Is There Asymmetry in the Relationship Between Government Consumption Dynamics and Economic Activity? Evidence From G7 Economies

Marko Senekovič
PhD Student at the University of Maribor, Faculty of Economics and Business, Slovenia
marko.senekovic1@um.si

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Abstract

In this paper, based on a quarterly dataset of G7 countries with the application of a nonlinear ARDL model we test for the presence of a short-run and long-term asymmetry in the relationship between government spending and economic activity. The main aim of this study is to analyze the relationship between government spending and economic activity in two separate scenarios, first, in periods when government spending increases and, second, in periods when government spending decreases. Our key findings are, first, the linear model that produces a positive relationship between government consumption and economic activity. Second, in the nonlinear model, more than half of the short-run and long-run coefficients are statistically significant. Third, short-run and long-run asymmetry are detected in four out of seven cases with recognized short-run asymmetry also in the remaining three cases based on graphical analysis. Finally, a negatively inclined short-run asymmetry is detected. The results thus imply a stronger output effect in periods of declining dynamics in government consumption. Future research should be focused on broadening the sample countries and model by adding additional variables.

Keywords: fiscal policy, nonlinear ARDL model, G7 countries

Introduction

Over the last 15 years, the development of the economic conditions on a global scale led to many changes in the perception and understanding of the functioning of economies at the macroeconomic level. From the great recession and the debt crisis-related deflationary pressures accompanied by the economics of depression to the later revival of economic activity mainly at the expense of extremely accommodative monetary policy measures, in the last two years, we found ourselves in the grip of covid economics. An attempt to cope with simultaneous supply and demand shocks was necessary and, therefore, also addressed by central banks and governments across the world. However, as the global epidemic has not yet been resolved and economic policy stimulus still ongoing, the main concern is how to properly manage inflationary pressures without

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jeopardizing future economic growth and high levels of employment. We seem to have become accustomed to a state of persistent crisis which requires constant efforts by the authorities to maintain economic development on the right course and where certain measures are already in use for many years.

Logically, questions are raised about the effectiveness of economic policy by managing the business cycle in changing and evolving macroeconomic conditions, especially in the desire to overcome this turbulent epidemic period with as much as possible low direct and indirect costs. If over the last decade, a mild consensus has been established about reduced efficiency of monetary policy in periods of zero lower bound (Di Bucchianico, 2021; Bernanke, 2020), simultaneously, fiscal policy has gradually gained in importance at both scientific (Buchner, 2020) and political (Gaspar et al., 2021; Schnabel, 2021) levels. Moreover, it was the epidemic period that demonstrated the true potency of fiscal transfer policy to stimulate aggregate demand in real-time.

For this reason, in the last decade, the turn to a more comprehensive and in-depth study of the effectiveness of fiscal policy in managing the business cycle was understandable. A hot topic has become a comprehensive understanding of the functioning of the fiscal multiplier mechanism, which, however, remains unexplored with too many empirical specificities, at least in some parts. The factors that influence the effectiveness of fiscal policy by promoting economic growth are particularly interesting. One of these peculiarities is the presence of nonlinear processes in the relationship between fiscal spending and economic activity (Horwath et al., 2020; Alqaralleh, 2020).

The main aim of this study is, therefore, to analyze the relationship between government consumption and economic activity in two separate scenarios, first, in periods when government spending increases and, second, in periods when government spending decreases. According to economic theory, a positive connection is assumed. Therefore, both variables should be moving in the same direction. On the other hand, the question is whether this output response is symmetric or asymmetric in its magnitude. The nature of the relationship between those two variables is estimated based on the new dataset for the sample of G7 countries with applying an asymmetric ARDL methodological framework.

This paper is structured as follows. In chapter 2, we provide an empirical literature review from the field of modeling and examining the role of fiscal policy actions by stimulating aggregate economic activity. In chapter 3, the methodological framework used in this paper is presented. In chapter 4, we briefly describe our data sample. Results are documented and explained in chapter 5 while chapter 6 concludes.

Empirical Literature Review

According to recent development in the field of understanding the efficient functioning of fiscal policy measures, more comprehensive knowledge is yet to emerge gradually. In this chapter, we outline key findings of the relevant empirical literature concentrating on examining the relationship between fiscal spending and output dynamics with all its known specialties. Through empirical literature review, we provide some estimates of fiscal multipliers with focusing on papers that analyze specific characteristics which might affect the effectiveness of fiscal policy actions and address nonlinearities in the aforementioned fiscal mechanism.

Perotti (2002) and Blanchard and Perotti (1999) set out foundations for the development of the study of fiscal policy and its impact on the gross domestic product and the other key macroeconomic variables based on the vector autoregression methodology. Blanchard and Perotti (1999) find positive government spending multipliers and negative tax multipliers in the United States while Perotti (2002) points out the reduced effect of fiscal stimuli in the years after 1980 in five developed countries. Studies that follow in that direction, e.g. Giordano et al. (2007) and Burriel et al. (2019), provide additional support of the significant output effect of discretionary fiscal policy in developed economies. Moreover, House et al. (2020) based on the analysis of 29 advanced economies found out that eliminating austerity measures in the period after great recession would have substantially reduced output losses.

