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FISCAL POLICY EFFECTS IN UKRAINE

Abstract

This paper empirically analyses fiscal policy effects in Ukraine using different identification strategies within the framework of a vector error correction model (VECM). For quarterly data from 2001 to 2016, we find a robust positive impact of both government expenditure and net revenue upon output in Ukraine, which closely corresponds with the predictions of the Mankiw-Summers model in the case of high demand for money in relation to consumption expenditure combined with significant investment elasticity in relation to the interest rate. In other respects, the fiscal policy transmission mechanism exhibits several standard features (such as an increase in government expenditure after a positive shock to revenue or a widening of the budget deficit following an interest rate hike). The results suggest the feasibility of revenue--based fiscal consolidation policies in Ukraine, as better tax collection may contribute to economic growth even in the short run. Since there is a robust conventional inverse relationship between interest rate and output, one of the puzzling results is that government expenditure puts downward pressure on the former, with net revenues being neutral in this respect. Real exchange rate (RER) depreciation is behind the decrease in output in the baseline model, but alternative identification schemes suggest that it is likely to be contractionary in the short run while turning expansionary in the long run.

Keywords: fiscal policy, output, interest rate, real exchange rate, Ukraine.
JEL Classification: C5, E1, E6, H6.

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1. Introduction

Although there is a wide consensus that fiscal consolidation is necessary in order to restore the economic growth in Ukraine, it is not so clear whether expenditure-reducing policies are preferable to revenue-based measures. Both the theoretical arguments and empirical evidence are mixed, with transformation economies not being an exception. In accordance with the policy implications of the standard Keynesian model, expansionary effects of higher government expenditure are found for Croatia (Deskar-Škrbić & Šimović 2015), the Czech Republic (Franta 2012, Klyuev & Snudden 2011), Poland (Haug, Jedrzejowicz & Sznajderska 2013, Laski, Osiatynski & Zieba 2010, Mirdala 2009), Serbia (Hinić & Miletić 2013) and Slovakia (Mirdala 2009, Zeman 2016). Fiscal multipliers of government expenditure in Serbia may reach 0.5–0.6 in times of recession, but they are almost insignificant in periods of expansion (Petrovič & Brĉerevič 2014). The same weak stimulating effect of government expenditure is found for Romania (Boiciuk 2015, Serbanoiu 2012) and Bulgaria (Mirdala 2009, Muir & Weber 2013), providing further support for the general view in the literature that fiscal multipliers are higher during periods of economic recession (Benčik 2014, Karagyozova-Markova, Deyanov & Iliev 2013). No impact of government expenditure on output is found for Slovenia and Serbia (Deskar-Škrbić & Šimović 2015). Using a panel VECM, J. Combes, A. Minea, I. Mustea, and T. Yogo (2016) assert that the expenditure multiplier is positive, but low on average, with its sign, significance and magnitude varying across CEE countries. As obtained for a panel of 10 Central and East European countries by P. Petrović, M. Arsić, and A. Nojković (2014), the government expenditure multiplier is rather high on impact at 0.6 but declines to just 0.2 in the long run (the stimulating effect is much stronger under a fixed exchange rate).

Examples of non-Keynesian effects that imply output growth in the case of government expenditure cuts or higher taxation are not lacking either. For example, G. Tondl (2004) finds negative output effects of government expenditure both in the panel data estimates for 7 CEE countries and in individual country estimates for Hungary, Lithuania, Romania and Poland (to a lesser extent), along with Portugal, Ireland, Greece and Spain (all these euro areas, the so-called PIGS countries, were in the epicentre of future debt problems at the beginning of the 2008–2009 world financial crisis). Only Slovakia demonstrates a positive relationship between government expenditure and growth, with Bulgaria being a neutral case. A. Rzońca and

P. Ciżkowicz (2005) provide evidence that fiscal consolidation in 8 CEE countries contributed substantially to the acceleration of output growth.

The response of output to a government revenue shock is rather negative for the Czech Republic (Franta 2012, Snudden & Klyuev 2011), Slovenia (Jemec, Kastelec & Delakorda 2011) and Slovakia (Zeman 2016). The same outcome is found for Croatia and Slovenia, but the opposite positive effect is observed in Serbia (Deskar-Škrbić & Šimović 2015), Bulgaria, Hungary, and Romania (Mirdala 2009). However, another study for Croatia demonstrates that revenue shock permanently increases industrial production, while in Chile expenditure shock is restrictionary (Ravnik & Žilić 2011). The tax multiplier is close to zero for Poland (Haug, Jedrzejowicz & Sznajderska 2013, Mirdala 2009). In the aforementioned study by G. Tondl (2004), taxation in a broader sense as measured by government revenue is found to be pro-growth for the CEE countries, while the opposite negative effect is obtained for the PIGS countries. However, P. Petrovič, M. Arsić, and A. Nojković (2014) found no effect of net revenues on output for the former, regardless of the exchange rate regime.

