



ANALYZING FISCAL POLICY USING A DSGE MODEL

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Abstract. This thesis examines the methodological capabilities of Dynamic Stochastic General Equilibrium (DSGE) models in the analysis of fiscal policy. The main focus is placed on evaluating, within a general equilibrium framework, the effects of government expenditures, taxes, and fiscal shocks on output, consumption, investment, inflation, and public debt. Based on the studies of Smets and Wouters (2007), Galí, López-Salido, and Vallés (2007), Christiano, Eichenbaum, and Rebelo (2011), Coenen et al. (2012), Leeper, Traum, and Walker (2017), as well as research related to the IMF's GIMF model, the thesis demonstrates that the fiscal multiplier depends on economic conditions, household behavior, and the monetary policy regime.

Keywords: DSGE model, fiscal policy, fiscal multiplier, government expenditures, taxes, public debt, fiscal shock, monetary policy.

Introduction. In the analysis of modern macroeconomic policy, assessing the effects of changes in government expenditures, taxes, transfers, and public debt on the economy is of considerable importance. The effects of fiscal policy on economic growth, consumption, investment, employment, and inflation occur through several channels. For this reason, Dynamic Stochastic General Equilibrium (DSGE) models are widely used in contemporary macroeconomic research.

DSGE models make it possible to analyze, within a unified framework, the forward-looking decisions of economic agents, various structural shocks, and the interrelationships among goods, labor, and financial markets. Smets and Wouters (2007) estimated a DSGE model for the U.S. economy incorporating real and nominal rigidities as well as structural shocks using Bayesian methods, demonstrating that such models can be empirically applied to explain and forecast macroeconomic fluctuations.

From the perspective of fiscal policy, the advantage of the DSGE approach is that it takes into account not only the direct effect of changes in government expenditures or taxes on GDP, but also the general equilibrium effects arising





through household consumption, firms' investment, the labor market, inflation, interest rates, and public debt.

Main part. In a DSGE model, the economy is generally represented through the interrelated decisions of households, firms, the government sector, and the central bank. Households make decisions regarding consumption, savings, and labor supply; firms determine production and demand for capital and labor; the government collects taxes, undertakes expenditures and transfers, and manages public debt. In open-economy models, foreign trade and international financial relations are also incorporated into the model.

One of the major structural models developed for the detailed analysis of fiscal policy is the International Monetary Fund's Global Integrated Monetary and Fiscal Model (GIMF). The GIMF described by Laxton, Mursula, Kumhof, and Muir (2010) is a multi-region dynamic general equilibrium model designed to analyze the interactions among government expenditures, taxes, public debt, foreign trade, and monetary policy. In the model, not all households exhibit fully Ricardian behavior, which makes it possible to reflect within the model the potential effects of fiscal measures on consumption and real economic activity.

In DSGE models, fiscal policy is generally analyzed through structural shocks to government expenditures, taxes, transfers, or public investment. An unexpected increase in government expenditures directly raises aggregate demand; however, the final outcome depends on the responses of private consumption and investment, price and wage rigidities, the reaction of the central bank, the method of financing expenditures, and household behavior.

Galí, López-Salido, and Vallés (2007) extended the standard New Keynesian model by incorporating "rule-of-thumb" households that consume according to their current income. They showed that price rigidities, deficit financing, and the presence of such consumers can explain within the model an increase in private consumption following an increase in government expenditures. This result implies that the effects of fiscal policy depend significantly on assumptions regarding the behavior of economic agents.

The fiscal multiplier is an important indicator in assessing the effectiveness of fiscal policy. It represents the extent to which output changes as a result of a change in a fiscal instrument. Using a DSGE model, Christiano, Eichenbaum, and Rebelo (2011) demonstrated that when the nominal interest rate is constrained by a lower bound close to zero, the government spending multiplier may be larger than under normal conditions. This conclusion indicates that the outcome of fiscal policy is directly related to the response of monetary policy.





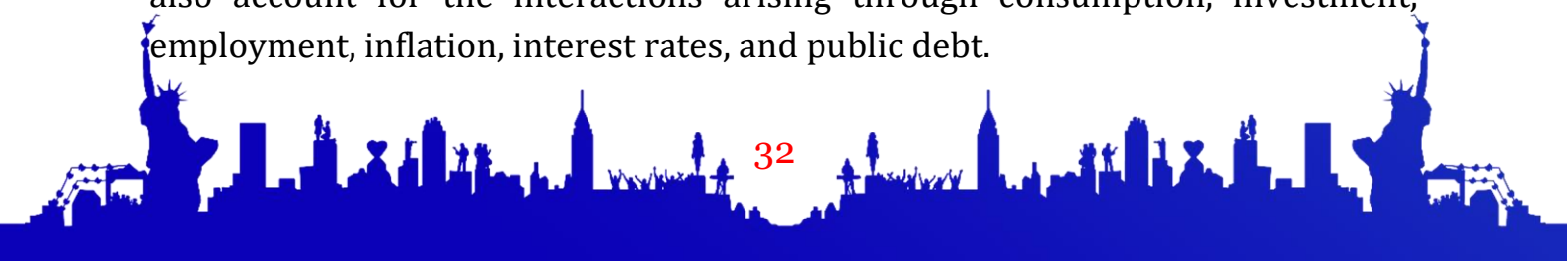
Coenen et al. (2012) compared several institutional and academic structural DSGE models in order to assess fiscal stimulus. The study examined the effects of different fiscal instruments and found that the magnitude of fiscal multipliers depends on the type of instrument, the duration of the stimulus, and the degree of monetary policy accommodation. These findings demonstrate that, when evaluating fiscal policy, attention should be paid not only to the volume of expenditures but also to their composition, duration, and financing mechanism.