Further research showed that it is reasonable to distinguish between different phases of the business cycle by estimating the output effect of fiscal stimuli. Auerbach and Gorodnichenko (2010, 2011, 2014) assessed fiscal multipliers in separate studies for the United States, OECD economies, and Japan. The common conclusion of these studies was that the estimated values of fiscal multipliers differed between recession and expansion with values increasing at the time of recession. Batini et al. (2012) also corroborated the premise of higher spending multipliers in recession periods. On the other hand, the results of Ramey and Zubairy (2014) for the United States did not indicate a statistically significant difference between the values of the multipliers relative to the phase of the business cycle. In addition to this, Qazizada and Stockhammer (2015) estimated higher spending multipliers during contractions, while results do not indicate a difference in the impact of government spending during zero lower bound periods.

Some researchers concentrate on the structural characteristics of countries and show that these factors contribute to the dynamic of output effect of government spending. Ilzetzki et al. (2013), for example, found that the output effect of fiscal stimuli is greater in more developed countries, the size of fiscal multipliers is smaller in more open economies compared with the reference figures in closed economies, and that fiscal multipliers are smaller or even negative in countries with high public debt. On the sample of 48 emerging and advanced economies, Hory (2016) gauged a considerably lower size of spending multiplier in the case of emerging market economies than in the case of advanced economies. Moreover, the spending multiplier is negatively correlated with imports, public debt, and savings. On the other hand, however, it is positively correlated with unemployment level and financial development. In addition to this, Wierzbowska and Shibamoto (2018) figured out that capital flows, especially foreign direct investment, play an important role in determining the sizes of fiscal multipliers. Koh (2017) confirms the findings of other studies and implies that fiscal multipliers are larger during periods of low public debt, in periods of the financial crisis and economic downturn, and more developed countries. Contrary to the findings in Ilzetzki et al. (2013), Koh (2017) reports that fiscal multipliers are not necessarily smaller in the economies with high trade and financial openness. He also argues that the size of fiscal multipliers does not necessarily depend on the type of exchange-rate regime. Borsi (2018) estimated larger fiscal multipliers in times of a credit crunch.

The great recession with a prolonged period of sluggish growth suggests that the scope for countercyclical monetary policy remains limited. Auerbach and Gorodnichenko (2017) found that constraint on monetary policy coincides with a resurgence in activist fiscal policy which has moved from a focus on automatic stabilizers to strong reliance on discretionary measures reflecting not only a necessity but also growing evidence of the effectiveness of such policy to fight recessions. This development of recognizing fiscal policy as at least equally if not more efficient than monetary policy in times of long and deep recessions surfaced to mainstream thinking during a covid-19 slump when governments of major capitalistic countries urged, together with its independent central banks, for a massive fiscal expansion (Gaspar et al., 2021; Schnabel, 2021).

Some studies scrutinize output response to fiscal policy actions also based on autoregressive distributed lag approach. For example, Alexiu and Nellis (2017) find for the Greek economy over the period 1960-2014 that the size of the fiscal multiplier does not differ substantially over the phases of the business cycle. In addition to this, their results indicate that irrespective of the scale of inflation, government spending positively affects output growth. At the same time, however, results do not clearly support the notion about the role of exceptionally low-interest rates in determining the relationship between government spending and economic activity. Furthermore, Sharma and Mittal (2019) provide some evidence about the presence of an asymmetric association between fiscal deficit and gross domestic product in the short and long run based on the nonlinear ARDL model for India where, according to their findings, fiscal deficit harms gross domestic product. Asandului et al. (2020) on a sample of twelve post-communist economies and asymmetric ARDL approach estimate that cumulative impact of fiscal policy generates inflationary output effect for countries in their sample.

In recent years, more and more studies have emerged in the field of examining the role of fiscal policy actions with results implying gradual convergence in understanding the functioning of the transmission mechanism of fiscal policy. However, the empirical literature is still far from a unanimous conclusion about the size dependence of fiscal multipliers to country-specific structural and dynamic factors. Moreover, the nature of the transmission mechanism of fiscal measures is only partially explained, with new determinants still to be tested and thoroughly analyzed. In this paper, we apply the aforementioned nonlinear ARDL approach to a sample of G7 countries which are all characterized as large, open, and developed economies.

Methodology

The relationship between government consumption and economic activity is estimated via the autoregressive distributed lag model following Pesaran et al. (2001) which is noted as a linear or symmetric ARDL model from here on. The model is presented in equation 1.

$$\Delta logY_t = \alpha_0 + \sum_{i=1}^{n_1} \alpha_{1i} y_t \Delta logY_{t-1} + \sum_{i=0}^{n_2} \alpha_{2i} \Delta \log G_{t-i} + \\ + \alpha_3 \Delta \log Y_{t-1} + \alpha_4 \Delta \log G_{t-1} + \varepsilon_t \quad (1)$$

Where the coefficients α_{2i} represent short-run effects of government consumption (measured in first differences) on economic activity and the coefficient α_4 represents long-run effect estimated based on the lagged variable of government consumption. Notations are as follows. G stands for government consumption and Y stands for aggregate output.