R. Mirdala (2009) finds that for the Czech Republic both government expenditure and revenue are expansionary. The same result is obtained for Bulgaria by K. Karagyozova-Markova, G. Deyanov, and V. Iliev (2013), although it is not robust with respect to the choice of estimation method. Calibration of a DSGE for Slovakia demonstrates that a combination of increases in government transfers as well as taxes can stabilise the economy in the short run and improve longer-term growth prospects following a shock with adverse fiscal implications (Múčka & Horváth 2015). Such findings could be interpreted in favour of the Mankiw-Summers model (Mankiw & Summers 1986), which explains a possible symmetry of expenditure and tax effects by modelling the demand for money function in a disaggregated manner, with such components of income as consumption, investments, and government expenditure being included separately. Regardless of a particular modelling setting, the interest rate and income elasticities of money demand are considered to be important factors behind fiscal policy effects, besides such structural features as the existence of nominal rigidities in the economy, the elasticity of labour supply, the interest rate elasticity of investment, the degree of openness of the economy, the exchange-rate regime or the magnitude of wealth effects (De Castro & de Cos 2008). The Mankiw--Summers model provides a middle ground in the discussion on the architecture of fiscal consolidation programmes. While standard Keynesian models imply contractionary effects of higher taxes and government

expenditure cuts, the models of so-called non-Keynesian effects provide positive output responses to both types of fiscal consolidation measures.

Although it is common in empirical studies to prefer government expenditure cuts over revenue-based consolidations (Alesina & Ardagna 2010, Alesina, Favero & Giavazzi 2015), including the experience of fiscal consolidations in the CEE countries for the 1991–2003 period (Afonso, Nickel & Rother 2006), there is evidence is that higher taxes could stimulate private consumption (Giavazzi *et al.* 2005). Even though it is customary to consider tax multipliers for the CEE countries to be small and short--lived, as implied by contradictory results from VAR models with different identification techniques (Karagyozova-Markova, Deyanov & Iliev 2013), it is not confirmed that a positive revenue shock could be expansionary.

This paper analyses fiscal policy effects in Ukraine using a range of VECMs. More specifically, the aim of this paper is to test the predictions of the Mankiw-Summers model of symmetrical government expenditure and net revenue effects on output.

Similar to other studies, for example Karagyozova-Markova, Deyanov & Iliev (2013) or Franta (2012), the results of a standard VECM with a recursive identification scheme are used as a benchmark for alternative modelling specifications. Section 2 reviews an open economy extension of the Mankiw-Summers model. Data and statistical methodology are presented in Section 3. Estimates of the baseline VECM and its extensions are interpreted in Sections 4 and 5. The paper concludes by offering policy recommendations.

2. Theoretical Framework

Conventional econometric models relate the demand for money to the level of GDP, serving as the scale variable determining the transactions demand for money balances. Referring to portfolio and transaction models of money demand as justification for a disaggregated money equation within the familiar IS-LM framework, G. Mankiw and L. H. Summers (1986) demonstrate that tax cuts can constrain aggregate demand, holding that money supply is constant. In the open economy version, the model is presented as follows[1]:

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[1] A. Rzońca (2007) uses a similar open economy extension of the Mankiw-Summers to interpret restrictive fiscal policies.

$$Y = C(Y - T, r) + I(Y, r) + G + CA(E, Y, Y^*), \tag{1}$$

$$C_Y, \ I_Y > 0, \ C_Y, \ I_Y > 0, \ CA_E, CA_{Y^*} > 0, \ CA_Y < 0,$$

$$M/P = L(C, I, G, r), \ \ L_C > L_I > L_G > 0, \ L_r < 0, \tag{2}$$

$$CA(E, Y, Y^*) + k(r - r^*) = 0, \tag{3}$$

where Y and Y^* are domestic and foreign output, C is consumption, I is investment, r and r^* are the domestic and foreign interest rate, G and T are government expenditure and government lump-sum taxes, respectively, CA is the current account, M is the money supply, P is the price level, E is a nominal exchange rate.

Equation (1) relates aggregate demand to private consumption, investments, government expenditure, and price and income effects in foreign trade. Both consumption and investments are proportional to income and inversely related to the interest rate. A similar contractionary channel is provided by the relationship between income and imports. Aggregate demand is stimulated by lower taxes, exchange rate depreciation and higher income abroad. In Equation (2), the money supply in real terms is equilibrated with the demand for money, which is an increasing function of disaggregated income and a lower interest rate. For simplicity, there is no difference between nominal and real interest rates in specifications for the goods and money markets. Equation (3) defines the balance-of--payments (BOP) equilibrium. The current account balance is equilibrated with the net capital inflows. It is assumed that capital flows are dependent on the interest rate differential. For the case of capital immobility ($k = 0$), the BOP equilibrium is achieved solely through relative price adjustment. Under inefficiency of the relative price mechanism, a decline in income is necessary to decrease demand for imports.

