According to Ministry of Labor and Social Policy registered unemployment monthly report, in 2004-2012 the number of unemployed eligible to receive unemployment benefits was on the level of 15,7% in relation to all unemployed. Relatively small number of unemployed people covered by compensation comes from the fact that time to search for jobs is longer than the period of determination the benefit. From 2004 to 2012 the average level of unemployment

benefit was about 580 Polish zloty (PLN). Relatively small number people eligible to receive unemployment benefits and also small its amount cause that the share of expenses for unemployment compensation in all government expenses is rather low.

Table 2. Cyclical component of government expenditures in Poland in 2004-2012.

	Cyclical component of government expenditures (in thousands)	GDP (in thousands)	Cyclical component of government expenditures in relation to GDP (%)
2004	80937.28	924 538 000	0.009
2005	325173.5	983 302 000	0.033
2006	271267.9	1 060 031 000	0.025
2007	-366831	1 176 737 000	-0.03
2008	-878651	1 275 508 000	-0.07
2009	-133038	1 344 505 000	-0.009
2010	250066.2	1 416 585 000	0.017
2011	232898.9	1 528 127 000	0.152
2012	290238.2	1 595 225 000	0.018

Source: Own calculations based on source data from GUS („Annular macroeconomic indicators 2007”).

Table 2 reports that increased government expenses for unemployment benefits were no higher than 0.15% in relation to GDP in the time of highest growth of unemployment and no lower than 0.03% of GDP when the situation on labor market was the best. It means cyclical nature of unemployment in Poland and its negative effects tend to weaken during expansion.

The model is generally constructed based on simple Keynes model which principles are price rigidity and available productive capacity in the economy. Of particular importance of Keynes model is the assumption that households consumption expenditures depend only on current disposable income available to spend after paying taxes and receiving transfers from government.

Effectiveness of automatic stabilizers on expenditure side studied using structural VAR models. The first VAR model allows to examine how changes in government expenditures affect the individual consumption which refers to all goods and services consumed by households. The first VAR model (VAR I) includes two variables cyclical component of government expenditure G_t and individual consumption D_t :

$$G_t = \mu_1 + \alpha_1 G_{1t-1} + \beta_1 G_{2t-1} + \varepsilon_1$$

$$D_t = \mu_3 + \alpha_3 D_{1t-1} + \beta_3 D_{2t-1} + \varepsilon_3$$

The second VAR (VAR II) model allows to study the relationship between government expenditures and sold production in industry. It has the following form:

$$G_t = \mu_1 + \alpha_1 G_{1t-1} + \beta_1 G_{2t-1} + \varepsilon_1$$

$$O_t = \mu_2 + \alpha_2 O_{1t-1} + \beta_2 O_{2t-1} + \varepsilon_2$$

All time series are taken from GUS database “Annual Macroeconomic Indicators 2007”. All variables are at quarterly frequency and time series run from 2004:1 to 2012:4. To convert exponential trends to linear trends logs of all variables are taken.

As a first step of a more detailed examination of the data properties and the final model specification, the stationarity property of the series has been analyzed using the Augmented Dickey-Fuller (ADF), the results are summarised in table 3.

Table 3. ADF test with constant and trend

	ADF test-statistics	lag	p-value
Cyclical component of government expenditures G_t	-2.2152	3	0.4805
Sold production in industry O_t	-2.83254	1	0.1854
Individual consumption D_t	-1.19195	3	0.9112

Source: Calculations performed using GRETL based on source data from GUS: “Annual macroeconomic indicators 2007”.

It can be seen from the table 3 that the null hypothesis of nonstationarity can be rejected for these variables at the 5% significance level.

In a second step the pairs of time series (G_t), (D_t) and (G_t), (O_t) are analysed for potential cointegration. This is done by applying Engle-Granger test.

Table 4. Cointegration test for time series (G_t), (D_t) oraz (G_t), (O_t)

	Sample size	ADF test-statistics (without constant and trend)
Time series (G_t) i (D_t)	31	-2.14235*
Time series (G_t) i (O_t)	31	-2.01716*

* rejection the null hypothesis of NOcointegration at the 5% significance level.