Shin et al. (2014) upgrade the linear ARDL model by introducing some nonlinearities into it. To detect asymmetries in the relationship between independent and dependent variables Shin et al. (2014) decompose fluctuations in the

independent variable, in our case in government consumption, into its positive and negative partial sums, which is represented in equation 2 and equation 3.

$$logG_t^+ = \sum_{j=0}^{t} \Delta logG_j^+ = \sum_{i=1}^{t} max(\Delta logG_{j,0}) \quad (2)$$

$$logG_t^- = \sum_{j=0}^{t} \Delta logG_j^- = \sum_{i=1}^{t} max(\Delta logG_{j,0}) \quad (3)$$

Then Shin et al. (2014) construct a nonlinear model by replacing independent variables, in our case government consumption, with partial sum components defined in equations 1 and 2. The Nonlinear (asymmetric) ARDL approach is then defined in equation 4 as follows.

$$\Delta logY_t = \beta_0 + \sum_{i=1}^{n_1} \beta_{1i} y_t \Delta logY_{t-1} + \sum_{i=0}^{n_2} \beta_{2i} \Delta logG_{t-i}^+ + \sum_{i=0}^{n_3} \beta_{3i} \Delta logG_{t-i}^- + \beta_4 logY_{t-1} + \beta_5 logG_{t-1}^+ + \beta_6 logG_{t-1}^- + \mu_t \quad (4)$$

Where coefficients β_{2i} represent the short-run effect of government spending on economic activity in case of positive dynamics of government consumption, and coefficients β_{3i} represent the effect of government spending on economic activity in case of negative dynamics in government consumption. The long-run output effect of government spending for the case of positive and negative dynamics in government spending is represented by the coefficients β_5 and β_6, respectively. Aforementioned methodological approach was also used for example in Husein and Kara (2020).

Data

In our empirical study we use quarterly data for seven G7 economies. For consistency, we obtained data from the OECD database (2021a; 2021b) for all countries except for the United States. In the estimation process, we used the governmental final consumption component for government consumption, as defined in the expenditure structure of the gross domestic product. We used the gross domestic product as a proxy for economic activity. In the case of the United States, we use data from the BEA database (2021) for government consumption and gross domestic product. In this case, as in the other six countries, we use the government final consumption as defined in the expenditure structure of the gross domestic product. The variables of government consumption and gross domestic product were obtained for all seven countries in the form of absolute values expressed in domestic currencies. Variables were also seasonally adjusted by both databases.

For model estimation, we designed time series that vary in length from country to country. For the United States, we used a data sample from 1947q1 to 2018q4, for Canada from 1981q1 to 2018q4, for Japan from 1994q1 to 2018q4, for the United Kingdom from 1955q1 to 2018q4, for France from 1960q1 to 2018q4, for Germany from 1991q1 to 2018q4, and for Italy from 1995q1 to 2018q4. For each of the seven countries, we converted nominal government consumption and nominal gross domestic product into real values using the consumer price index with a base in 2010. We then transform real government consumption and real gross domestic product into a logarithmic form.

Results

In this section, we present the estimates for each country separately, for both the symmetric and asymmetric models. In the case of the asymmetric model, the results are also shown in a graphical form where a short-dashed line represents the output response in the case of a positive change in real government spending while a long-dashed line indicates the response of real output in the case of negative change in real government consumption. The solid line represents the perceived asymmetry. The shaded area represents the 90% confidence interval in detecting output response asymmetry between the aforementioned two scenarios. Graphical representations of the results of the nonlinear model are plotted on a 20 quarters horizon.

In the case of the United States (Table 1), the linear model shows a positive and statistically significant relationship between government consumption and output, both in the short and long run, with a greater long-run effect. Within the asymmetric model, a statistically significant relationship between the two aforementioned variables can be detected in the case of positive changes in government consumption while in the case of negative changes, both coefficients, short- and long-run, are statistically insignificant. The estimates also show that there is no statistically significant asymmetry in the response of output concerning the initial positive or negative change in government consumption (Figure 1).

Table 2 shows that in the case of the linear model for the United Kingdom, the relationship between government consumption and output is positive in both the short and long run, but statistically significant only in the short term. Through the prism of magnitude, the long-term effect of

Table 1. Results for the United States

Linear (symmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	α_0	0.045	2.53	0.012
Short-run	α_2	0.078	2.27	0.024
Long-run	α_4	0.800	12.8	0.000
Nonlinear (asymmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	β_0	0.163	2.40	0.017
Short-run positive	β_2	0.017	2.07	0.040
Short-run negative	β_3	0.009	0.55	0.585
Long-run positive	β_5	0.798	86.5	0.000
Long-run negative	β_6	-0.462	0.34	0.559
Asymmetry testing				
		F-statistic		Prob. level
Short-run asymmetry		1.314		0.253
Long-run asymmetry		0.219		0.640

