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DISCRETIONARY COMPONENT OF FISCAL POLICY IN UKRAINE

Abstract

In the article author sets a goal to assess cyclically adjusted budget balance (*CAB*) in Ukraine and employ this indicator for analysis of fiscal policy cyclicality. Parameters needed for assessment of *CAB* are estimated with application of VECM approach. Results obtained lead to conclusions about procyclicity of fiscal policy in Ukraine accompanied with significant internal lags, what is confirmed by estimates with usage of alternative government discretionary fiscal policy measurements.

Key words:

Cyclically adjusted budget balance, discretionary fiscal policy, cyclicality of economy.

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I. Introduction and literature review.

Identification of discretionary fiscal policy activity of the government is important and meanwhile complex problem in conducting empirical macroeconomic research. The challenge which researcher has to resolve is to distinguish between automatic reaction of fiscal balance which is caused by economic fluctuations and discretionary actions of government in macroeconomic regulation through the budget instruments. Discretionary measures of fiscal policy may be interesting for researches because of various reasons and first of all for modeling an economy reaction on fiscal shocks. In his previous researches the author investigated cyclicality of monetary and fiscal policy in Ukraine and concluded that the later is acyclic. For the purpose of discrete fiscal policy component identification we employed VAR-model. While discussing results of research colleges and experts often noted that a cyclically adjusted budget balance (*CAB*) should be used as an indicator of discrete fiscal policy actions. In this article the author estimates this indicator, makes assessment of fiscal policy cyclicality parameters in Ukraine with CAB application and compares results with those that were obtained earlier. Using the CAB as a measure of discretionary fiscal policy measures arises a number of problems of theoretical and practical nature which were pointed out in a previous article of the author (Vdovychenko, 2012). However this indicator stills an important measure of the state's fiscal position and requires periodic assessment. Technical aspects and different approaches to CAB evaluation are presented in (Cour-Thimann et al., No., 77; Hagemann, IMF working paper; Fedelino, IMF Technical Notes and Manuals 09/05). Parameters of fiscal policy cyclicity are estimated in a series of macroeconomic researches. High degree of actuality for Ukraine performs research of V. Zymovets where the thesis of Ukrainian fiscal policy procyclicity is stated, however this statement wasn't proved on empirical level (Zymovets, 2010, p. 356). In Philip Lane's research on empirical level was shown that governments of high volatility economies with low power concentration are inclined to running procyclical fiscal policy. Channel of procyclical fiscal policy realization to high extend are wages in public sector of economy (Lane, 2003, p. 2661–2675). Ernesto Talvia and Carlos Végh (Talvia and Végh, 2005, p.156–190) ascertain acyclic fiscal policy in G7 countries, meanwhile in developing countries fiscal policy is procyclical. Such facts are explained by authors with employing optimal fiscal policy model where supporting budget surpluses is costly because of incentives for increasing public expenditures in these conditions. In another analogous research (Ilzetzki, 2011, p. 30–46) the author makes similar conclusions concerning parameters of fiscal policy cyclicity in various countries, however gives different explanation to procyclicity phenomenon. In mentioned article into optimal fiscal policy model, which is countercyclical by initial conditions, introduced the «political friction» factor according

to it all subsequent governments are disagree with predecessors concerning desirable public expenditures distribution. «Political friction» is exactly the factor, as author asserts, that leads to procyclical fiscal policy formation and explains this process better than other commonly referred factors like debt constraints, macroeconomic volatility.

In publications referred, policy analysis is conducted using various methods for identification of discretionary component of fiscal policy, including *CAB*. The rest of the paper is organized as follows: in Section II is presented the goal and objectives of the study, Section III is devoted to presentation of main results, conclusions from the empirical results presented in Section IV.

II. The goal and objectives of the study

The goal of the study is to estimate CAB for Ukrainian economy and assess cyclicality of fiscal policy with its help. Comparison of the results with earlier ones provides a better understanding of the fiscal policy cyclicality parameters in Ukraine, despite the ambiguity of CAB as an indicator of discretionary action by fiscal authorities.