A comparative static analysis yields fiscal policy multipliers as follows:
a) floating exchange rate regime:

$$\frac{dY}{dG} = \frac{CA_q \left[(L_G - L_I) I_r + (L_G - L_C) C_r - L_r + k L_G \right]}{\Omega}, \tag{4}$$

$$\frac{dY}{dT} = -\frac{CA_q C_Y \left[(L_C - L_I) I_r - L_r + k L_C \right]}{\Omega}; \tag{5}$$

b) fixed exchange rate regime:

$$\frac{dY}{dG} = \frac{k}{k(1 - C_Y - I_Y) + CA_Y (C_r + I_r)}, \tag{6}$$

$$\frac{dY}{dT} = -\frac{kC_Y}{k(1-C_Y-I_Y)+CA_Y(C_r+I_r)},$$ (7)

where:

$$\Omega = -CA_q\left[(1-C_Y-I_Y)(L_r+L_CC_r+L_II_r)+(C_r+I_r)(L_CC_Y+L_II_Y)\right] - \\ -CA_q\left[k(L_CC_Y+L_II_Y)-CA_Y(L_II_r+L_CC_r+L_r)\right].$$

Regardless of capital mobility, the determinant Ω is unambiguously negative under standard assumptions that $C_Y, I_Y > 0, C_r, I_r < 0, L_r < 0$, and $C_Y + I_Y < 1$.

For a closed economy ($k = 0$), the multipliers reduce to those obtained by Mankiw and Summers (1986). A fiscal multiplier for government expenditure is positive if $L_G < (I_rL_I+C_rL_C+I_r)/(I_r+C_r+k)$, as long as government spending generates less money demand than a weighted average of consumption and investments and capital mobility is rather low. As for the tax multiplier, higher taxes positively contribute to income only on condition that the consumption-based demand for money is stronger compared to the investment-based demand for money, i.e. $L_C > L_I$, and if the money demand is interest-inelastic relative to the high interest rate sensitivity of investments. However, a stimulating effect becomes not sensitive to structural features in the case of perfect capital mobility ($k = \infty$), as the tax multiplier becomes unambiguously positive: $dY/dT = L_CC_Y/(L_CC_Y+L_II_Y)$.

A graphical interpretation of government expenditure and revenue effects is presented in Figures 1 and 2, respectively. For a floating exchange rate regime, an increase in government expenditure is followed by higher demand for both goods and services ($IS_0 \rightarrow IS_1$) and money ($LM_0 \rightarrow LM_1$). As there is a BOP deficit at the new internal equilibrium (p. B), the nominal exchange rate depreciates. In turn, it brings about a further expansion of aggregate demand ($IS_0 \rightarrow IS_1$) and an improvement in the external position ($BP_0 \rightarrow BP_1$). The expansionary effect on output is combined with an increase in the interest rate. Under a fixed exchange rate system, the BOP adjustment requires a decrease in the money supply ($LM_1 \rightarrow LM_2$), which reinforces the initial money demand shock ($LM_0 \rightarrow LM_1$). In the new equilibrium (p. C), there is still an increase in income, but it is smaller in comparison to a floating exchange rate case.

As is apparent from Figure 2a, an increase in taxes is followed by a decrease in demand on the goods and services market ($IS_0 \rightarrow IS_1$) and a lower demand for money ($LM_0 \rightarrow LM_1$). If condition $L_G < (I_rL_I+C_rL_C+I_r)/(I_r+C_r+k)$ holds, there is a BOP deficit (p. B)