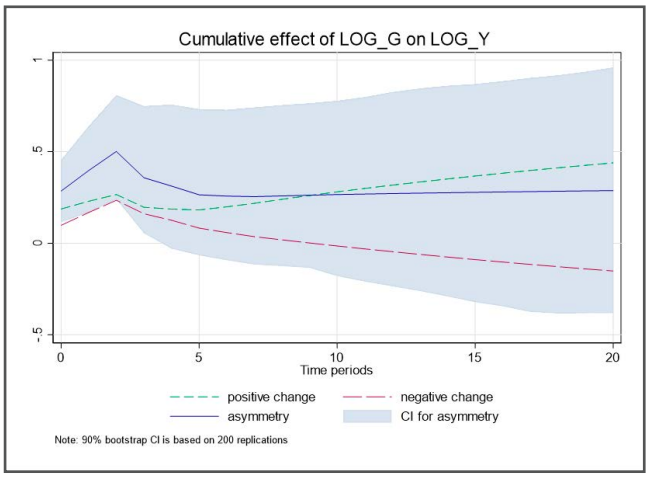
Table 2. Results for the United Kingdom

Linear (symmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	α_0	0.026	0.73	0.465
Short-run	α_2	0.311	7.17	0.000
Long-run	α_4	1.803	0.49	0.621
Nonlinear (asymmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	β_0	0.506	2.52	0.012
Short-run positive	β_2	0.016	1.20	0.233
Short-run negative	β_3	-0.021	-1.16	0.248
Long-run positive	β_5	0.374	3.66	0.057
Long-run negative	β_6	0.501	0.94	0.331
Asymmetry testing				
		F-statistic		Prob. level
Short-run asymmetry		5.966		0.015
Long-run asymmetry		7.390		0.007

government consumption on output is stronger. In the case of the nonlinear model, only the long-term coefficient is statistically significant within a 10% probability level in the case of positive dynamics in government consumption. On the other hand, the results show a statistically significant presence of asymmetry in the output response to the initial positive or negative change in government consumption. Asymmetry is perceived and significant in both the short and long run. It is also depicted from Figure 2 that in the case of negative dynamics in government consumption, the

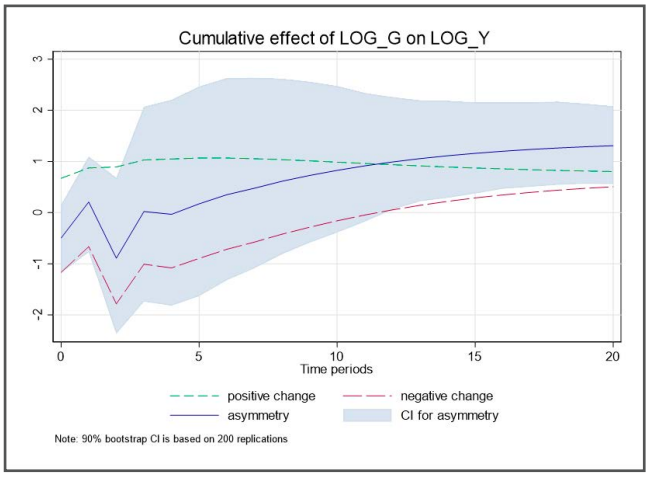
output response is greater in absolute terms in the short run than in the case of positive dynamics in government consumption, but then gradually diminishes.

Figure 1. United States – asymmetry testing



(Table 3). The coefficients in the linear model are also comparable in magnitude. On the other hand, the coefficients in the nonlinear model are statistically significant in the case of a positive change in government consumption both in the short and long run while in the case of negative dynamics in government consumption, the coefficients are statistically insignificant in both periods. No short-run asymmetry is observed for the French economy. Nevertheless, Figure 3 shows a stronger output response in the

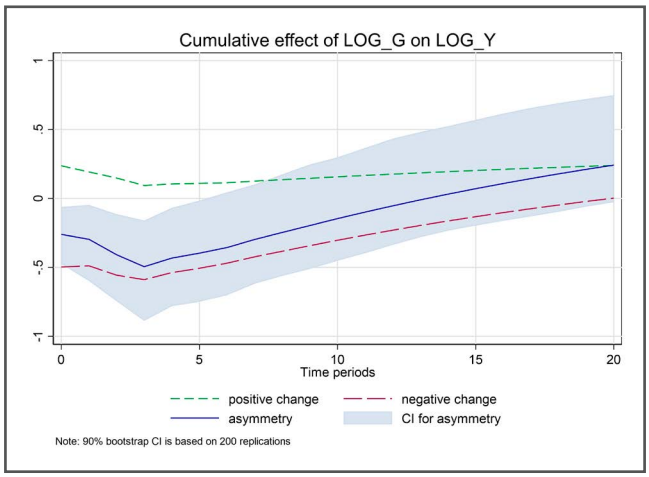
Figure 3. France – asymmetry testing



government consumption and economic activity in both the short and long run with a stronger impact of government consumption being seen over the long run. In the asymmetric model, all coefficients are statistically significant while according to statistical criteria, there is no statistically