Source: Calculations performed using GRETL based on source data from GUS: “Annual macroeconomic indicators 2007”.

The Engle-Granger test indicates cointegration relationships for the variables (G_t) and (D_t) and also (G_t) and (O_t) at the 5% significance level. There is a stable, long-term relationship between the two pairs of variables so it is allowed to use VAR model to analyze impulse response function.

First, two VAR models were estimated: VAR I with three lags to simulate the dynamic response of the government expenditures cyclical component changes to individual consumption and VAR II with four lags to simulate the dynamic response of the government expenditures cyclical component changes to the industry production. The choice of lag length was made on the basis of Schwarz Bayesian, Hannan-Quinn and Akaike Information Criterion. Another stage of the analysis was an estimate of structural parameters of the VAR models. Results of the parameter estimate of the VAR models each consisting of 2 equations are in the table 5.

Table 5. Results of the parameter estimate of the VAR models for variables G_t and D_t and also G_t and O_t

Model I	Descriptive parameter	Variables estimation	
		G_t	D_t
	Coefficient of determination R^2	0.984453	0,998344
	Residual autocorrelation	0.218692	0,033245
	Test portmanteau	0.0374	
Model II		G_t	O_t
	Coefficient of determination R^2	0.735659	0,983768
	Residual autocorrelation	-0.084358	0,191540
	Test portmanteau	0.0201	

On the basis of the data from the above Table it can be noted that the residuals of each equation are not correlated. Each equation residual autocorrelation indicator is low and p-values for Portmanteau Tests are bigger than 0,01 which allow to accept the null hypothesis that there is no serial correlation in a time series. Then, the basic condition to estimate time series model was fulfilled. It is worth underlying high R-squared value which is typical for VAR models. All additional statistical tests for the VAR models are presented in Table 6.

According to the reported Ljung-Box (Q) tests, residuals from the VAR models have no autocorrelation. The Doornik-Hansen test for multivariate normality confirms the presence of a normally distributed random variable. Test for Multivariate ARCH Effects confirms homoscedasticity of random variables. Results of tests carried out confirm properly specified structural econometric model describing the impact of government expenditures on real economy. Nevertheless the basic condition of model practical application is the condition for model stability. The necessary and sufficient condition for stability is that all characteristic roots have absolute value less than one and lie inside the unit circle.

Table 6. Diagnostic checks for models VAR I i VAR II

	Test		Value from the statistical test	Critical value	Test performance
Model I	Checking the residuals for autocorrelation – Ljung-Box Q' test	Equation 1	3.03655 p – value = 0.552	Chi-kwadrat(4) 9.48773	$p = P(\text{Chi-kwadrat}(4) > 3.03655) = 0.552$ – residuals are not autocorrelated
		Equation 2	1.30489 p – value = 0.861	Chi-kwadrat(4) 9.48773	$p = P(\text{Chi-kwadrat}(4) > 1.30489) = 0.861$ – residuals are not autocorrelated
	Tests for heteroskedasticity – testing for ARCH effect	Equation 1	The Lagrange Multiplier test statistic is given by: LM = 5.83849 p value – 0.211539	Chi-kwadrat(4) 9.48773	$p = P(\text{Chi-kwadrat}(4) > 5.83849) = 0.211539$ – random variables is homoscedastic
		Equation 2	The Lagrange Multiplier test statistic is given by: LM = 2.49569 p value - 0.645407	Chi-kwadrat(4) 9.48773	$p = P(\text{Chi-kwadrat}(4) > 2.49569) = 0.645407$ – random variables is homoscedastic
	Doornick-Hansen test for multivariate normality		Chi-kwadrat(4) = 12.9326	13.2767	Chi-kwadrat(4) = 12.9326 [0.0116] – random variable normally distributed
Model II	Checking the residuals for autocorrelation – Ljung-Box Q' test	Equation 1	1.90779 p value – 0.753	Chi-kwadrat(4) 9.48773	$p = P(\text{Chi-kwadrat}(4) > 1.90779) = 0.753$ – residuals are not autocorrelated
		Equation 2	6.97749 p value - 0.137	Chi-kwadrat(4) 9.48773	$p = P(\text{Chi-kwadrat}(4) > 6.97749) = 0.137$ – residuals are not autocorrelated
	Tests for heteroskedasticity – testing for ARCH effect	Equation 1	The Lagrange Multiplier test statistic is given by: LM = 0.252171 p value - 0.992689	Chi-kwadrat(4) 9.48773	$p = P(\text{Chi-kwadrat}(4) > 0.252171) = 0.992689$ - random variables is homoscedastic
		Equation 2	The Lagrange Multiplier test statistic is given by: LM = 0.658818 p value - 0.956309	Chi-kwadrat(4) 9.48773	$p = P(\text{Chi-kwadrat}(4) > 0.658818) = 0.956309$ – random variables is homoscedastic
	Doornick-Hansen test for multivariate normality		Chi-kwadrat(4) 9.48773	8.60965	$p = \text{Chi-kwadrat}(4) = 8.60965$ [0.0716] – random variable normally distributed

