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THE LONG-RUN EFFECTS OF THE SHORT-RUN STABILIZATION POLICIES IN UKRAINE

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Abstract: Based on the quarterly data for the period of 2002-2021, short- and long-term output effects of stabilization policies in Ukraine are estimated. Our main results are as follows: (i) domestic currency appreciation is expansionary regardless of the time horizon, (ii) government expenditures are expansionary in the short run, with an opposite effect in the long run, (iii) monetary policy tightening is contractionary in the long run, (iv) liberalization of economy is expansionary in the long run. Also, about 80% of deviation from the long-run relationship is corrected in the short run.

Keywords: Autoregressive Distributed Lag Model (ARDL), exchange rate, the fiscal-monetary mix, stabilization policy, Ukraine

JEL classification: E27, E52, E62

INTRODUCTION

Since the beginning of 1980s, it was common to believe that the use of monetary policy tools is sufficient for the purpose of stabilizing output around its equilibrium (or natural) level, while keeping inflation at its long-run target, and in the presence of elasticity optimism in foreign trade (it implies that domestic aggregate demand effects of monetary policy shocks are strengthened by a symmetric impact on the net trade balance). However, the experience of the world fiscal crisis of 2008–2009 suggests a stronger role of the fiscal policy in any output stabilization efforts, as monetary policy has become much less potent in a low interest rate environment of the last decade. On the other hand, an active use of fiscal stimuli cannot but raise concerns about fiscal sustainability and fiscal dominance

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when it is not possible to finance budget deficit without a retreat to the central bank funds, thus endangering price stability.

In the case of Ukraine, stabilization policy issues become further complicated by institutional problems that weaken the transmission mechanism and the harsh realities of the military conflict with Russia (since 2014), which turned into a full-scale war in February 2022. Overall, Ukraine seems to be an example of excess macroeconomic shocks that require not only a conventional stabilization policy with the fiscal-monetary mix or exchange rate changes but also the implementation of structural measures.

The objective of our paper is to provide empirical evidence on the short- and long-term output effects of stabilization policies in Ukraine, with a control for institutional features of the economy. As short-run stabilization policy can have both short- and long-term effects [Calmfors 1982], it implies the use of the error-correction framework for estimation purposes.

The remainder of the paper proceeds as follows. Section 2 provides a brief review of the empirical studies regarding stabilization policy effects in Ukraine. In Section 3, data and statistical methodology are discussed. Section 4 presents the main empirical results and Section 5 includes conclusions.

LITERATURE REVIEW

The long-term effects of stabilization policy aimed at the balance between supply and demand in the economy can be explained by changes in the allocation of resources and consequences for future macroeconomic performance [Calmfors 1982]. For example, expenditure-increasing policies may prevent recession but at the cost of higher inflation and long-term output losses. On the other hand, budget deficit cuts or interest rate hikes can reduce inflation but cause a persistent decrease in the natural level of output due to the hysteresis in unemployment rates or unfavourable structural shifts. As argued by the adherents of structuralist theories in the developing countries, any demand restraint leads mainly to a drop in domestic output in the short run, which in turn can discourage investment and thus reduce the economy's long-run output [Crockett 1981]. Further complications are caused by the so-called non-Keynesian fiscal policy effects when fiscal austerity becomes expansionary, as suggested by Afonso, Alves, and Jalles [2022], or the price puzzle when an increase in the central bank interest rate is associated with a higher inflation rate [Sims 1992].

Previous empirical studies for Ukraine are in support of conventional monetary policy effects on both output and inflation, while the estimates of fiscal policy are ambiguous. As established by Bondarchuk and Raboshuk [2020] with the vector autoregression (VAR) model, money supply is expansionary while there is an inverse relation to the interest rate. However, impulse response functions estimated for the 2006Q1–2019Q2 period are unstable and suggest seasonality in the time series.

Naumenkova, Malyutin and Mishchenko [2015] analyse the monthly data for the period of 2008–2013 and conclude that there is a conventional inverse relation between the aggregate demand and interest rate.

Using quarterly data for the 2001Q1–2016Q2 period and applying them in the structural vector autoregression (SVAR) model, Vdovychenko [2018] finds that both government expenditures and revenues are inflationary and expansionary, with the fiscal multiplier being higher for the former. Similar results are obtained for the same data sample by Shevchuk and Kopych [2017] with the autoregression vector error correction model (VECM).