The link between government consumption and economic activity is positive in the case of France in the short and long run and, at the same time, statistically significant

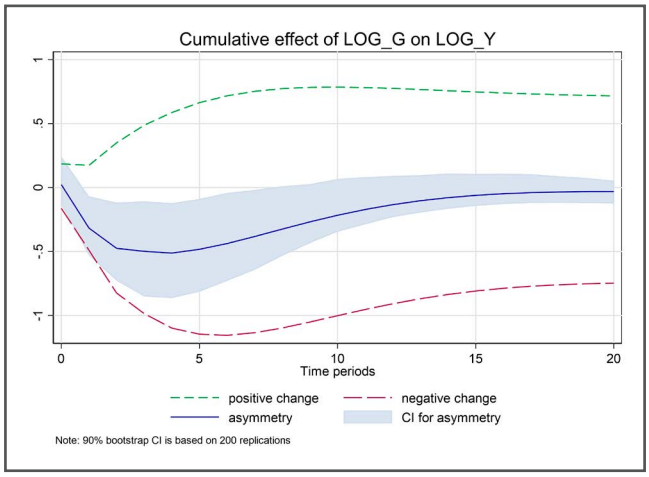
Figure 2. United Kingdom – asymmetry testing



case of negative dynamics in government consumption. However, a statistically significant long-term asymmetry is detected where the negative response of economic activity gradually diminishes in the scenario of negative dynamics in government consumption. It then turns into a positive area around 13 quarter.

Table 4 presents results for Italy where the linear model shows a statistically significant relationship between

Figure 4. Italy – asymmetry testing



significant asymmetry in the response of economic activity. Nevertheless, the detection of short-run asymmetry just barely missed the 10% probability level. Figure 4 shows a stronger output response to the negative dynamics in government consumption. In the long run, however, an almost

completely symmetrical output response to shock in government consumption is detected, regardless of whether it initially decreases or increases. As a result, test statistics do not support long-term asymmetry.

Table 3. Results for France

Linear (symmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	α_0	0.168	2.31	0.022
Short-run	α_2	0.734	8.51	0.000
Long-run	α_4	0.809	20.6	0.000
Nonlinear (asymmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	β_0	0.739	3.23	0.001
Short-run positive	β_2	0.047	3.19	0.002
Short-run negative	β_3	-0.042	-0.97	0.335
Long-run positive	β_5	0.744	381	0.000
Long-run negative	β_6	0.660	0.91	0.341
Asymmetry testing				
	F-statistic		Prob. level	
Short-run asymmetry	0.051		0.821	
Long-run asymmetry	4.418		0.037	

Table 4. Results for Italy

Linear (symmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	α_0	0.693	2.61	0.011
Short-run	α_2	0.218	5.00	0.000
Long-run	α_4	0.534	5.61	0.000
Nonlinear (asymmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	β_0	1.217	2.26	0.024
Short-run positive	β_2	0.067	2.30	0.002
Short-run negative	β_3	0.072	2.26	0.027
Long-run positive	β_5	0.711	22.0	0.000
Long-run negative	β_6	-0.759	17.1	0.000
Asymmetry testing				
	F-statistic		Prob. level	
Short-run asymmetry	2.756		0.101	
Long-run asymmetry	0.873		0.353	

In the case of Germany (Table 5), the linear model assesses the positive and statistically significant effect of government consumption on economic activity with a more pronounced long-term effect. In the asymmetric model, estimated coefficients are also statistically significant. It can be seen from Figure 5 that initially, in the case of both positive and negative dynamics in government consumption, the output response is negative, with the difference that in the case of the latter, the output response is deeper. After the first year, in the case of positive dynamics in government consumption, the output response skips to the positive area and then rises to a level that corresponds to negative equivalents in the case of negative dynamics in government consumption more symmetrically in the long run. This is also confirmed by test statistics which show statistical significance according to the 5% probability level threshold only in the case of a short-run asymmetry.

For Canada (Table 6), estimates of the coefficients are statistically significant only in the nonlinear model and even in this model, only in the case of positive dynamics in government consumption. In the short run, the response of economic activity is statistically insignificant. Nevertheless, Figure 6 shows rather vague dynamics of the response

Table 5. Results for Germany

Linear (symmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	α_0	0.097	0.65	0.518
Short-run	α_2	0.254	3.88	0.000
Long-run	α_4	1.044	7.79	0.000
Nonlinear (asymmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	β_0	2.039	3.65	0.000
Short-run positive	β_2	0.107	3.59	0.001
Short-run negative	β_3	0.085	2.39	0.004
Long-run positive	β_5	0.701	54.2	0.000
Long-run negative	β_6	-0.553	12.4	0.000
Asymmetry testing				
	F-statistic		Prob. level	
Short-run asymmetry	6.143		0.015	
Long-run asymmetry	3.875		0.052	

