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Fiscal Multipliers in Ukraine

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Abstract

Amid renewed crisis, falling tax revenues, and rising debt, Ukraine faces serious fiscal consolidation needs. Durable fiscal adjustment can support economic confidence and rebuild buffers but what is its overall impact on growth? How effective are revenue versus spending instruments? Does current or capital spending have a larger impact? Applying a structural vector autoregressive model, this paper finds that Ukraine's near-term revenue and spending multipliers are well below one. In the medium-term, the revenue multiplier becomes insignificant (with a wide confidence interval) and the spending multiplier strengthens. Capital and current spending have a similar effect on growth but the capital multiplier remains significant for longer. These results suggest near-term consolidation based on a combination of revenue and spending measures would have a modest impact on growth. At the same time, medium-term policies could minimize the adverse consequences of consolidation on growth by offsetting some current spending cuts with increased capital spending. Given the severe challenges facing the Ukrainian economy, it is important that policymakers apply these results in conjunction with broader considerations such as public debt sustainability, investor confidence, credibility of government policies, and public spending efficiency. Consequently, it may be necessary to rely more on current spending cuts over other types of consolidation measures even though multiplier estimates suggest a more diverse combination of measures.

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I. INTRODUCTION

Fiscal policy plays an important stabilizing role in the Ukrainian economy. Since the 2008-09 global crisis, which hit Ukraine particularly hard, the government relied on fiscal stimulus to support recovery. In reality, it was the main lever for macroeconomic management given an effectively pegged exchange rate regime. Today, even after the recent float of the Ukrainian hryvnia, fiscal policy remains key to economic stabilization. Faced with renewed crisis, durable fiscal adjustment is critical to restoring economic confidence amid heightened uncertainties and geopolitical risks.

In this context, the effectiveness of fiscal policy instruments and their pace of implementation have been under debate. Over the past five years, the government relied on real public wage and pension hikes to stimulate economic activity, sometimes at the expense of public infrastructure spending. Many argue that this choice of fiscal instruments undermined private sector growth and contributed to the economy falling back into recession in mid-2012. Currently, the severe crisis, its toll on tax revenues, and financing constraints, necessitate fiscal consolidation. But the challenge is to minimize its negative impact on growth. Will tax hikes or spending cuts harm growth more? Does capital or current spending have a stronger impact on economic activity?

Despite their operational importance for policymakers, little work has been done to compare the economic impact of Ukraine's public policy choices across tax measures and government spending, as well as lags in fiscal policy transmission. Its quantification is frequently referred to as the fiscal multiplier – the change in output, relative to baseline, following an exogenous change in the fiscal deficit that stems from a change in revenue or spending policies.

This is the first study to estimate fiscal multipliers for Ukraine. Applying a structural vector auto regression, the empirical results show that Ukraine's near term fiscal multipliers are well below one. Specifically, the impact revenue and spending multipliers are -0.3 and 0.4, respectively. This suggests that if a combination of revenue and spending consolidation measures were pursued, the near-term marginal impact on growth would be modest.² Over the medium-term, the revenue multiplier becomes insignificant, rendering it impossible to draw any conclusions on its strength. The spending multiplier strengthens to 1.4, with about the same impact from capital and current spending. However, the impact of the capital multiplier lasts longer. Against this backdrop, the adverse impact of fiscal consolidation on medium-term growth could be minimized by cutting current spending while raising that on capital.

Section II provides some background on fiscal multipliers. The methodology and data are discussed in Sections III and IV. Estimation results in Section V follow and section VI concludes. Given the severe challenges facing the Ukrainian economy, it is important that policymakers apply these results in conjunction with broader considerations –

² The total impact on growth depends on the size of the consolidation package.

including public debt sustainability, investor confidence, credibility of government policies, public spending efficiency. These considerations combined with the large size of current spending in the budget, may necessitate larger near- and long-term current spending cuts than what multiplier estimates suggest.

II. BACKGROUND

Fiscal consolidation measures are considered to have a large impact on growth when the spending multiplier or the revenue multiplier (in absolute value) exceeds one. A spending multiplier greater than one indicates that public spending cuts harm economic activity and produce a reduction in output larger than the initial drop in public spending. Similarly, a revenue multiplier less than -1 implies that raising one unit of taxes causes a decline in economic activity of more than one unit. A spending multiplier less than one, or even negative, reflects a reversal of the initial decline in aggregate demand due to confidence effects, the crowding-in of productive private sector activities, and reduced leakage through imports.³ Distortions in private investment incentives, households' anticipation of future tax declines (or spending increases), or changes in inflation and imports caused by a change in tax policy could result in revenue multipliers that are larger than -1 and even positive in some cases.