and an exchange rate is set to depreciate in order to restore the external equilibrium. Consequently, a weaker currency brings about a recovery in demand for goods and services ($IS_1 \rightarrow IS_2$) and an improvement in the BOP ($BP_0 \rightarrow BP_1$).
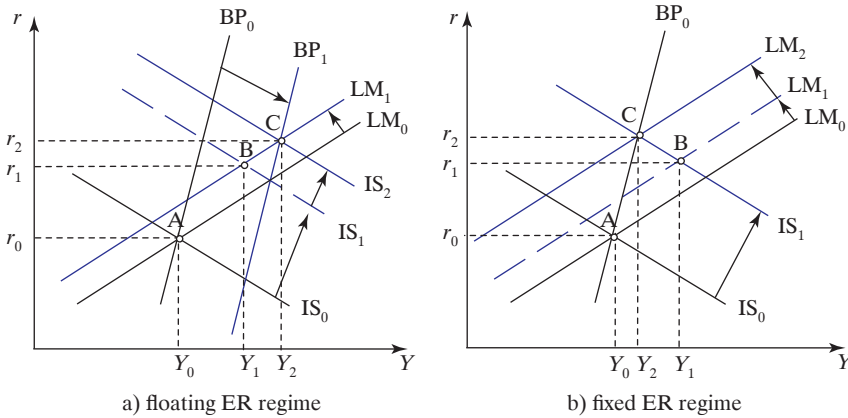
Fig. 1. Effects of Higher Government Expenditure under Low Capital Mobility
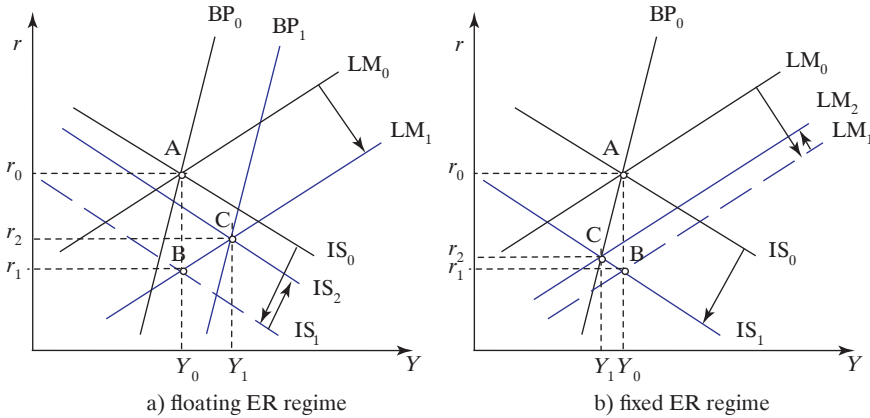
Source: authors' own elaboration.

Fig. 2. Effects of Higher Taxes (Low Capital Mobility)

Source: authors' own elaboration.

Assuming exchange rate stability (Figure 2b), a stronger decrease in the demand for money ($LM_0 \rightarrow LM_1$) combined with a somewhat weaker fall in demand for goods and services ($IS_0 \rightarrow IS_1$), implies a worsening of the BOP

position (p. B). Similar to the case of government expenditure (Figure 1b), there is a loss of international reserves leading to a decrease in the money supply ($LM_1 \rightarrow LM_2$) and necessary macroeconomic adjustment (p. C), but this time the macroeconomic equilibrium is achieved both at a lower income and interest rate.

As for the stability of money demand as an important assumption behind the viability of the Mankiw-Summers model, evidence for the stability of long-run demand functions for the M1 money aggregate is obtained for the US, Japan, Canada, UK and West Germany (Hoffman, Rasche & Tieslau 1995), as well as for seven East European countries (Bahmani & Kutan 2010) and four South Asian countries (Narayan, Narayan & Mishra 2009).

3. Data and Statistical Methodology

The data are quarterly observations from 2001Q1 to 2016Q2 taken from Ukraine's Ministry of Finance, which has published quarterly cash figures since 2000, and the IMF *International Financial Statistics* online database. Seasonally adjusted cash figures (in per cent of GDP) for current government expenditure on goods and services and net revenue, G_t and REV_t respectively, are plotted in Figure 1. Government expenditure has increased unevenly over the sample period, with local peaks in 2006, 2009, 2010, and 2013. Net revenue exceeded expenditure over the 2001–2007 period, but the budget balance later deteriorated significantly in the wake of the world financial crisis of 2008–2009. Fiscal consolidation efforts took place in 2011, but the budget deficit widened in the aftermath. Another financial crisis in 2014 brought about a steep decline in the level of both government expenditure and revenue, but the former recovered by the end of 2015 while the latter declined. GDP (Y_t) steadily increased between 2001 and 2008, but the financial crises of 2008–2009 and 2014–2015 brought it down to the 2004 level, despite a steep depreciation of the real effective exchange rate (RER_t).

Table 1. Johansen Co-integration Test

Data Trend	None (I)	None (II)	Linear (III)	Linear (IV)	Quadratic (V)
Trace	57.87 (0)	93.1** (1)	85.6** (1)	99.7** (1)	89.6* (1)
Max-Eng	27.89 (0)	48.1** (1)	47.58** (1)	49.0** (1)	44.79** (1)