Figure 5. Germany – asymmetry testing

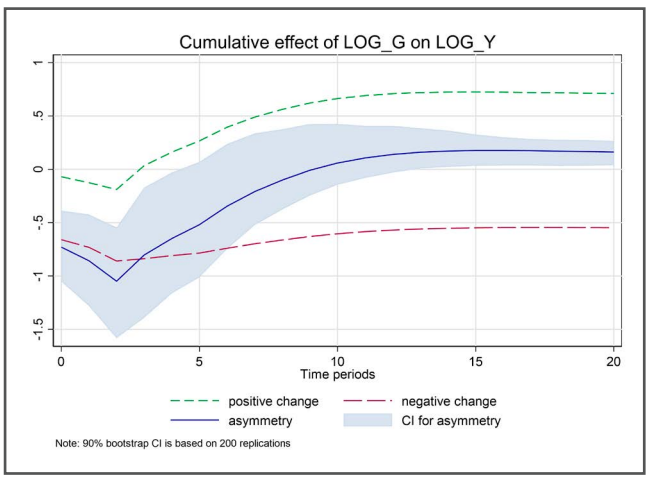
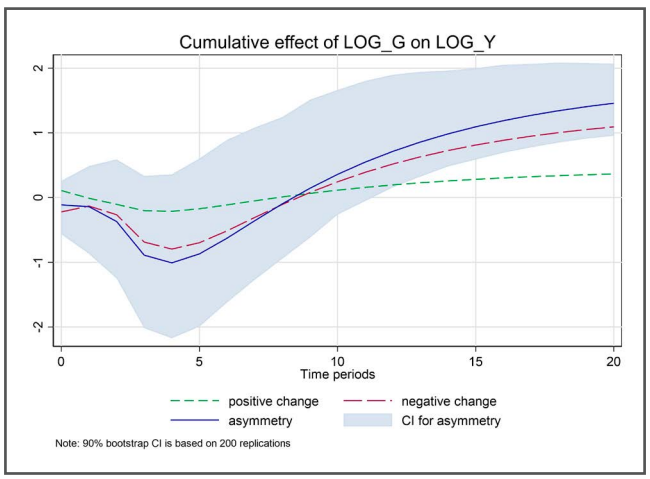


Figure 6. Canada – asymmetry testing



of economic activity in the case of positive dynamics in government consumption. At the end of the first year, the output response is even slightly negative. On the other hand, in the case of a negative change in government spending, the output response is relatively strongly negative at the beginning, but then markedly positive in the long run. Statistically significant short-run and long-run asymmetries were detected.

Table 6. Results for Canada

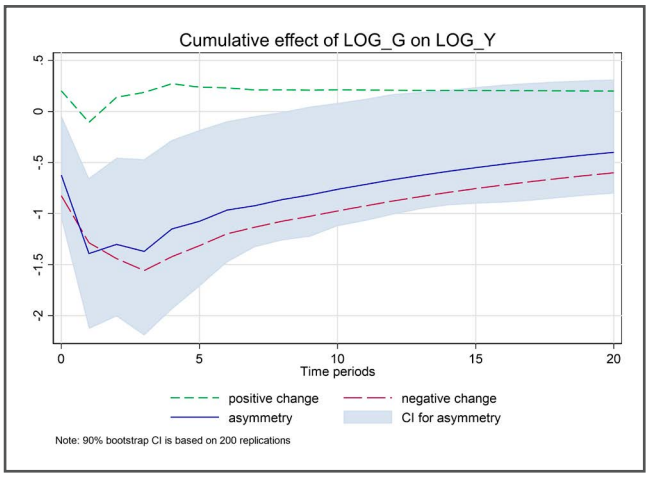
Linear (symmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	α_0	0.017	0.48	0.629
Short-run	α_2	0.094	1.24	0.216
Long-run	α_4	2.855	0.09	0.930
Nonlinear (asymmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	β_0	0.722	2.58	0.011
Short-run positive	β_2	0.026	1.49	0.139
Short-run negative	β_3	-0.080	-2.76	0.007
Long-run positive	β_5	0.445	7.78	0.006
Long-run negative	β_6	1.366	5.89	0.017
Asymmetry testing				
	F-statistic		Prob. level	
Short-run asymmetry	3.624		0.059	
Long-run asymmetry	19.40		0.000	

Table 7. Results for Japan

Linear (symmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	α_0	0.937	1.66	0.100
Short-run	α_2	0.524	4.71	0.000
Long-run	α_4	0.087	0.63	0.533
Nonlinear (asymmetric) ARDL model				
	Coefficient	Estimates	t-statistic	Prob. level
Constant	β_0	0.753	1.21	0.228
Short-run positive	β_2	0.012	0.48	0.634
Short-run negative	β_3	-0.14	0.24	0.812
Long-run positive	β_5	0.190	0.21	0.648
Long-run negative	β_6	-0.221	0.06	0.809
Asymmetry testing				
	F-statistic		Prob. level	
Short-run asymmetry	5.359		0.023	
Long-run asymmetry	0.003		0.955	

The coefficient estimates met the statistical standards worst in the case of Japan because only the short-run effect of government spending on economic activity proved to be statistically significant (Table 7). Nonetheless, Figure 7 offers us the perceived asymmetric short-run impact of government spending on economic activity. In the case of a negative shock or negative dynamics in government consumption, the response of economic activity is much stronger than in the case of a positive shock in government consumption. This also results in a statistically significant short-term asymmetry. In the long run, the output effect of the negative shock in government spending is waning gradually. There is also a weak positive output response noted to a positive shock in government consumption which stays low across the entire horizon.