Source: Own calculations based on GRETL.

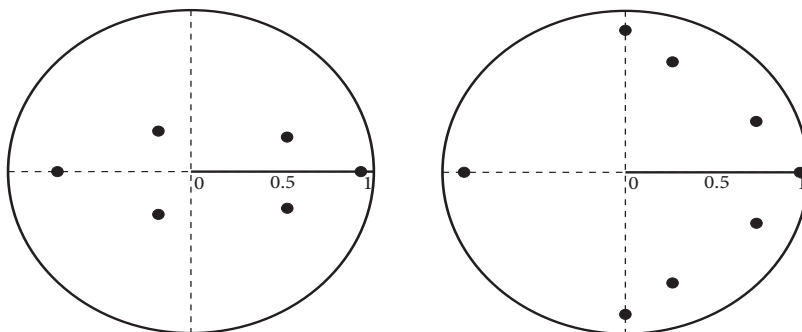


Figure 2. Roots of the characteristic equation for models VAR I i VAR II.

Source: Calculations performed using GRETL based on source data from GUS: “Annual macroeconomic indicators 2007”.

In estimated models all roots (6 roots in VAR and 8 in VAR II) are smaller than 1 in absolute value. The model is stable so it is allowed to estimate the strength of mutual interaction between government expenditures cyclical component and individual consumption and also government expenditures cyclical component and sold industry production. Below one can see respective graphs of the impulse response functions of individual consumption and sold industry production to a one-time unit change of the government expenditures cyclical component.

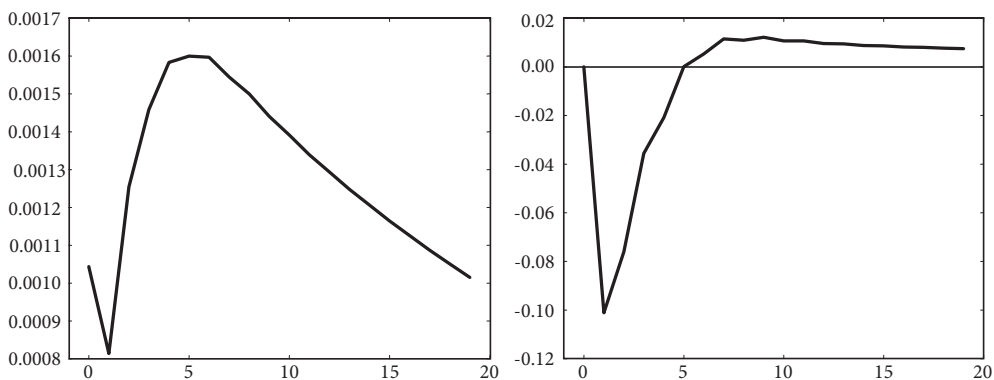


Figure 3. Impulse response function of government expenditures cyclical component and individual consumption in Q1.2004-Q4.2012: a) Impulse response function of individual consumption to government expenditures cyclical component, b) Impulse response function of government expenditures cyclical component to individual consumption

Source: Calculations performed using GRETL based on source data from GUS: “Annual macroeconomic indicators 2007”.