Most of the literature focuses on advanced economies with very few studies on emerging economies. Baunsgaard and others (2014) provide a comprehensive literature review on fiscal multipliers in advanced economies based on 37 studies including both model-based and vector autoregressive (VAR) approaches. They show spending multipliers ranging between 0 and 2 and revenue multipliers between -1.5 to 1.4 during the first year after fiscal measures have been taken. Both spending and revenue multipliers are generally found to be lower in emerging economies (Ilzetki, 2011). This is likely due to their less developed financial markets and higher sovereign risk premia resulting in a stronger effect of fiscal policy on interest rates, which partly offsets the impact of the initial fiscal measures.

Despite an extensive literature, there is still no consensus regarding the size of fiscal multipliers. They tend to be smaller in more open economies and countries with larger automatic stabilizers, but vary widely across countries. Spilimbergo et al. (2009) find that in advanced economies government consumption spending multipliers are larger than revenue multipliers, and in the long-term, smaller than capital spending multipliers. In contrast, emerging economies' revenue multipliers seem to be larger than spending multipliers (Ilzetki, 2011, Ilzetki et al., 2011). The low spending multiplier could reflect concerns that, once implemented, spending measures (especially expansionary ones) are difficult to reverse. In some studies, it may also be due to the estimation of only one spending multiplier, instead of separately estimating the government consumption spending multiplier – which could be negative – and the government capital spending multiplier. Recently, several studies have also found that multipliers are significantly

³ Lower imports can also improve the current account and reduce international reserves pressures.

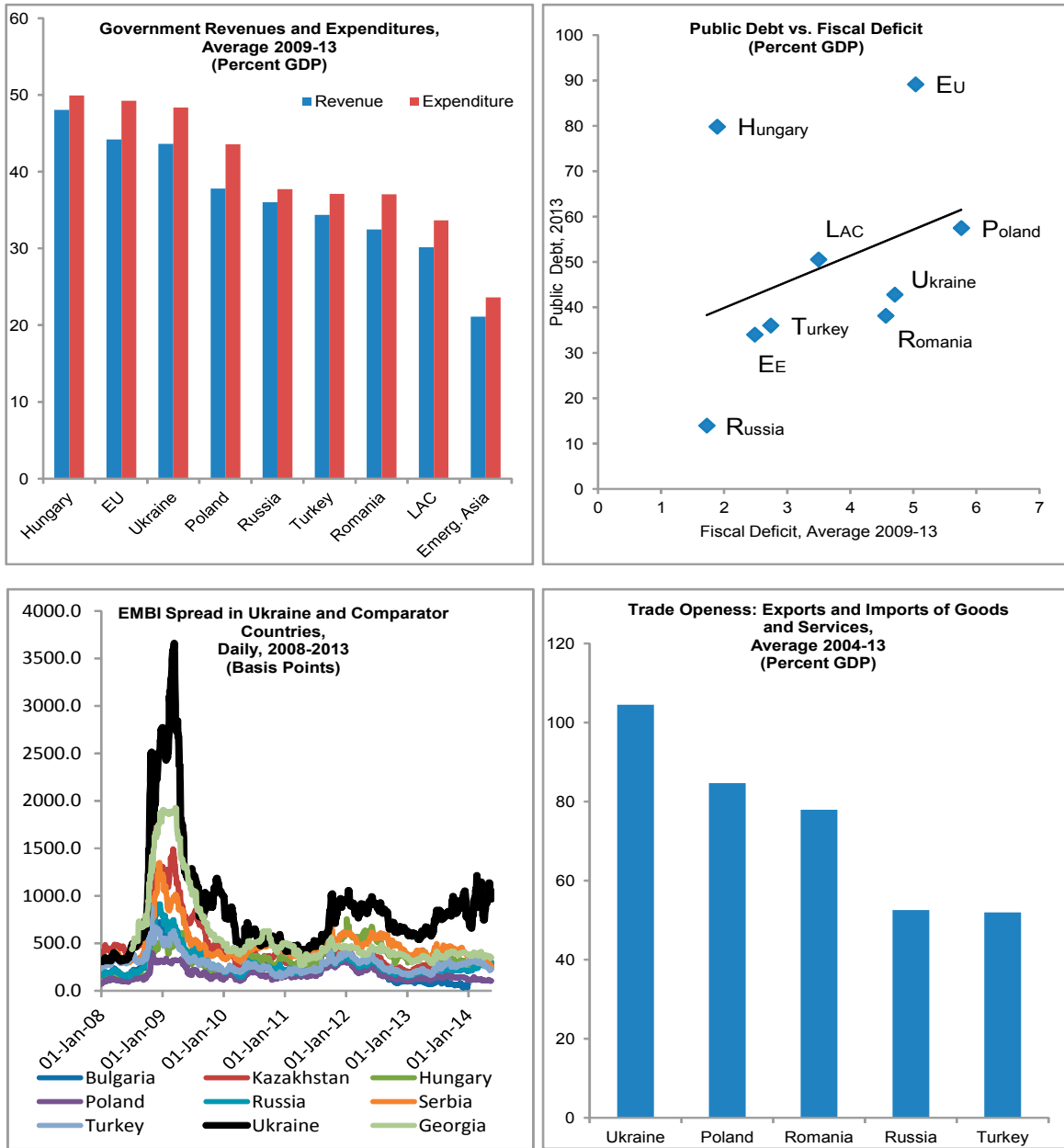
larger when the economy is in recession than in expansion (Auerbach and Gorodnichenko, 2012, Batini et al., 2012, Baum et al., 2012).⁴