III. Basic material presentation

The first thing to note, referring to the cyclic data correction – we have to operate with a certain method of decomposition time series on trend and cycle. Regarding statistical approaches to decomposition of time series, their respective characteristics and the economic interpretation of the trend and the cyclical components a huge number of publications exists, and scientific debates are conducted starting from the 70-ies of the last century, so we refer just a few seminal studies (Box and Jenkins, 1970, p. 500; Nelson and Plosser, 1982, p. 139–162; Chan et al., 1977, p. 737–744; Granger and Newbold, 1974, p. 11–120; Durlauf and Phillips 1988, p. 1333–1354; Nelson and Kang, 1981, 741–751). We shall not concentrate attention on the technical side of the issue; we note only that the cyclical position of the economy is determined by comparing the actual macroeconomic situation with the so-called «normal». According to the general practice assessment of the later is made through the usage of statistical filters, the usual one is Hodrick-Prescott. Budget impact of cyclical fluctuations of the economy (cyclical component of the budget balance) is calculated through fiscal elasticities. Since the fiscal position is determined in real terms, fiscal elasticities point to the impact of real indicators on the budget. Fluctuations in inflation and relative prices are excluded from the analysis. These fluctuations also have a significant

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impact on the budget, but to estimate their effect is difficult, moreover, it depends on the institutional features of each country. Furthermore, it is difficult to identify an automatic and permanent effect of prices on the budget, since it depends on, among other things, on whether or not price fluctuations were expected.

Building an adequate indicator of the CAB is based on two stages: decomposition of the time series representing macroeconomic base for the formation of budget items on cyclical and trend components; calculation the elasticity of budget revenues or expenses, which may depend on the cyclical fluctuations of the economy on the basis of their formation. Elasticities can be calculated by constructing a regression or through analysis of changes in the tax and budget legislation and detailed information on the distribution of revenues. Each approach has its advantages and disadvantages. The standard econometric approach to the assessment of budget elasticities is based on regression of fiscal variables (revenues and expenditure) on indicators of economic activity. Sometimes variables included in the regression to control the variation of variables for specific country conditions, time trends, tax reforms, other discretionary measures, etc.

It should be noted that the elasticity can be calculated using two regression specifications. In the first one an aggregated time series are used for estimations, in the second – cyclical components of time series. These two approaches produce slightly different interpretations. The first approach is based on the percentage change of variables and therefore indicates the elasticity, which reflects the reaction of budget balance to changes in economic activity. The second approach, based on gaps of indicators focuses on the cyclical component of budget and economic changes. This approach is more suitable for the calculation of the CAB, but the estimation of elasticity in this case depends on the method of economic time series detrending and correction for the structural change in the economy.

In this study, we estimate the elasticities of budget items which are affected by cyclical fluctuations of the economy on their macroeconomic bases. Conducting estimations, we evaluated the long-term relationship between variables through the exploitation of cointegration and running error correction regressions (VECM). Existence of cointegration between the majority of fiscal variables and corresponding components of GDP allowed us to estimate the elasticities using basic model[1]:

$$\Delta \ln B_t^j = \alpha + \beta\left(\ln B_{t-1}^j - \gamma \ln V_{t-1}^j + \varphi\right) + \sum_1^i \delta_i \Delta \ln V_{t-1}^j + dum + A + \varepsilon, \qquad (1)$$

[1] All next elasticity coefficients are derived from cointegrating relationships that have statistical significance over 95%. Time series analyzed in this article are I(1)-processes, this hypothesis has ADS-GLS test confirmation. Parameters mentioned are not shown in the article because of space scarcity and for readers' time economy.

where, B_t^j – an item of budget revenues or expenses j, V_t^j – corresponding component of GDP, which is the base for budget revenues and expenses formation, A – a variable that accumulates discretionary measures of fiscal policy and other relevant parameters of the economy, α – constant, γ is a coefficient of long-term relationship between the variables, the parameter δ_i indicates short-run simultaneous and lagged elasticities B_t^j on V_t^j, *dum* – a dummy variable indicating the period of structural change in the economy of Ukraine (4 quarter of 2008., 1 quarter of 2009). To obtain long-term elasticity, we need to estimate the coefficient *γ*. We need to note some technical details that affect the results of estimations and must be supported by certain logic of research:

1) for each model, the number of lags (*i*) was chosen in such a way as to remove residuals autocorrelation of the first and higher order, to ensure normal distribution of residuals and the stability of the model;

2) deterministic part of the cointegration relationship has only constant. Thus, we implicitly assume that both variables that are included in each of the models (an item of budget revenue/expenditures, macroeconomic base for formation of these revenues/expenses) share a common stochastic trend[2];

3) models were specified under the assumption that the base of budget items formation contains a trend, which drives the entire system of relationships between variables. In other words, the formation of budgetary performance is a consequence of changes in the relevant macroeconomic framework.