Note: we use test types I (no intercept, no trend), II (intercept, no trend), III (intercept, no trend), IV (intercept, trend), V (intercept, trend); *, ** denote rejection of the null hypothesis at the 10% and 5% level, respectively; the number of co-integration vectors is in brackets.
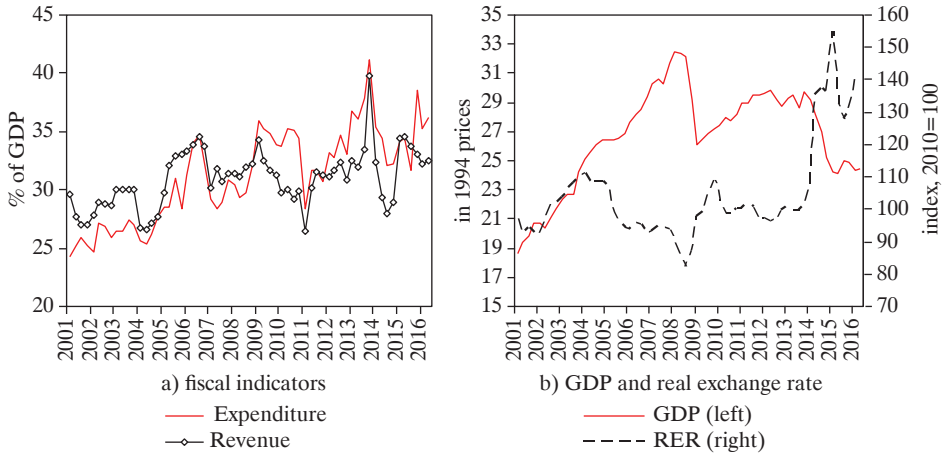
Source: authors' own calculations.

Fig. 3. Ukraine: Selected Macroeconomic Indicators, 2001–2016

Source: Ukraine's Ministry of Finance, IMF *International Financial Statistics*.

As revealed by the augmented Dickey-Fuller (ADF) test (results are available on request), for all the series, the null of unit root cannot be rejected at 1% and 5% statistical significance for their levels, while this is the case for the first differences. As endogenous variables are found to be integrated of order 1, i.e. $I(1)$, it is necessary to investigate the cointegration relationship between them. The results of the Johansen cointegration test are summarised in Table 1. Both the trace test and the maximum eigenvalue test suggest the cointegration rank $r = 1$ with a 5% confidence level.

Since there is a cointegration of endogenous variables, a VAR system with error correction (VECM) should be used. If endogenous variables are $I(1)$ and they are cointegrated with rank r $(0 < r < n)$, then the VECM representation is as follows:

$$A(L)\Delta z_t = -\alpha\beta z_{t-1} + \delta D_t + u_t, \tag{8}$$

where $z_t = (REV_t, G_t, R_t, RER_t, Y_t)$ is the vector of endogenous variables, with R_t standing for the lending rate, $A(L)$ is a matrix polynomial in the lag operator L, D_t is the vector of deterministic variables, u_t is a $k \times 1$ vector of reduced-form disturbances which are assumed to be normally distributed white noise $E[u_t] = 0$ with a constant covariance matrix $E[u_t u_t'] = \Sigma_u$ and $E[u_t u_s'] = 0$ for $s \neq t$, Δ is the operator of the first differences.

The ordering of the variables in the Cholesky decomposition implies that: (a) net revenue does not react contemporaneously (in the same quarter) to exogenous shocks in the other variables, (b) government expenditure reacts contemporaneously only to shocks in net revenues, (c) shocks to fiscal variables determine the level of the interest rate, (d) fiscal variables and the interest rate are behind the changes in the RER, (e) output is affected in the current period by shocks in all other endogenous variables. Contrasted with a standard identification scheme suggesting causality running from output to revenues, our ordering implies that net revenue is influenced in the contemporaneous period by administrative actions and is thus independent of real sector activities, which seems to be an adequate approximation of the Ukrainian reality. In addition to the lagged values of the endogenous variables, the VECM includes the level of external public debt (bn USD), world metal and crude oil prices (index, 2010 = 100), and the crisis dummy (1 for 2008Q3–2009Q4, 2013Q4–2016Q2 and 0 otherwise).

The number of lags is set to two according to LR, FPE, AIC and HD tests. We use a constant and a linear trend in the VECM model, as it brings about better statistical properties of the residuals according to the normality, serial correlation and homoskedasticity tests.

4. Estimation Results

Estimates of the long-run cointegration relationships are as follows (the absolute values of standard deviations of parameter estimates are given in the brackets):

$$REV_t = \underset{(0.69)}{-4.188G_t} + \underset{(0.53)}{2.299R_t} + \underset{(0.92)}{0.183RER_t} + \underset{(0.17)}{7.732Y_t}. \tag{9}$$

The cointegration relationship (9) implies that net revenue decreases in line with higher government expenditures. A direct relationship between the interest rate and REV_t could reflect stronger tax-collection efforts in the high interest rate environment as it is likely that when facing difficulties in financing debt liabilities government authorities reinforce their tax activities. Depreciation of the RER is not a strong factor behind higher net revenue, as the statistical significance of the coefficient on RER is rather low. The long--run estimates are in favour of a strong link between GDP and net revenue.