In Ukraine, low exchange rate flexibility observed until recently implies that tax and public spending policies may have a significant effect on growth. Public spending and revenues are larger than in most Emerging European economies (Figure 1). However, the impact of fiscal policy on economic activity could be weakened by Ukraine's high degree of trade openness, less developed financial markets, high sovereign risk, and growing public debt (Figure 1). Currently, public debt is projected to approach almost 70 percent by end-2014 and decline only gradually from 2016. But these projections are subject to considerable upside risks (IMF 2014).

More broadly, fiscal multipliers are one of many tools policymakers should use to guide their decisions. Given the severe challenges facing the Ukrainian economy – including public debt sustainability, low investor confidence, and subsequent limited availability of financing – it may be necessary for policymakers to undertake stark consolidation efforts across both revenues and expenditures, despite the adverse consequences for growth. For example, the rapid erosion of potential output may necessitate large increases in capital spending, which cannot be financed by revenue policies alone. If fiscal consolidation is to take place in such an environment, cuts in current spending may be warranted regardless of the size of its multiplier – especially where current spending is a sizeable portion of the budget.

⁴ Given a very small number of observations, we were not able to assess whether fiscal multipliers have varied across different phases of business cycle in Ukraine.

Figure 1: Fiscal and Trade Indicators



Sources: IMF World Economic Outlook, National Authorities; IMF staff estimates.

III. METHODOLOGY

The empirical evaluation of fiscal multipliers for Ukraine is based on the estimation of a structural vector autoregression (SVAR) model. The endogeneity of fiscal policy and GDP is addressed by applying quarterly data, as in Blanchard and Perotti (2002), over the period 2001:Q1 to 2013:Q4 for tax revenues, government spending, and GDP.⁵ The assumption is that fiscal variables impact GDP contemporaneously but GDP impacts fiscal policy decisions with a lag.

SVAR specification

The applied reduced form VAR model takes the following form:

$$Y_t = \sum_{k=1}^K C_k Y_{t-k} + \sum_{p=1}^P D_p Z_t + u_t \quad (1)$$

where Y_t represents a three variable vector of seasonally adjusted and detrended endogenous variables (government spending, government revenue, and GDP) measured in logarithms, Z_t represents a vector of exogenous variables (seasonal dummies and additional control variables), matrix C contains the effects of the K own-lags of endogenous variables, matrix D contains the effects of P exogenous variables, u_t is a vector of normally distributed reduced form residuals with mean zero and variance-covariance matrix Ω . Given the short time series (54 observations), we use 2 lags in our baseline VAR specification.⁶

Following Blanchard and Perotti (2002), we assume that the reduced form residuals u_t are the following linear combinations of structural shocks e_t :

$$\begin{cases} u_{g_t} = b_1 * u_{y_t} + b_2 * e_{t_t} + e_{g_t} \\ u_{t_t} = a_1 * u_{y_t} + a_2 * e_{g_t} + e_{t_t} \\ u_{y_t} = c_1 * u_{t_t} + c_2 * u_{g_t} + e_{y_t} \end{cases} \quad (2)$$

where g , t , and y indices denote government spending, government revenue, and GDP, respectively. Structural shocks e are uncorrelated with identity variance-covariance matrix I_3 .