Several studies combine effects of fiscal and monetary policies. Using a SVAR model for the period of 2002Q1–2018Q2, Shevchuk [2019] found that an increase in the National Bank of Ukraine (NBU) reference rate brings about a temporary decrease in the output gap, while improvement in the budget balance is expansionary with respect to the output gap. Based on quarterly data for the period of 2000Q1–2016Q4 and with the application of SVAR model, Shevchuk, Kopych and Golynska [2018] concluded that the budget surplus is expansionary and anti-inflationary, while tightening of monetary policy is associated with a decrease in the output gap. As the use of government expenditures for stabilization purposes can be constrained by the high level of public debt, any attempts to increase budget revenues used to face significant political obstacles.

Under important constraints for expansionary fiscal and monetary policies, stabilization efforts can be supported by the exchange rate realignments. However, it is not without obstacles. As exchange rate depreciation is expansionary in the Eastern European countries, according to, for example, Haug, Jędrzejowicz and Sznajderska [2013], Jevdović [2014], Cizmović, Shachmurove and Vulanovic [2021], estimates for Ukraine are mostly of the inverse relation between the weak currency and output. Contractionary effect of nominal (real) exchange rate depreciation is obtained in different modelling settings by Shevchuk [2016], Shevchuk and Kopych [2017], and Shevchuk [2019]. However, the expansionary effect of exchange rate depreciation on the aggregate demand is found by Naumenkova, Malyutin and Mishchenko [2015].

To sum up, empirical studies do not distinguish between the short run and long run effects of stabilization policy tools. However, we can tentatively conclude that exchange rate depreciation is not helpful for stabilization purposes, at least in the short run. It is less clear what the long run properties of monetary policy are and how stable the findings that suggest expansionary effects on output by both government expenditures and revenues are. Also, empirical studies do not control for institutional features of the economy, which can modify the effects of the fiscal-monetary mix and exchange rate changes or even have independent stabilizing impact.

DATA AND STATISTICAL METHODOLOGY

For the purpose of our study, the dataset contains quarterly observations for the period of 2002–2019 of the real gross domestic product in Ukraine and the euro area (index, 2010=100), Y_t and $YEURO_t$, respectively, terms of trade (index, 2010=100), TOT_t, money aggregate M3 (in hryvnas), M_t, the NBU reference rate (in percent), $RNBU_t$, the nominal exchange rate (hryvnas per dollar), E_t, government expenditures and revenues (in percent of GDP), G_t and REV_t, respectively, and the Index of Economic Freedom from the Heritage Foundation (values in the range from 0 to 1), $HERIT_t$. The crisis dummy, $CRISIS_t$, controls for developments of the period of 2008–2009, taking the value 1 from 2008Q3 to 2009Q4 and 0 otherwise. Another dummy IT_t is aimed at controlling the effects regarding introduction of the full-scale inflation targeting policy in 2016. Terms of trade are defined as the relation of the world metal prices to the world crude oil prices, reflecting domination of metals and related products in the Ukraine's exports and heavy dependence on the energy imports. All data come from the International Monetary Fund (IMF) *International Financial Statistics* online database (www.data.imf.org), the Washington-based Heritage Foundation (www.heritage.org) and the Ukraine's Ministry of Finance (www.mof.gov.ua).

Except for the use of Index of Economic Freedom, our choice of variables is standard for stabilisation policy studies, for example Shevchuk, Kopych and Golynska [2018] or Shevchuk [2019]. Monetary variables include both the money supply and the NBU reference rate, as monetary aggregates still seem to play a role in the economy of Ukraine, despite a recent switch to the inflation targeting policy. Similar to Shevchuk and Kopych [2017] and Vdovychenko [2018], government expenditures and revenues are included separately, as in the presence of likely symmetry in their output effects the use of the budget balance indicator seems not to be very informative. Control for the terms of trade effects reflects the dominance of commodity goods in the Ukraine's foreign trade. The importance of economic freedom is justified on the grounds of its relation to such factors as institutional quality, market competition, trade liberalization or capital flows, which used to play a role in both short-term and long-term output developments.