Leeper, Traum, and Walker (2017) estimated a monetary DSGE model with detailed fiscal features using U.S. data and Bayesian methods, demonstrating that government spending multipliers differ across monetary-fiscal policy regimes. In their study, the posterior mean of the short-run output multiplier was approximately 1.3 on impact, while the long-run effect was strongly dependent on the policy regime. Therefore, from a scientific perspective, it is not appropriate to treat the fiscal multiplier as a single constant coefficient applicable to all countries and periods.

Practical DSGE analysis is conducted in several stages. First, economic agents and sectors appropriate to the objectives of the study are selected. Structural parameters are then calibrated or estimated on the basis of available macroeconomic time-series data. Smets and Wouters (2007) provide one of the classic empirical examples of Bayesian estimation. Subsequently, structural shocks are introduced into government expenditures, taxes, or transfers, and the responses of model variables over time are analyzed using impulse response functions. At the final stage, fiscal multipliers and alternative policy scenarios are compared.

When applying the DSGE approach to the economy of Uzbekistan, it is appropriate to jointly account for the characteristics of an open economy, government expenditures and taxes, public debt, monetary policy, the exchange rate, and the external sector. However, in order to provide precise numerical values for the fiscal multiplier or DSGE parameters for Uzbekistan, it is necessary to construct a separate model, calibrate or econometrically estimate its parameters using official national data, and conduct the relevant simulations.

Conclusion. DSGE models constitute a modern methodological tool that makes it possible to assess the macroeconomic effects of fiscal policy within a structural and general equilibrium framework. They are not limited to assessing the direct impact of changes in government expenditures and taxes on GDP, but also account for the interactions arising through consumption, investment, employment, inflation, interest rates, and public debt.





Scientific studies demonstrate that the fiscal multiplier is not a fixed and constant indicator. Galí et al. (2007) highlighted the importance of household behavior and nominal rigidities in determining the effects of fiscal policy; Christiano et al. (2011) showed that the multiplier may increase under monetary policy constraints; and Coenen et al. (2012) demonstrated the importance of fiscal instruments and the duration of policy measures. Leeper et al. (2017), using an empirical DSGE model, established that the fiscal multiplier also depends on the monetary-fiscal policy regime.

Accordingly, the DSGE model is of considerable importance for identifying the mechanisms through which fiscal shocks propagate throughout the economy, comparing alternative fiscal policy scenarios, and assessing the interactions between fiscal and monetary policy.

References:

1. Christiano, L., Eichenbaum, M., & Rebelo, S. (2011). When is the government spending multiplier large? *Journal of Political Economy*, 119(1), 78–121. <https://doi.org/10.1086/659312>
2. Coenen, G., Erceg, C. J., Freedman, C., Furceri, D., Kumhof, M., Lalonde, R., Laxton, D., Lindé, J., Mourougane, A., Muir, D., Mursula, S., de Resende, C., Roberts, J., Roeger, W., Snudden, S., Trabandt, M., & in't Veld, J. (2012). Effects of fiscal stimulus in structural models. *American Economic Journal: Macroeconomics*, 4(1), 22–68. <https://doi.org/10.1257/mac.4.1.22>
3. Galí, J., López-Salido, J. D., & Vallés, J. (2007). Understanding the effects of government spending on consumption. *Journal of the European Economic Association*, 5(1), 227–270. <https://doi.org/10.1162/JEEA.2007.5.1.227>
4. Laxton, D., Mursula, S., Kumhof, M., & Muir, D. V. (2010). The Global Integrated Monetary and Fiscal Model (GIMF)—Theoretical structure (IMF Working Paper No. 10/34). International Monetary Fund. <https://doi.org/10.5089/9781451962734.001>
5. Leeper, E. M., Traum, N., & Walker, T. B. (2017). Clearing up the fiscal multiplier morass. *American Economic Review*, 107(8), 2409–2454. <https://doi.org/10.1257/aer.20111196>
6. Smets, F., & Wouters, R. (2007). Shocks and frictions in US business cycles: A Bayesian DSGE approach. *American Economic Review*, 97(3), 586–606. <https://doi.org/10.1257/aer.97.3.586>