The identification strategy works as follows. First, coefficients a_1 and b_1 are contemporaneous elasticities of government revenue and spending to GDP fluctuations, respectively. The former is predetermined ($a_1 = \bar{a}_1$) by the existing tax code and captures automatic response of taxes to economic fluctuations. The latter, according to Blanchard and Perotti (2002), should be set to

⁵ Tax revenues are defined as all major direct and indirect taxes (PIT, CIT, VAT, excises), as well as other taxes and fees (property and land taxes, international trade duties, natural resource taxes and royalties, etc.). Government spending includes both current and capital spending, net of interest payments and transfers. Both variables are deflated with the GDP deflator.

⁶ The Schwarz-Bayes (SBIC) information criterion supports 2 lags as optimal. As shown below, increasing the number of lags to 4 does not affect the main results of the paper.

zero ($b_1=0$), due to a fiscal policy lag and inability of the government to immediately adjust spending in response to economic developments within a quarter.

Next, using the above assumptions on a_1 and b_1 , cyclically adjusted reduced form residuals, $\tilde{u}_g = u_g - b_1 * u_y = u_g$ and $\tilde{u}_t = u_t - \bar{a}_1 * u_y$, are calculated. The cyclically adjusted reduced form residuals can be mutually correlated but are not correlated with e_y because both are linear functions of the other two structural errors (e_g and e_t). Hence, they can be used as instruments to estimate c_1 and c_2 from the last equation of (2).

Finally, a_2 and b_2 coefficients indicate the sequencing of spending and revenue policies pursued by the authorities. Two options are available here. First, if revenue policies are implemented first and spending decisions respond to these policies, then a_2 is set to zero and b_2 is estimated. And second, if spending policies are implemented first and revenue decisions respond to these policies, then b_2 is set to zero and a_2 is estimated. We estimate impulse response functions (IRFs) under both options.

Fiscal multipliers

The *impact multipliers* for government revenue ($\Delta Y_t / \Delta T_t$) and spending ($\Delta Y_t / \Delta G_t$) show the contemporaneous effect of one unit increase in the respective fiscal variable on output. The *medium-term* multipliers for government revenue ($\Delta Y_{t+i} / \Delta T_t$) and spending ($\Delta Y_{t+i} / \Delta G_t$) show the effect of one unit increase in the respective fiscal variable on output in the medium-term or i quarters ahead. For estimation purposes, the medium-term is defined as 8 quarters or 2 years (i.e., $i=8$). Finally, the *cumulative* multiplier is defined as the sum of fiscal multipliers through horizon j and shows the total effect of fiscal policy changes output over a pre-defined time period. For estimation purposes, the pre-defined time period for calculating cumulative fiscal multipliers is set at 8 quarters or 2 years (i.e., $j=8$).

Given that the endogenous variables used in estimations are measured in logarithms, the obtained impulse response functions (IRFs) are elasticities measuring the percentage change in output in response to one percentage point change in fiscal variables. To convert these elasticities to multiplier units, we correct IRFs by the average ratios of the respective fiscal variable and GDP. For example, in the case of the government spending IRF, the impact multiplier can be calculated as: $\Delta Y_t / \Delta G_t = \Delta y_t / \Delta g_t * \bar{Y} / \bar{G}$, where lower case letters denote logarithms and superscripts denote sample averages of respective variables. Similarly, one could estimate multipliers for other periods $t+i$ using the above formula: $\Delta Y_{t+i} / \Delta G_t = \Delta y_{t+i} / \Delta g_t * \bar{Y} / \bar{G}$. We estimate multipliers for up to $t=16$ periods (4 years).

To evaluate the statistical significance of the estimated multipliers, we construct confidence intervals based on empirical distributions from 10,000 Monte Carlo simulations. Based on these simulations we estimate the corresponding 95 percent confidence intervals of each multiplier.

IV. DATA

Similar to Blanchard and Perotti (2002), the endogenous variables (government spending, government revenue, and GDP) are assumed to have a deterministic trend and are cointegrated.

We use both aggregate fiscal variables and their components (current versus capital spending, and direct versus indirect taxes). The unrestricted VAR is estimated using the logarithm of variables detrended from their linear and quadratic trends.

We also include quarterly seasonal dummies as part of the exogenous variables, Z . Following previous studies on emerging markets, other exogenous variables include:

- *Current account balance-to-GDP ratio*. This variable captures net international trade interactions of the economy. An improved (worsened) current account deficit driven by a lower (higher) propensity to import tends to increase (reduce) fiscal multipliers, because the demand leakage though imports are less (more) pronounced (Ilzetsky et al., 2010).
- *Money supply (real M2)*. This variable captures the monetary policy stance. Expansionary monetary policy (increase in money supply) can cushion the impact of fiscal contraction on demand. In periods when the use of monetary policy is impaired by exchange rate stabilization objectives, fiscal multipliers can potentially be larger (WEO, 2010).
- *General government debt-to-GDP ratio*. This variable captures the credibility of fiscal consolidation. Fiscal multipliers tend to be lower in periods of high debt, as fiscal consolidation is likely to have positive credibility and confidence effects on private demand and the interest rate risk premium (Ilzetzki et al., 2010, Kirchner et al., 2010). Nickel and Tudyka (2014) also show that prevailing confidence and public indebtedness are important underlying factors affecting the multiplier.