Let's stop on the budget variables and appropriate macroeconomic bases of their formation, basing on which the elasticities calculated and which are taken into account when calculating the CAB. As usual four broad items of revenue and one of expenditures are marked out as those being under the influence of cyclical fluctuations in the economy: direct taxes on households; corporations' direct taxes; indirect taxes; social insurance contributions; expenditures associated with unemployment. The last tem is not only unemployment benefits but also includes all other social transfers associated with unemployment. All other budget items, following the standard practice, are considered to have zero elasticity with respect to the business cycle.

For each category of the budget, which is adjusted for cyclical fluctuations shall be determined appropriate macroeconomic base. Basically direct taxes on households and contributions to social insurance funds are related to the level of wages in the private sector. Indirect taxes have correspondence to private consumption, direct taxes on enterprises – to the gross financial result before taxa-

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[2] We don't include deterministic trend because there are serious theoretical and empirical doubts concerning determinism of output and GDP components in Ukraine. For detailed analysis of this field we recommend to read next papers [10, 13, 15].

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tion, the unemployment expenditures – with the number of unemployed. Therefore, the elasticity is calculated with respect to these items. Since the revenue and expenditure side of the budget can be divided into numerous categories of larger or smaller scale, it should be born in mind that they all have different bases elasticities. The principle of obtaining broad budget item elasticity with respect to correspondent base is that it is a weighted average of the elasticities of the smaller items. We need to take into account the fact that there are budget items that are acyclic, that is they don't responding to the cyclical fluctuations of business activity and the corresponding elasticities are zero. For the calculation of budget balance cyclical component in estimates are used only those categories of income and expenses that have nonzero elasticity. Another important point is that, even within a particular budget item may exist financial flows that have zero elasticity with respect to macroeconomic base. This situation arises due financial flows acyclicity or falsity of the selected base. An example is withholding tax in Belgium, levied on the sale of real estate, which is an indirect tax, but is not directly related to the level of consumption. Such a tax also exists in Italy and Portugal, where it is charged on interest income being in effect a tax on personal income, but not being directly related to the level of wages.

For the purposes of our study, we used a method of calculating the CAB, which is often used by central banks for calculations and provides extensive use of filters to decompose a time series:

$$
B_{c,t}\big/Y_t = \sum_j R_t^j\big/Y_t \times \varepsilon_{R^j,V^j} \times v_{c,t}^j - X_t^U\big/Y_t \times \varepsilon_{X^U,U} \times u_{c,t} - X_t^G\big/Y_t \times \varepsilon_{\omega_g,\omega_p} \times \omega_{p,c,t}, \quad (2)
$$

where, $B_{c,t}$ – cyclical fiscal balance; Y_t – GDP; R_t^j – a certain item of revenue; ε_{R^j,V^j} – the elasticity of revenues with respect to appropriate macroeconomic base (V^j); $v_{c,t}^j$, $u_{c,t}$, $\omega_{p,c,t}$ – the relative cyclical indicator values; U – the number of unemployed; X_t^U – budget expenditures related to unemployment; X_t^G – wage costs in the public sector; ω_g, ω_p – the average real wage in the public and private sectors. The relative cyclical indicators are calculated:

$$
x_{c,t} = \log(X_t) - \log(X_t^*), \quad (3)
$$

where X_t^* – a trend of indicator[3].

This approach is the extended version of the OECD method, it also allowed to change the relative weights of the different budget categories. In addition, this approach attempts to capture the impact on the budget of changes in

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[3] Decomposition of time series on trend and cyclical component conducted through the use of Hodrick-Prescott (H-P) filter.

the structure of aggregate demand and income distribution. A more detailed analysis of the method is given in (Cour-Thimann et al., European Central Bank, No 77).