Also, we use several interaction variables. It is assumed that introduction of the inflation targeting policy in 2016 has modified the impact of the NBU interest rate policy ($IT{\cdot}RNBU$) on output and consumer prices, as well as reaction to the exchange rate ($IT{\cdot}E$), government expenditures ($IT{\cdot}G$) and revenues ($IT{\cdot}REV$). It is likely that the relationship between dependent variables and the terms of trade undergo substantial changes in the crisis environment ($CRISIS{\cdot}TOT$). While it is widely assumed that the transparent monetary policy framework in general and the monetary regime of inflation targeting in particular contribute to economic growth [Clinton et al. 2017; Fazio et al. 2018], recent empirical results for European and

Asian emerging economies suggest that inflation targeting policy did not affect GDP growth [Arsić et al. 2022; Krušković 2020].

Both the augmented Dickey–Fuller (ADF) test and the Phillips–Perron (PP) unit root test indicate that most of the variables are stationary at first differences (Table 1), thus having a unit root I(1). However, the NBU reference rate and fiscal variables are stationary at level or I(0). To sum up, our variables are a mixture of stationary and non-stationary ones.

Table 1. Results of unit root tests

Variable	ADF		PP	
	Level	1st Difference	Level	1st Difference
Y_t	–3.14	-6.61^{***}	–2.61	-6.64^{***}
$YEURO_t$	–1.37	-12.16^{***}	–1.57	-12.19^{***}
TOT_t	–1.34	-9.06^{***}	–1.35	-9.10^{***}
M_t	–2.78	-3.91^{**}	–2.87	-8.11^{***}
$RNBU_t$	-3.45^{*}	-6.95^{**}	-3.67^{**}	-6.96^{***}
E_t	–0.81	-2.98^{**}	–0.29	-5.94^{***}
G_t	-4.68^{***}	-11.78^{***}	-4.68^{***}	-20.63^{***}
REV_t	-4.35^{***}	-9.52^{***}	-4.48^{***}	-13.18^{***}
$HERIT_t$	–1.20	-5.87^{***}	–0.89	-5.87^{***}

* model with intercept is used for E_t, $YEURO_t$ and TOT_t, and model with intercept and trend is used for other variables; ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Source: own calculations

For our study, the choice of the Autoregressive Distributed Lag Model (ARDL) has several advantages. First, the method is applicable to the situation of variables being I(0), I(1) or a mixture of I(1) and I(0), as it is in our case. Second, it deals with the issue of endogeneity. Third, it is possible to ascertain both the short run and the long run effects simultaneously [Pesaran et al. 1999]. Consequently, it is possible to present the statistical model as follows:

$$Y_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{i=0}^{q} \psi_i \Delta \mathbf{X}_{t-p+1} + \varepsilon_t, \tag{1}$$

where $\mathbf{X}_t$ is a vector of exogenous variables ($YEURO_t$, M_t, $RNBU_t$, E_t, G_t, REV_t, $HERIT_t$, TOT_t), ε_t is a white noise variable, and i stands for the lag numbers.

Equation (1) can be re-written as follows:

$$\Delta Y_t = \alpha + \phi\left(Y_{t-i} - \varphi' \mathbf{X}_t\right) + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{i=0}^{q} \psi_i \Delta \mathbf{X}_{t-p+1} + \varepsilon_t, \tag{2}$$

where $\phi = -\left(1 - \sum_{i=1}^{p} \beta_i\right)$,

$$\varphi = \sum_{i=1}^{q} \psi_i \Big/ \left(1 - \sum_{i=1}^{p} \beta_i\right).$$

The error-correction term ϕ measures the adjustment of short run dynamics to the long run relationships. If the value of ϕ is significant and negative, it means that there is cointegration between the dependent variable, that is output and consumer prices in our case, and exogenous variables.

As the variables are integrated in the mixed order, it creates a favourable context for the application of ARDL Bounds test for cointegration (Table 2). Moreover, the results of the analysis are robust for an incorrect specification of the order of integration. Our results of the ARDL Bounds test indicate the presence of long-run relationship between output and the independent variables of the vector $\mathbf{X}_t$ in Model I and Model II, respectively.