Inclusion of these exogenous variables controls for changes in output related to changes in economic openness, monetary policy, and debt overhang, rather than changes in fiscal policy (revenue or expenditure shocks). As a result, the expanded specification helps increase the precision of revenue and expenditure multiplier estimates (Ilzetzki et al., 2010). Nevertheless, we also check the robustness of results using a specification that excludes the exogenous variables.

V. ESTIMATION RESULTS

A. Baseline specification: Aggregate fiscal variables

In the baseline specification, we use data on total spending and tax revenues (see above). The predetermined reaction of revenues to GDP is proxied by the elasticity coefficient from the regression of revenues and GDP (both in logs) over the whole sample. The obtained coefficient ($a_1 = 1.47$) is lower than the 2.08 number used by Blanchard and Perotti for the U.S.

Furthermore, applying an instrumental variable regression for the third equation in system (2) we obtain coefficients $c_1 = -0.12$ and $c_2 = 0.14$. Similar to Blanchard and Perotti, the elasticity of GDP to government revenue is negative, while the elasticity of GDP to government spending is positive. The magnitudes are close to the ones found by Blanchard and Perotti for the U.S. ($c_1 = -0.15$ and $c_2 = 0.20$).

Using these coefficients, we estimated IRFs for two scenarios: (i) spending policies are implemented first, and (ii) revenue policies are implemented first.

Spending policies implemented first

Figure 2, Panel A presents multipliers of government spending, government revenue, and GDP for a one unit shock in government spending and government revenue, respectively. The results suggest that, in Ukraine, spending multipliers are much stronger than revenue multipliers. The effectiveness of revenue policies is possibly being eroded by weak revenue administration practices (IMF 2014).

The impact multiplier of government spending (0.43) slightly exceeds that of revenue (-0.30). However, already in the second period the revenue multiplier becomes insignificant and remains that way for the whole projection period. By contrast, the spending multiplier increases to above 1 and remains high and significant for more than a year (6 quarters).

In the medium-term (eight quarters), the spending multiplier is 1.0 – much larger than the medium-term revenue multiplier of -0.5 (both insignificant). Simovic et al. (2013) find qualitatively similar results for Croatia, with a medium-term spending multiplier of 1.9 and that on revenues at -0.8. However, studies on Bulgaria (Muir and Weber, 2013) and Romania (Stoian, 2012) estimate the size of revenue multipliers to be almost twice that on spending, possibly reflecting larger spending leakages through imports.

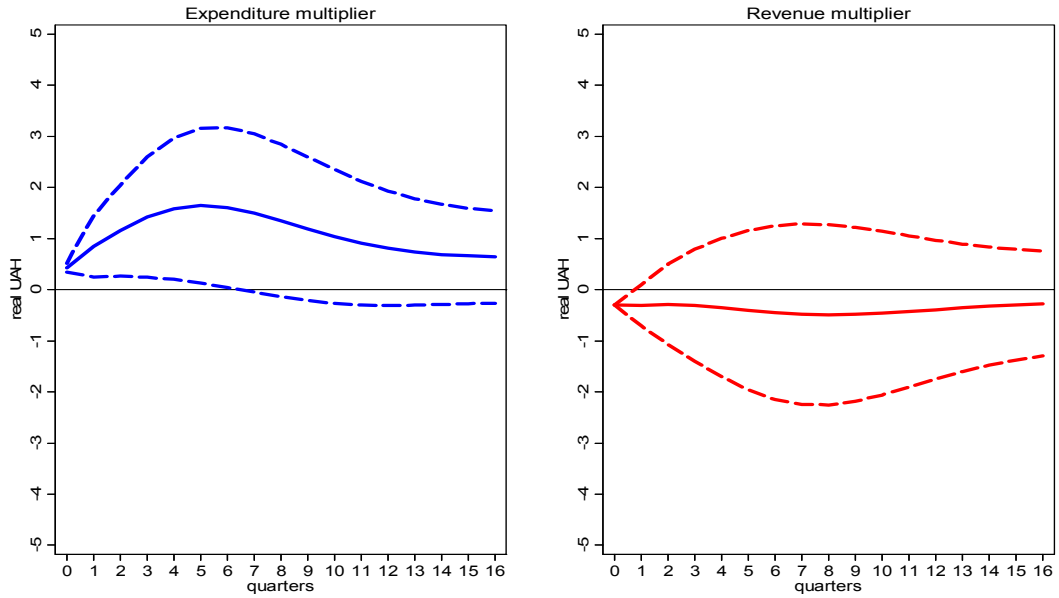
In cumulative terms, medium-term (during the first eight quarters) differences in the cumulative spending and revenue multipliers become larger. The former is estimated at 2.86 and the latter - 0.96 (which is also insignificant for quarters 2 to 8). Although Ilzetski (2011) and Ilzetski et al. (2011) find the opposite result, the estimates for Ukraine are in line with those for Russia and Poland. Ponomarenko and Vlasov (2010) estimate 0.1 and 0.6 for Russia's medium-term revenue and spending multipliers, respectively, and Haug et al. (2013) find 0.1 and 0.5 for Poland.