Figure 7. Japan – asymmetry testing



To sum up, our empirical analysis via the linear ARDL model characterized six out of seven estimated short-run coefficients and four out of seven long-run coefficients as statistically significant. As expected, a positive relationship between government consumption and economic activity is confirmed based on results from the linear model. On the other hand, in the nonlinear ARDL model, in the short run, 50% of estimates satisfy the threshold for statistical significance while in the long run, nine out of fourteen coefficients are statistically significant. Furthermore, short-run asymmetry is detected through test statistics in four out of seven cases. Based on the graphical analysis, however, we may conclude that even in the remaining three cases short-run asymmetry can be detected. Interestingly, in six out of seven cases, we estimate negatively inclined short-run asymmetry, which indicates that there is expected stronger output response in periods of negative dynamics in government consumption. In the long run, we detect a statistically significant asymmetric relationship between the dynamics of government consumption and the output response in four out of seven cases.

The results thus show that there is more to a basic linear connection between government consumption and economic activity. Based on results, fiscal policy actions and their counter-cyclical function have an asymmetric effect on aggregate economic activity, which implies careful and tailored use of fiscal policy measures according to the different underlying macroeconomic conditions of the economy. This is especially important in times of recessions when a lot of countries apply austerity measures willingly or unwillingly and, therefore, gradually try to decrease government spending and consolidate public budgets. And if this is the case, the presence of negatively inclined asymmetry makes balancing the budget even more stressful and, ultimately, also inefficient because the inevitable connection between the pace of economic activity and tax revenues still persists and, therefore, disables to achieve the aforementioned goal of a balanced budget.

If we assume that government consumption frequently decreases during the recession periods, despite the differences in methodological approaches, our findings are in line with Auerbach and Gorodnichenko (2010, 2011, 2014), Batini et al. (2014), and Koh (2017) who all assessed larger fiscal multipliers in times of recession.

Conclusion

The role and functioning of fiscal policy in stabilizing the business cycle have received considerable research attention due to the specific economic conditions in the post-recession period. Above all, the main focus is to understand specificities in the multiplicative mechanism of fiscal actions on a macroeconomic scale, especially because the effectiveness of the stabilizing role of fiscal policy in different periods and conditions depends on many structural characteristics of individual economies as well as on built-in specific dynamic nonlinearities. In this paper, based on a quarterly dataset of G7 countries with an application of a nonlinear ARDL model we test for the presence of a short- and long-term asymmetry in the relationship between government spending and economic activity.

The key findings of our study are the following. First, the linear model produces a positive relationship between government consumption and economic activity. Second, in the nonlinear model, more than half of the short-run and long-run coefficients are statistically significant. Third, short-run and long-run asymmetry are detected in four out of seven cases. However, from the graphical analysis, the presence of a short-run asymmetry can be inferred in the remaining three cases. Finally, however, the main result of the present study is a detection of a negatively inclined short-run asymmetry

which implies a stronger output effect in periods of declining dynamics in government consumption.

In future research, it would be interesting to apply the existing methodological framework to countries that differ in fundamental economic characteristics from the countries included in this research, e.g. the use of a sample of smaller and less developed economies. In addition to this, expanding the model by including additional explanatory and control variables would help clarify the functioning of fiscal policy under different circumstances, especially to identify possible new asymmetric relationships between considered variables in the case of former or to increase the robustness of a model in the case of the latter.

References

Alexiou, C., & Nellis, J. G. (2017). Cyclical Multiplier and Zero Low Bound Effects of Government Expenditure on Economic Growth: Evidence for Greece. *Australian Economic Papers, 56*(2), 119–133. https://doi.org/10.1111/1467-8454.12084

Alqaralleh, H. (2020). The Fiscal Policy and the Dynamic of the Economic Cycle. *Journal of Economic Studies, 47*(2), 231–241. https://doi.org/10.1108/JES-08-2018-0293

Asandului, M., Lupu, D., Maha, L., Viorică, D. (2020). The Asymmetric Effects of Fiscal Policy on Inflation and Economic Activity in Post-communist European Countries. *Post-communist Economies, 33*(7), 900–920. https://doi.org/10.1080/14631377.2020.1867430

Auerbach, A. J., & Gorodnichenko, Y. (2010). *Measuring the output responses to fiscal policy*. NBER Working Paper No. 16311, National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w16311

Auerbach, A. J., & Gorodnichenko, Y. (2011). *Fiscal multipliers in recession and expansion*. NBER Working Paper No. 17447, National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w17447

Auerbach, A. J., & Gorodnichenko, Y. (2014). *Fiscal multipliers in Japan*. NBER Working Paper No. 19911, National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w19911

Auerbach, A. J., & Gorodnichenko, Y. (2017). *Fiscal Stimulus and Fiscal Sustainability*. NBER Working Paper No. 23789, National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w23789