In our estimations, we used a modification of the referenced approach. For cyclical correction were analyzed quarterly fiscal and macroeconomic indicators for the period 2001–2011. In our case, were calculated the elasticities of various revenue and expense items with respect to the relevant macroeconomic bases. For the revenues side: personal income tax – the disposable income of the population; the corporate income tax – gross operating surplus; value added tax – final consumption expenditures, the excise duty on goods produced in Ukraine, excise duty on imported to Ukraine goods, the import duty – final consumption expenditure. For expenditure side: wages of public institutions – the level of wages in the private sector; transfers from the budget to the Pension Fund – wages of the population of Ukraine. Note that variables presented are somewhat different from those proposed in the method to which we refer. This is caused by the fact that some data can't be formed with the required accuracy and discreteness, for example – the number of people employed in the public sector. In such cases, we carried out the indicator replacement to one that is more affordable and also well approximates necessary economic processes. The author also analyzed a number of other elasticities between the budget items and relevant bases, which may exhibit cyclical fluctuations and impact on the budget. For instance, we have included in estimations consolidated budget transfers to the pension fund as a pension fund in Ukraine is in a state of permanent deficits and requires stable funding from the budget. The magnitude of these budget transfers should depend on the magnitude of under-funding of the pension fund income, which depends on the amount of legal wage in the economy. On the other hand, unemployment budget expenditures are not directly related to cyclical fluctuations in employment, because such expenditures are made from extra-budgetary funds. However, by analogy with the pension fund transfers from the budget may exist, which can be related to economic cycles. This possibility we also took into account in the estimations. Further we will focus on the variables that have demonstrated sensitivity to the cyclical fluctuations of the economy. Variables not included in this analysis showed zero elasticity.

Before estimates all time series were transformed in constant prices of 2007 and seasonally adjusted. Using the approach of (1) we have evaluated two types of elasticity – the elasticity of each income and expenditure budget item with respect to GDP and the elasticity of mentioned items with respect to the relevant macroeconomic bases. The results are presented in Table 1.

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Table 1

**Elasticity coefficients of various budget revenue and expense items
with respect to relative macroeconomic bases**

| Budget item	Macroeconomic base	Elasticity coefficients*
Personal income tax	GDP	1 [16,3]
	Disposable income	0,65 [9,4]
Corporate income tax	GDP	1 [9,6]
	Gross operating surplus	0,24 [2,78]
Value added tax	GDP	1,72 [12,7]
	Final consumption	1,7 [7,63]
Excise duty on goods produced in Ukraine, excise duty on imported to Ukraine goods, the import duty	GDP	1,18 [10,34]
	Final consumption	0,97 [11,88]
Wages of public institutions employees	GDP	1 [18,9]
	Wage in private sector of economy	1 [16,3]
Budget transfers to Pension Fund	GDP	0,65 [9,4]
	Wage in overall economy	1 [9,6]

* in parentheses t-statistic of corresponding coefficients is given.

Preliminary analysis of the elasticities suggests some unexpected conclusions for VAT and transfers to the Pension Fund of Ukraine coefficients. The elasticity of VAT on final consumption and GDP would be close to 1. Cause for overestimation to 1,7 we see in the system of tax refund to exporters, which resulted in large sums of tax to remain in the budget. Situation with high elasticity for transfers to the Pension Fund is a bit more complicated. Theoretically, we expected to find out that coefficient belongs to the interval [0, −1]. That is, increasing legal wages and GDP reduces the deficit of the Pension Fund of Ukraine and

the burden on consolidated budget. However, if we compare the dynamics of transfers and wages, we can see that both mightily rose up together during 2003–2005 (Fig. 1). If we calculate the coefficient of elasticity for the period 2005–2011, we obtain a value of 0,4–0,5. The elasticity is greatly reduced, but not qualitatively changed – wage growth is accompanied by increased demand for additional funding of the pension fund from the budget[4]. This paradoxical situation is due to the fact that expenditures of the pension fund are growing much faster than legal households' income[5]. A number of reasons for this situation might be noted (aging of population, a significant income shadowing, disparities in the distribution of pensions, poor management of the Pension Fund assets, etc.), which are outside the scope of this article.