Revenues policies implemented first

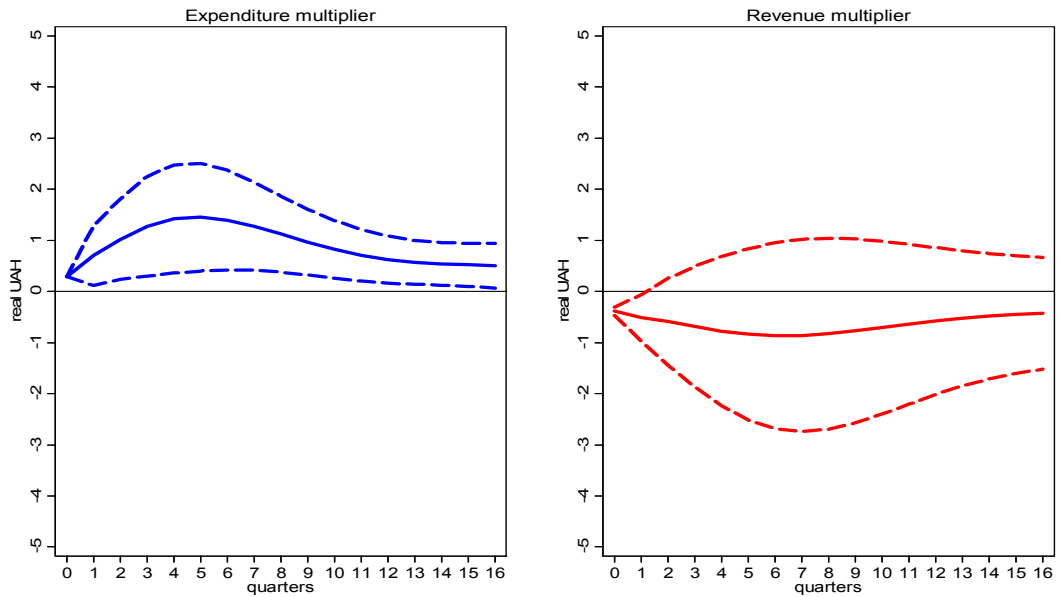
Figure 2, Panel B presents the same multipliers estimated under the alternative assumption that revenue policies are implemented first. The results are very similar to the previous case suggesting a much stronger impact of government spending multipliers compared to revenue multipliers. This implies that the assumption on policy sequencing is not critical to the key finding that spending multipliers are stronger than revenue multipliers.

Figure 2. Fiscal Multipliers for the Baseline Specification (aggregate fiscal variables)