Table 2. Results of the ARDL Bounds Test

Test F-statistic	Significance	Critical values	
		I(0)	I(1)
5.32^{***}	10%	2.13	3.09
	5%	2.39	–3.41
	1%	2.93	4.06

Source: own calculations

To check the robustness of our ARDL estimates for the long-term coefficients, we use alternative Dynamic Ordinary Least Squares (DOLS) and Fully Modified Ordinary Least Squares (FMOLS) estimators. Although the latter are aimed at the estimation of equilibrium parameters in relationships between variables containing unit roots, their use is nevertheless helpful in the sensitivity analysis.

We verify the stability of ARDL coefficients using the Ramsey's RESET test through the graphical representation of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of square recursive residuals (CUSUM of Squares), respectively. The coefficients are stable if the variance of residuals fits within the interval that indicates the variation limits for a significance level at 5%. We check residuals for serial correlation with the Breusch–Godfrey Serial Correlation LM test, as well as for homoscedasticity with the ARCH test.

EMPIRICAL RESULTS

We present empirical estimates of the determinants of GDP in Table 3. According to the Fischer test, both ARDL models are statistically significant at the 1% level. The value of the determination coefficient R^2 indicates that 76% of variation in GDP is explained by the independent variables. The Ramsey's RESET test indicates that both ARDL models are correctly specified. Representations of both

CUSUM and CUSUM SQ tests indicate stability of the coefficients. The LM test does not reveal any serial correlation of the residuals. Also, there is no homoscedasticity in the residuals.

Table 3. Estimates of the determinants of GDP

Variables	Coefficients					
Long run estimates						
	ARDL		DOLS		FMOLS	
YEURO	0.979*** (3.74)		0.588* (1.72)		1.244*** (9.85)	
TOT	0.026 (0.02)		–0.016 (–0.51)		–0.019 (–1.38)	
M	0.201*** (9.10)		0.211*** (8.34)		0.172*** (8.79)	
RNBU	–0.071*** (–2.75)		–0.056** (–2.67)		–0.045*** (–2.99)	
E	–0.096** (–2.02)		–0.134*** (–3.99)		–0.139*** (–5.05)	
G	–0.298*** (–3.60)		–0.366** (–2.24)		–0.110** (–2.09)	
REV	0.059 (0.79)		0.217 (1.59)		0.062 (1.25)	
HERIT	0.329*** (5.41)		0.287*** (5.07)		0.213*** (4.30)	
TREND	–0.005*** (–2.72)		–0.008*** (–3.38)		–0.004*** (–3.09)	
Short run estimates (ARDL)						
Lag	0	1		2		3
ΔY	—	0.293*** (2.71)		—		—
ΔYEURO	0.650*** (5.61)	–0.297** (–2.27)		—		—
ΔRNBU	–0.015 (–0.83)	—		—		—
ΔE	–0.211*** (–5.53)	–0.050 (–1.52)		–0.083** (–2.46)		—
ΔHERIT	0.014 (0.13)	–0.176 (–1.59)		—		—
ΔG	–0.114*** (–3.23)	0.191*** (4.97)		0.126*** (3.96)		0.069** (2.06)
ΔREV	0.069** (2.06)	–0.080** (–2.37)		—		—
IT	–0.785*** (–3.57)	—		—		—
IT·G	0.397*** (3.71)	—		—		—
IT·RNBU	0.049** (2.33)	—		—		—
IT·E	0.068 (0.74)	—		—		—
CRISIS	–0.012 (–1.50)	—		—		—
CRISIS·TOT	–0.055*** (–3.45)	—		—		—
ECT	–0.858*** (–7.98)	—		—		—
Diagnostic Statistic (ARDL)						
F	LM	RESET	ARCH	CUSUM	CUSUM	Adj. R^2
12.21***	0.95	0.51	1.68	S	S	0.76

* numbers in parentheses are Student's t-Statistic; *, **, *** imply statistical significance at the 10, 5 and 1% level, respectively.