Figure 4 presents the impulse-response functions for endogenous shocks. The horizontal axis indicates quarters after a shock. Table 2 reports the portion of the forecast error variance decomposition (FEVD) for endogenous variables.
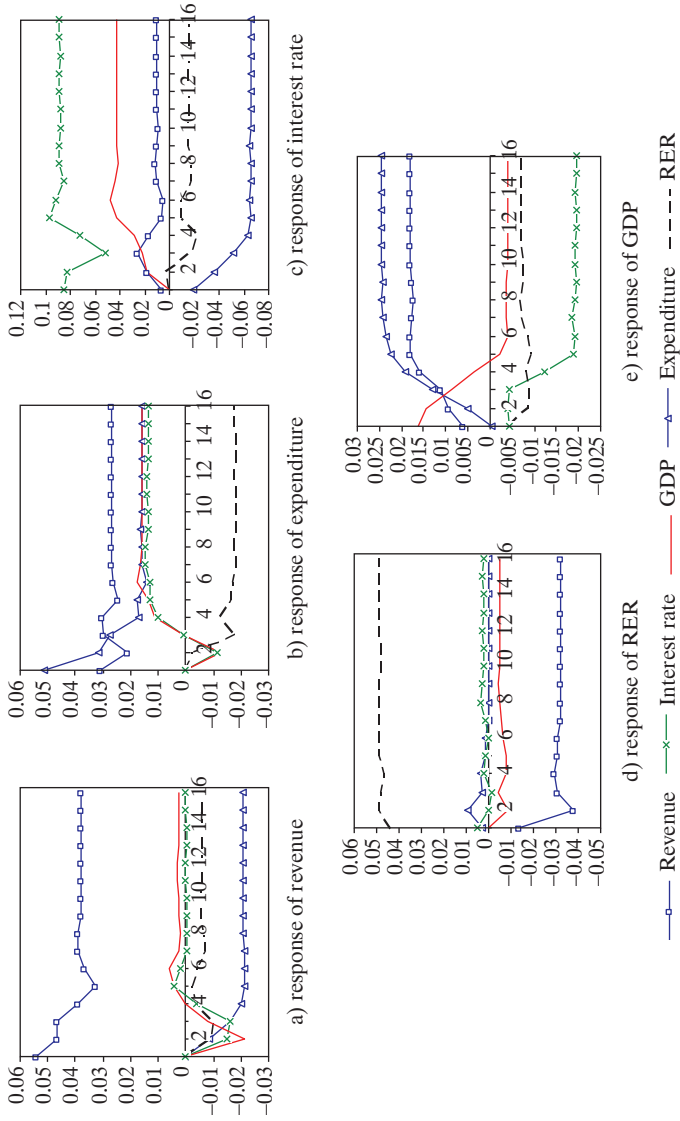
a) response of revenue

b) response of expenditure

c) response of interest rate

d) response of RER

e) response of GDP

— Revenue   — Interest rate   — GDP   — Expenditure   - - - - RER

Fig. 4. Impulse Response Functions of Endogenous Variables

Source: authors' own calculations.

Table 2. Forecast Error Variance Decomposition

Responses of	Innovations in	Forecast horizons			
		4	8	12	16
REV	*REV*	82	78	77	77
	G	7	14	16	18
	R	4	3	2	2
	RER	2	2	2	2
	Y	5	3	2	2
G	*REV*	35	37	39	39
	G	53	35	30	26
	R	3	6	8	8
	RER	6	11	13	17
	Y	3	8	10	11
R	*REV*	4	2	1	1
	G	25	28	28	29
	R	64	59	57	56
	RER	3	2	2	2
	Y	5	10	11	12
RER	*REV*	27	28	29	29
	G	1	0	0	0
	R	0	0	0	0
	RER	70	70	69	69
	Y	1	1	1	1
Y	*REV*	24	24	24	24
	G	27	38	41	42
	R	10	22	25	26
	RER	12	7	6	5
	Y	27	8	5	4

Source: authors' own calculations.

Our main result is that both government expenditure and revenue shocks have positive symmetrical and fairly persistent effects on output. Impulse responses are consistent with the predictions of the Mankiw-Summers model. Together, fiscal shocks explain more than 50% of the variation in output. Among other fiscal policy effects, an increase in net revenue contributes to higher government expenditure, which is a standard result in fiscal policy empirical studies (Franta 2012). Following an increase in

net revenue, there is RER appreciation, without any significant impact on the interest rate. A positive government expenditure shock brings about a reduction in net revenue and a decrease in the interest rate (a shock to G_t accounts for 25% to 28% of the variation in R_t), both being not conventional outcomes. For example, a positive response of net revenues and (to a lesser extent) the interest rate to government expenditure is found for the Czech Republic (Franta 2012). A puzzling inverse relationship between government expenditure and the interest rate could result from (1) foreign debt financing or (2) domestic monetary policy accommodation. Shocks to REV_t explain up to 40% of the changes in government expenditure, while the reverse causality is half as strong. The fraction of REV_t in the decomposition of RER_t is as high as 29%, while G_t is more influential with respect to changes in the interest rate.