Panel A. Spending Policies Implemented First



Panel B. Revenue policies implemented first



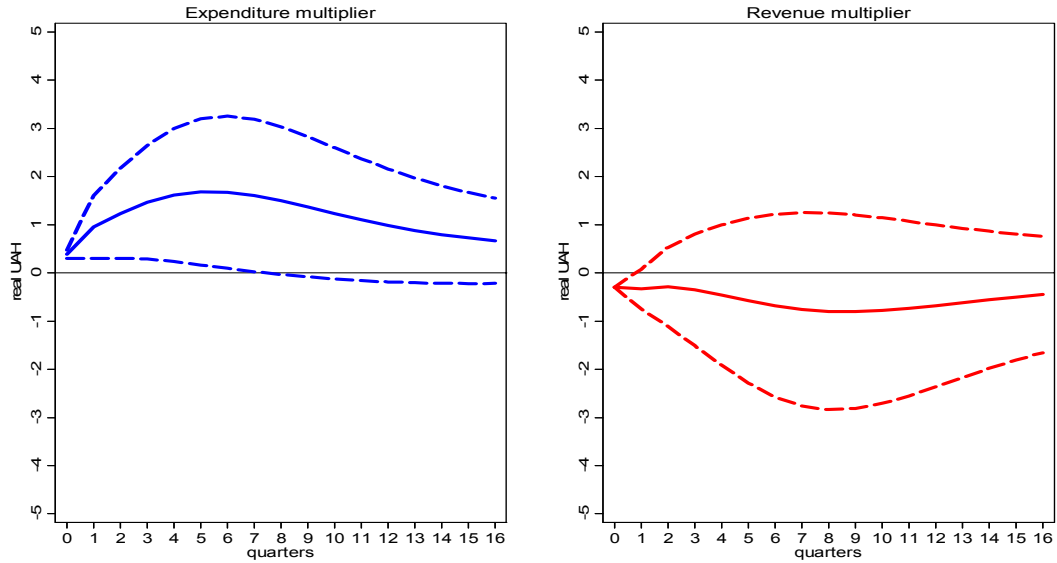
B. Alternative specification: Disaggregated fiscal variables

Figure 3 shows disaggregated government spending multipliers. Results for current spending multipliers (excluding interest spending and transfers) are presented in Panel A, while Panel B has results for capital spending multipliers. Confirming the previous results, both current and

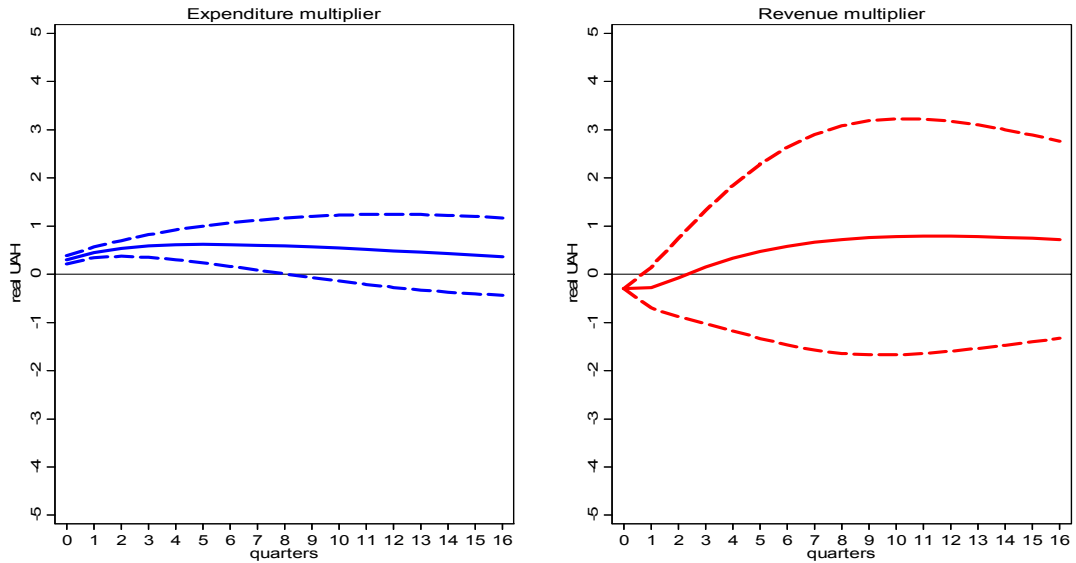
capital spending multipliers are stronger than revenue multipliers. The capital spending multiplier is slightly weaker than that for current spending, which could reflect challenges in the efficiency of public investment spending (Gupta et al., 2014). The impact of capital spending is significant for a slightly longer horizon than that of current spending. Similar results are obtained for disaggregated spending multipliers estimated applying the assumption that revenue policies are implemented first (not reported).

Figure 3. Fiscal Multipliers for Disaggregated Spending

Panel A. Current Spending



Panel B. Capital Spending



VI. ROBUSTNESS CHECKS AND ECONOMIC IMPACT ON GROWTH

Robustness checks

As a robustness check, we have re-estimated the VAR model after excluding exogenous control variables controlling for openness, monetary policy, and public indebtedness. We have also re-estimated the model using 4 lags, instead of 2.

Table 1 summarizes results from these robustness check specifications. The results are qualitatively similar to the previous ones, supporting a larger impact from the spending multiplier than the revenue multiplier.