Figure 1

The dynamics of seasonally adjusted real transfers from the budget to the Pension fund (a) and the wages of Ukrainian population (b) for the period 2001–2011 (in logs)


(а)   (б)

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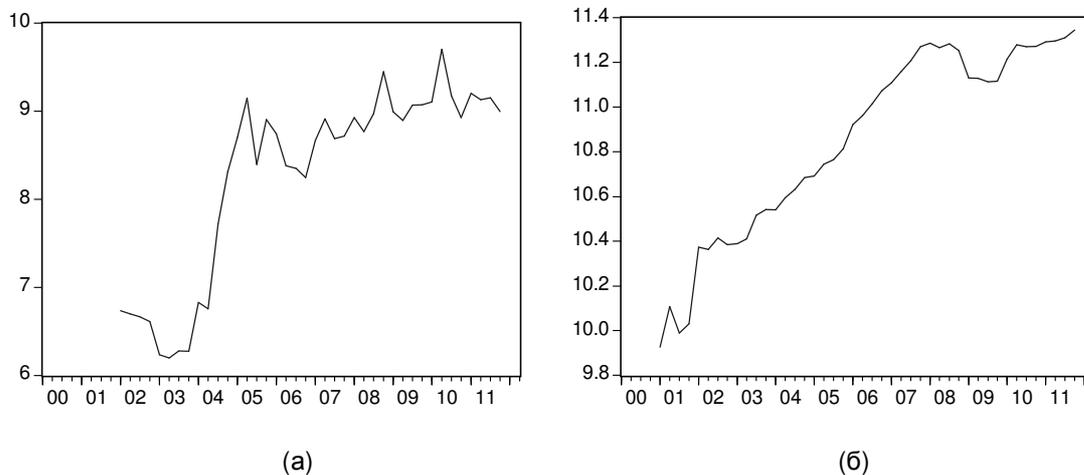
[4] We have made all further calculations presented in the article employing these elasticities. The overall result still unchanged.

[5] According to statistics of Pension Fund of Ukraine and State Statistics Service of Ukraine for the period 2002–2011, the nominal figures of total Pension Fund expenditures and wage income on average increased year-to-year by 29% and 25% respectively.

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After the calculation of elasticities we assessed the cyclically-adjusted budget balance according to the model (2) with a single specification – budget unemployment expenditures have zero elasticity with respect to unemployment fluctuations in Ukraine, thus they are not taken into account. Instead were introduced transfers from the budget to the pension fund, which, as shown above, are strongly related to fluctuations in GDP and wages in Ukraine. Annual dynamics of real seasonally adjusted budget balance to GDP ratio (B/GDP), *CAB*, calculated on the basis of elasticities with respect to GDP (Btr/GDP), *CAB*, calculated on the basis of the elasticities with respect to the corresponding bases of budget items (Btr/V) presented in Figure 2.

Figure 2

Dynamics of cyclically adjusted budget balance in Ukraine[6]
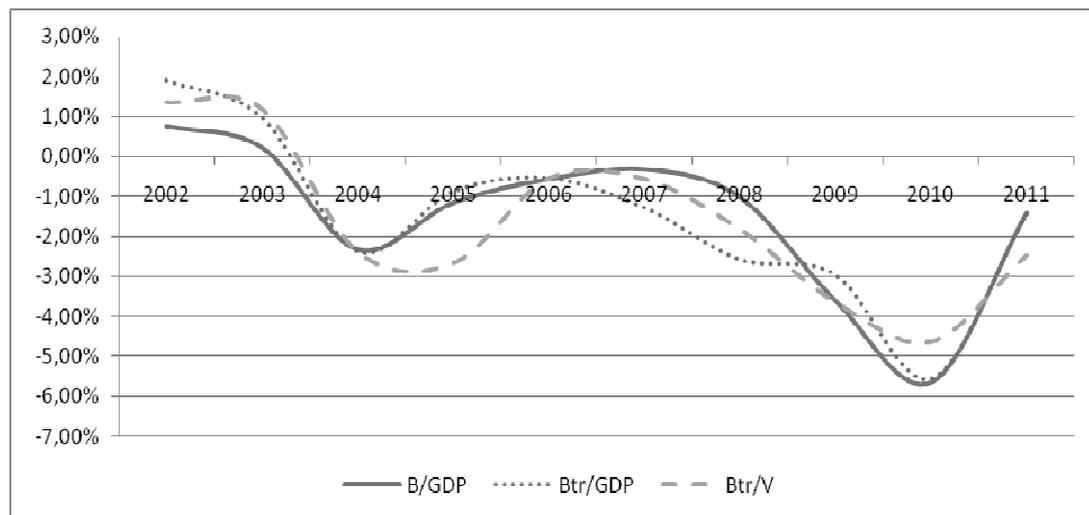
In the final phase of our study we compare cyclicality parameters of discretionary fiscal policy measures in Ukraine, which were identified through two variants of CAB and through the use of VAR-model. In previous paper to extract discretionary component of fiscal policy, we have built bivariate VAR-model for real seasonally adjusted GDP and primary fiscal deficit of Ukraine in constant prices