Source: own calculations

As suggested by the ARDL method, the Ukraine's GDP is stimulated in the long run by higher output in the euro area, an increase in the money supply and

improvement in the level of economic freedom (all coefficients are significant at 1% level). On the other side, an increase in the NBU reference rate, higher government expenditures and exchange rate depreciation bring about a decrease in the GDP level. Better terms of trade and higher budget revenues are neutral with respect to GDP eventually. Comparable results are obtained with the DOLS and FMOLS estimators. It is worth noting that there is a clear long-term downward trend in the Ukraine's GDP.

The error-correction term reveals that there is a strong correction of the long run relationships (the coefficient on ECT at −0.858 is significant at the 1% level). As expected, there is a positive impact of the dynamics of output in the euro area. Surprisingly, the terms of trade, the NBU reference rate and money supply do not exert any effect on output in the short run. We confirm that depreciation of the hryvna is contractionary, with no differences between the short-term and long-term effects. However, we observe significant differences for the fiscal policy instruments. Government expenditures become expansionary in the short run. It means that fiscal stimuli can be effective in the short run, but at the expense of output losses in the long run. Budget revenues provide with an initial expansionary impact, but it is corrected with a lag. On the opposite, liberalization efforts seem not to be effective in the short run, while being pro-growth in the long run.

Regardless of the time horizon, our findings confirm majority of earlier results indicating that exchange rate depreciation is contractionary in Ukraine [Shevchuk 2016; Shevchuk and Kopych 2017; Shevchuk 2019]. Such an outcome can be explained by dependence on the import of crude oil, natural gas, chemical raw materials, as well as of foreign technology and intermediate goods. Also, it is likely that mechanisms of contractionary depreciation include currency substitution and persistent exchange rate-based inflationary expectations. Similar to Shevchuk and Kopych [2017] or Vdovychenko [2018], we confirm that government expenditures are expansionary in the short run, but it is not the case for the long-run effects. Contrary to abovementioned studies, there is no evidence of significant output response to budget revenues. It seems that non-Keynesian effects of fiscal policy in Ukraine refer to government expenditure cuts, not revenue increases, as it is obtained for a large sample of countries by Afonso et al. [2022].

Assessment of the inflation targeting effects is not straightforward. Although the direct impact of a new monetary regime is negative, in the presence of inflation targeting we have a stronger expansionary effect of government expenditures combined with the same positive effect of the NBU policy rate hikes. We observe no changes to the exchange rate effects under inflation targeting. Among other results, improvements in the terms of trade are contractionary under inflation targeting.

Overall, there is no difference between short-run and long-run output effects for the exchange rate, but it is not the case for the fiscal-monetary mix. Monetary policy is not neutral eventually, with no output effects in the short run. Higher government expenditures are expansionary in the short run (with a lag), but the long

run effect is unambiguously contractionary. As expected, liberalization policies become pro-growth only in the long run. As there is not any serious trade-off between the long run (expansionary) and short run (contractionary) effects, it should be favourable in the context of political support for economic reforms.

CONCLUSIONS

Our research is the next step in studying stabilization policies in Ukraine, as we analyse short-term and long-term effects of the fiscal-monetary mix and exchange rate depreciation within a congruent framework of the ARDL model. In the case of recession, the best option for output recovery is exchange rate appreciation as it is expansionary regardless of the time horizon. Monetary policy has long run properties only, with the expansionary effect of an increase in the money supply and the NBU reference rate cuts. We can view the lack of statistically significant monetary policy effects in the short run as a serious obstacle for stabilizing output under a monetary regime of inflation targeting. An increase of the government expenditures can stabilize output in the short run (though with a lag) but at the expense of the long-term losses. There seems to be no room for stabilization policy through the budget revenue channel. In this respect our results are different from previous studies, which report expansionary effect of higher budget revenues. Finally, liberalization efforts are neutral with respect to output in the short run, while having a strong expansionary effect in the long run. It means that institutional developments of liberal flavour could be a part of stabilization policy package. However, it should be admitted that our study does not account for the price and balance-of-payments effects of stabilisation policies. Other limitations include using of univariate analysis and aggregated fiscal policy indicators (it is likely that output effects are different across different kinds of government expenditure or tax revenues). Directions of future studies envisage estimation of the effectiveness of stabilization policies in bringing down inflation and tackling the balance-of-payments disequilibria, with accounting for possibly heterogeneous effects of direct and indirect taxes as well as of government transfers, purchases and investments.

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