Future research could explore whether Ukraine's fiscal multipliers vary over time, especially in response to the business cycle. The lack of a long time series of consistent quarterly data currently prohibits such estimations through VAR techniques. However, estimates may be possible through simulations of general equilibrium models. In this vein, future work could also assess the trade-off between consolidation and growth by examining the size of the cyclical component of the fiscal deficit.

Table 1. Fiscal multipliers: Robustness checks

	Impact multiplier (1 quarter)	Medium-term multiplier (8 quarters)	Quarters during which effect is significant	Cumulative multiplier (8 quarters)	Impact multiplier (1 quarter)	Medium-term multiplier (8 quarters)	Quarters during which effect is significant	Cumulative multiplier (8 quarters)
<i>Expenditure policies implemented first</i>								
	Expenditure multiplier				Revenue multiplier			
Baseline model (aggregate fiscal variables)	0.43	1.36	6	2.86	-0.30	-0.49	1	-0.96
Robustness check: Using 4 lags in VAR	0.43	2.35	8	4.76	-0.30	0.20	1	0.50
Robustness check: Excluding exogenous variables from VAR	0.40	1.27	2	2.58	-0.30	-0.15	1	-0.29
<i>Revenue policies implemented first</i>								
	Expenditure multiplier				Revenue multiplier			
Baseline model (aggregate fiscal variables)	0.29	1.12	16	2.40	-0.39	-0.83	2	-1.69
Robustness check: Using 4 lags in VAR	0.29	2.44	10	4.99	-0.43	-0.91	3	-1.76
Robustness check: Excluding exogenous variables from VAR	0.29	1.21	2	2.47	-0.40	-0.58	1	-1.17

Economic impact on growth

The estimated near-term impact on growth of a hypothetical spending cut in the second half of 2014 is contained. A spending cut is applied to the latest IMF projections for quarterly growth, taking into account the spending multiplier estimated in Section V above. For simulation purposes, we assume a 1 percent of GDP spending cut, equally distributed in each remaining quarter of the year (0.5 percent of GDP per quarter). Our estimations suggest that this would result in a 0.8 percentage point drop in the -5 percent real GDP growth expected for 2014.

Another useful indicator for the growth-fiscal policy nexus is the size of the semi-elasticity of deficit-to-GDP ratio to changes in output. In this analysis, the semi-elasticity is estimated at 0.2

percent, suggesting that a 1 percent increase in output growth would reduce the fiscal deficit ratio by 0.2 percentage points.⁷

VII. CONCLUSION

In Ukraine, fiscal policy is an important instrument for macroeconomic stabilization. In the midst of the current severe crisis, durable fiscal adjustment can help restore economic confidence and rebuild buffers. But its impact on growth is frequently debated. In particular, how effective are revenue versus spending instruments? Does current or capital spending have a larger impact? A solid grasp of the effect of various government policies on the Ukrainian economy will contribute towards the resolution of these questions and help shape fiscal policy going forward.

The analysis in this paper finds that fiscal consolidation pursued through a combination of revenue and spending measures would have a modest near-term impact on growth. Meanwhile, over the medium-term, adverse effects on growth from cuts in current spending could usefully be offset by higher spending on well-targeted growth promoting public capital, such as infrastructure. The effectiveness of such policies, of course, relies on a variety of other factors such as the quality, and efficiency of public investment spending.

These conclusions reflect estimations based on a SVAR model, where Ukraine's near term fiscal multipliers are well below one. The impact revenue and spending multipliers are -0.3 and 0.4, respectively. Over the medium-term, the revenue multiplier becomes insignificant with a wide confidence interval, ranging from above 1 to below -4. This makes it difficult to predict whether revenue measures will have a small or large impact on growth. As such it is not possible to draw any conclusions on the medium-term impact of revenue measures. The spending multiplier, however, strengthens to above 1. The effect of capital and current spending multipliers are about equal, although changes in capital spending have a longer lasting impact.

Given the severe challenges facing the Ukrainian economy, it is important that policymakers apply these results in conjunction with broader considerations. Some key ones include the need to maintain public debt sustainability, improve investor confidence, and enhance credibility of government policies. These considerations, combined with the large size of current spending in the budget, may necessitate greater reliance on current spending cuts over other types of consolidation measures even though multiplier estimates suggest a more diverse combination of measures.

⁷ The following formula is used to calculate semi-elasticities: $(\varepsilon^R - 1) * r - (\varepsilon^E - 1) * e$, where r and g are revenue and expenditure ratios to GDP and ε^R and ε^E are revenue and expenditure elasticities, respectively (Cottarelli and Fedelino, 2010).

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