Government expenditure is likely to be pro-cyclical in the long-run as higher output is associated with an increase in government expenditure on goods and services, but the importance of this link should not be overstated as the fraction of Y_t in the variance decomposition of G_t is below 10%. The response of the revenue to output shock is negative but small and short--lived. Following RER depreciation, government expenditure is likely to decrease (the fraction of RER_t in the variance decomposition of G_t gradually increases from 6% to 17% within the sixteen-period horizon analysed), while net revenue seems to be neutral with respect to changes in the RER. Ukraine's pro-cyclical fiscal response to domestic economic activity is similar to that of Macedonia, while it is counter-cyclical in Bulgaria and Croatia (Petrevski, Bogoev & Tevdovski 2016).

An increase in the interest rate has no significant effect on net revenue, while the effects on government expenditure turn positive after three quarters (a shock to R_t explains less than 10% of changes in G_t). As suggested by the impulse response and the variance decomposition, shocks to the interest rate have negligible effects on the RER. However, there is a strong negative impact of interest rate hikes on output. On the other hand, the output shock is a factor behind the increase in the interest rate, with the fraction of Y_t in the variance decomposition of R_t gradually increasing up to 12%. Somewhat surprisingly, the interest rate does not react to the RER shock, as the latter explains a marginal fraction of the changes in the former.

Besides a worsening of fiscal indicators, a depreciation of the RER has contractionary effect on output, which is consistent with a recent study on Ukraine's economy (Shevchuk 2016). In the presence of fiscal shocks, the RER does not react to changes in both output and the interest rate.

5. Robustness Check

In addition to the baseline model (VECM-I), we estimate two modified VECMs with the same identification scheme of government expenditure and revenue ordered before output (GDP). In the first one (VECM-II), the real exchange rate is replaced with the terms-of-trade variable calculated as the ratio of world metal prices to crude oil prices. In the second one (VECM--III), we replace the interest rate with the money aggregate M2. Next, we use a different identification scheme as follows: $G \Rightarrow R \Rightarrow RER \Rightarrow Y \Rightarrow REV$ (VECM-IV). This is the most popular identification approach in empirical studies, implying a contemporaneous period causality running from output to revenues. Finally, two small-scale models are estimated with the ordering $R \Rightarrow G \Rightarrow Y$ (VECM-V) and $G \Rightarrow Y \Rightarrow REV$ (VECM-VI), respectively. Figure 5 presents the impulse responses implied by all six identification schemes, including that of the baseline VECM-I.

a) net revenue   b) government expenditure

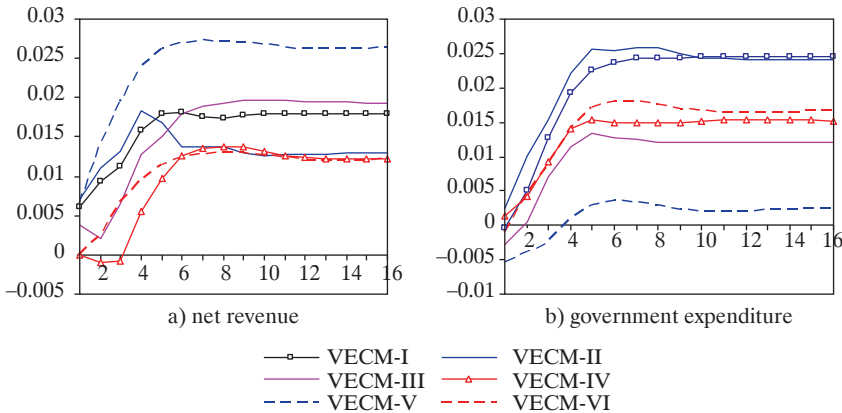|	VECM-I		VECM-II
	VECM-III		VECM-IV
	VECM-V		VECM-VI

Fig. 5. Alternative Impulse Response Functions of Fiscal Policy Output Effects
Source: authors' own calculations.

Generally, the impulse responses of alternative VECMs are not considerably different from the responses of the baseline VECM-I. The only exception is a three-variable VECM-V, which implies a neutrality of output with respect to government expenditure. On the other hand, this kind of specification seems to overstate the positive impact of government revenues on output. Identification with revenue and expenditure preceding GDP seems to imply stronger fiscal policy effects on output. Using world metal and crude oil prices instead of the RER, or money aggregate M2 instead

of the interest rate, does not substantially change the impulse responses for both fiscal variables.