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[6] In majority of quarters in 2008 and 2009, the basis for corporate income tax formation (gross operating surplus) was negative. Since the natural logarithm of a negative number is a complex number, the interpretation of this result is problematic. For these periods cyclical component of corporate income tax revenues were calculated not through elasticity but employing a marginal effect (0.2), which was estimated by the same principles.

of 2007. Primary deficit was calculated by us as a consolidated budget deficit less expenditures on public debt servicing. Number of lags in the model was set in such a way as to remove the autocorrelation of residuals. Residuals obtained by modeling should reflect discretionary fiscal policy measures of the government. We call this indicator «discretionary budget deficit» in the rest of the article. Correlation coefficients of all three indices with cyclical fluctuations in real GDP of Ukraine are presented in Table 2. Given the possibility of fiscal policy reaction to cyclical fluctuations of economy with some delay, we present the correlation coefficients in the table for a number of lags. Note that we employed Hodrick-Prescott filter for decomposition of GDP on cyclical and trend component.

Table 2

Correlations between GDP cycle and fiscal policy measures

GDP cycle	t	t-1	t-2	t-3	t-4	t-5	t-6	t-7	t-8	t-9	t-10
Discretionary budget deficit	0,23	0,22	0,22	0,09	0,029	-0,021	-0,29	-0,42**	-0,43**	-0,33	-0,2
Btr/GDP	0,2	0,01	0,02	-0,03	-0,045	-0,07	-0,24	-0,37*	-0,38*	-0,32	-0,3
Btr/V	0,26	0,1	0,05	-0,04	-0,079	-0,11	-0,21	-0,28	-0,27	-0,22	-0,2

* – 5% confidence interval; ** – 1% confidence interval.

The results reveal two important points, which we have not paid attention earlier. First, maintaining fiscal policy acyclicity in a previous study, we did not consider the possibility of longer internal lags in adopting fiscal decisions. Table 2 shows that the relationship between measures of discretionary fiscal policy and business cycle occurs with a lag of two years. Previously we assumed that the effect should be indicated within a maximum of six quarters. Second, the conclusion of fiscal neutrality requires revision. Negative correlation coefficients indicate that during negative phase of the economic cycle (the economy under the trend of its development) budget deficit was declining or surplus emerged. If the economy was overheated budget deficit increased. Thus, we should talk about the procyclicity of fiscal policy in Ukraine with considerable internal lag of 7–8 quarters.

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IV. Conclusions

In this article, we evaluated the cyclically adjusted budget balance for the economy of Ukraine, somewhat modifying existing approach for local conditions. The resulting elasticities of certain budget items with respect to corresponding macroeconomic may be of interest for future research in this area. An important conclusion is that the usage of the *CAB* indicator calculated in this study, and the discretionary budget deficit variable, which we used previously to identify the fiscal policy, leads to similar conclusions. The correlation coefficients of these indicators with cyclical fluctuations in output of Ukraine reach maximum value and become statistically significant with a lag of 7–8 quarters. As to fiscal policy in Ukraine itself it can be stated about its procyclicity and significant internal lags of decisions.

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