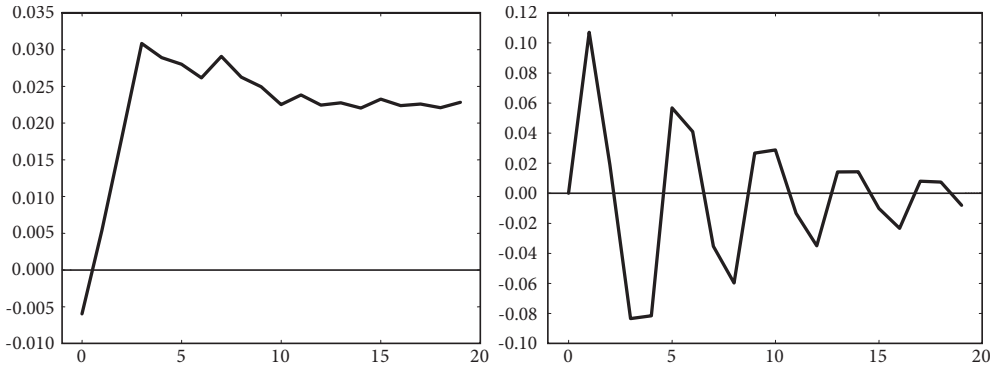


Figure 4. Impulse response function of government expenditures cyclical component and sold production in industry in Q1.2004-Q4.2012: a) Impulse response function of sold production in industry to government expenditures cyclical component, b) Impulse response function of government expenditures cyclical component to sold production in industry

Source: Calculations performed using GRETl based on source data from GUS: “Annual macroeconomic indicators 2007”.

Figures 3 and 4 present the response of individual consumption and sold production in industry to a government expenditures cyclical component shock. As can be seen in Figure 3 government expenditures cyclical component shock leads to immediate rise of private consumption in the first quarter. Private consumption maintained its growth trend up to 6th quarter reaching maximum in the 5th quarter after the subsequent quarter stabilization occurs. As in the case of private consumption, a positive government expenditures cyclical increases sold production in industry. Significant increase of production following the government expenditures occurs in the first quarter but the growth trend maintained only up to the 3rd quarter. Then it starts to decrease and stabilizes after 10th quarter elapses.

Generally, the positive response of production and private consumption to an expenditures shock is compatible with Keynesian theory macroeconomic effects of fiscal policy. Nevertheless, it is worth underlying that industry production response to an expenditures shock is much stronger than individual consumption response. The IRF function maximum value in the first quarter is three times bigger in the case of industry production response to an expenditures shock than individual consumption response.

Rotemberg and Woodford demonstrate that in a new Keynesian model with oligopolistic pricing an increase in government expenditures has indeed an effect on firms labor demand as long as it lowers the mark-up of prices over marginal costs. This leads to an increase in real wages, private consumption and output even with a constant labor supply (Rotemberg and Woodford (1988), p. 44).

Conclusions

This paper has presented the evidence on the effects of passive fiscal policy on the economy in Poland based on the structural VAR approach. The result of this analysis is that there is a positive response of consumption and production to expenditure shocks. The results also suggest that effect of public expenditures cyclical component on individual consumption is weaker than effect on industry production. Instead, in both cases this effect is almost immediate and refers to the first quarter.

Despite the reasonable results obtained, the methodology presented in the paper has its drawbacks. The effectiveness of automatic stabilizers on the expenditure side would be probably bigger while taking into account other stabilizing tools (e.g. social security contributions).

These results have to be interpreted in the light of Polish membership in European Monetary Union and limited possibilities to use discretionary fiscal policy in stabilizing the output.

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