Alternative identification schemes do not alter (several) other results. First, it is confirmed that there is a negative link between the interest rate and GDP. Second, government expenditure increases after higher revenues, which is quite a standard outcome in empirical studies. Third, revenues decrease in the wake of a positive government expenditure shock but this effect becomes weaker in a three-variable model, regardless of recursive sequencing of fiscal shocks in the contemporaneous period. Fourth, an immediate reaction of net revenues to an output shock is confirmed in VECMs with TOT and money supply variables, but this effect is weaker in an alternative specification with output preceding net revenues (VECM-IV) and a three-variable VECM-V and VECM-VI, with a more articulated positive long-term link between GDP and net revenues as well.

As there is a robust inverse relationship between the interest rate and output, it is confirmed that government expenditure put downward pressure on the former, with net revenue being neutral in this respect. Similar to the baseline model, depreciation of the RER is likely to induce losses in net revenue (to a lesser extent) and cuts in government expenditure, but the latter effect is lost in an identification scheme with output preceding net revenue. However, there are important differences regarding the RER effects on output. Depreciation of the RER becomes a factor behind higher GDP in the specification with money supply (VECM-III) and under an identification scheme with net revenue influenced by output in a contemporaneous period (VECM-IV). The fraction of the RER in the variance decomposition of output increases gradually up to 15% in the long run. There is no change in the pattern of response of the interest rate to an RER shock. Also, it is confirmed that the RER is affected neither by output nor by the interest rate.

6. Conclusion

The main results of the study can be summarised as follows. First, there is a robust positive impact of both government expenditure and revenue on output in Ukraine. The response of GDP to shocks to both fiscal variables is positive and, in most specifications, statistically significant. Such symmetry of fiscal policy effects is in accordance with the prediction of the Mankiw--Summers model for a low capital mobility case under (i) high consumption--based demand for money in comparison with investment-based demand for

money combined with (ii) a significant inverse link between investments and the interest rate. Second, there is an increase in government expenditure after a positive shock to government revenue, with the budget deficit widening after an interest rate hike. Third, RER depreciation brings about a symmetrical decrease in either net revenue or government expenditure, but the latter effect is lost in the identification scheme with output preceding net revenue. Fourth, there is a strong inverse relationship between the interest rate and output across all identification schemes.

Most of our results are robust to various sensitivity checks. Some sort of uncertainty relates to RER effects on output. RER depreciation is behind the decrease in output in the baseline model (VECM-I) but other identification schemes suggest that it is likely to be contractionary in the short run while turning expansionary in the long run.

Contrary to recommendations by Alesina and Ardagna (2010) that spending cuts are more appropriate for stabilising the sovereign debt than tax increases, our results suggest the feasibility of revenue-based fiscal consolidation in Ukraine, as better tax collection as the main source of government revenue may contribute to economic growth even in the short run. At the same time, Ukraine would be better off if the government increased investments in infrastructure, health and education.

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Abstract

Efekty makroekonomiczne polityki fiskalnej na Ukrainie

W opracowaniu przeanalizowano empirycznie efekty polityki fiskalnej w gospodarce Ukrainy z wykorzystaniem modelu autoregresji wektorowej z korektą błędu (VECM). Na podstawie analizy danych kwartalnych z lat 2001–2016 stwierdzono pozytywny wpływ wydatków rządowych i dochodów do budżetu na poziom dochodu na Ukrainie, co odpowiada przewidywaniom modelu Mankiwa-Summersa dla wypadku wysokiego popytu na pieniądz względem wydatków konsumpcyjnych w połączeniu ze znaczącą elastycznością inwestycji względem stopy procentowej. W innych aspektach mechanizm transmisyjny polityki fiskalnej demonstruje pewne typowe cechy, jak zwiększenie wydatków rządowych po wzroście przychodów do budżetu albo zwiększenie deficytu budżetowego wskutek wzrostu stopy procentowej.

Otrzymane rezultaty świadczą o przewadze konsolidacji fiskalnej opartej na zwiększeniu przychodów do budżetu na Ukrainie, gdyż lepsza ściągalność podatków stymuluje wzrost gospodarczy nawet w krótkim okresie. Z uwagi na to, że występuje standardowa odwrotna relacja między stopą procentową a dochodem, większe wydatki rządowe powodują obniżenie stopy procentowej, jak też wskaźnik nie reaguje na przychody do budżetu. Deprecjacja kursu walutowego w ujęciu realnym powoduje zmniejszenie dochodu w modelu podstawowym, ale alternatywne schematy identyfikacji sugerują występowanie efektu restrykcyjnego tylko w krótkim okresie, na dłuższą metę efekt jest ekspansywny.

Słowa kluczowe: polityka fiskalna, dochód, stopa procentowa, realny kurs walutowy, Ukraina.