Batini, N., Callegari, G., & Melina, G. (2012). *Successful austerity in the United States, Europe and Japan*. IMF Working Paper No. 12/190, International Monetary Fund, Washington. https://doi.org/10.2139/ssrn.2169736

BEA (2021). National Data. Domestic Product and Income. Retrieved from https://www.bea.gov/tools/

Bernanke, B. S. (2020). The New Tools of Monetary Policy. *American Economic Review*, 110(4), 943–83. https://doi.org/10.1257/aer.110.4.943

Blanchard, O., & Perotti, R. (1999). *An empirical characterization of the dynamic effects of changes in government spending and taxes on output*. NBER Working Paper No. 7269, National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w7269

Borsi, T. M. (2018). Fiscal multipliers across the credit cycle. *Journal of Macroeconomics, 56*, 135–151. https://doi.org/10.1016/j.jmacro.2018.01.004

Buchner, M. (2020). Fiscal Policy in an Age of Secular Stagnation. *Comparative Economic Studies 62*(3), 398–429. https://doi.org/10.1057/s41294-020-00128-x

Burriel, P., de Castro, F., Garrote, D., Gordo, E., Paredes, J., & Pérez, J. J. (2009). *Fiscal policy shocks in the Euro Area and the US. An empirical assessment*. ECB Working paper No. 1133, European Central Bank, Frankfurt. https://doi.org/10.2139/ssrn.1529277

Di Bucchianico, S. (2021). Negative Interest Rate Policy to Fight Secular Stagnation: Unfeasible, Ineffective, Irrelevant, or Inadequate? *Review of Political Economy, 33*(4), 687–710. https://doi.org/10.1080/09538259.2020.1837546

Gaspar, V., Lizarazo, S., Medas, P., & Piazza, R. (2021). *Fiscal Policy for an Uncertain World*. IMF Blog: Insights & Analysis on Economics & Finance. Retrieved from https://blogs.imf.org/2021/10/13/fiscal-policy-for-an-uncertain-world/

Giordano, R., Momigliano, S., Neri, S., & Perotti, R. (2007). The effects of fiscal policy in Italy: Evidence from a VAR model. *European Journal of Political Economy, 23*(3), 707–733. https://doi.org/10.1016/j.ejpoleco.2006.10.005

Horvath, R., Kaszab, L., Marsal, A., & Rabitsch, K. (2020). Determinants of Fiscal Multipliers Revisited. *Journal of Macroeconomics, 63*. https://doi.org/10.1016/j.jmacro.2019.103162

Hory, M.-P. (2016). Fiscal multipliers in emerging market economies: Can we learn something from advanced economies? *International Economics, 146*, 59–84. https://doi.org/10.1016/j.inteco.2015.11.002

House, C. L., Proebsting, C., & Tesar, L. L. (2020). Austerity in the Aftermath of the Great Recession. *Journal of Monetary Economics, 115*, 37–63. https://doi.org/10.1016/j.jmoneco.2019.05.004

Husein, J., & Kara, S. M. (2020). Nonlinear ARDL Estimation of Tourism Demand for Puerto Rico from the USA. *Tourism Management*, 77. https://doi.org/10.1016/j.tourman.2019.103998

Ilzetzki, E., Mendoza, E. G., & Végh, C. A. (2013). How big (small?) are fiscal multipliers? *Journal of Monetary Economics, 60*(2), 239–254. https://doi.org/10.1016/j.jmoneco.2012.10.011

Koh, W. C. (2017). Fiscal multipliers: New evidence from a large panel of countries. *Oxford Economic Papers, 69*(3), 569–590.

OECD (2021a). *Main economic indicators. Consumer prices. Quarterly Data*. Retrieved from https://stats.oecd.org/

OECD (2021b). *Quarterly National Accounts. Quarterly Data*. Retrieved from https://stats.oecd.org/

Perotti, R. (2002). *Estimating the effects of fiscal policy in OECD countries*. ECB Working Paper No. 168, European Central Bank, Frankfurt. https://doi.org/10.2139/ssrn.358082

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*, 289–326. https://doi.org/10.1002/jae.616

Qazizada, W., & Stockhammer, E. (2015). Government Spending Multipliers in Contraction and Expansion. *International Review of Applied Economics, 29*(2), 238–258. https://doi.org/10.1080/02692171.2014.983053

Ramey, V. A., & Zubairy, S. (2014). *Government spending multipliers in good times and in bad: Evidence from U.S. historical data*. NBER Working Paper No. 20719, National Bureau of Economic Research, Cambridge. https://doi.org/10.3386/w20719

Schnabel, I. (2021). *Unconventional Fiscal and Monetary Policy at the Zero Lower Bound*. Keynote Speech at the Third Annual Conference Organized by the European Fiscal Board on "High Debt, Low Rates and Tail Events: Rules-Based Fiscal Frameworks under Stress". Retrieved from https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210226~ff6ad267d4.en.html

Sharma, V., & Mittal, A. (2019). Fiscal Deficit, Capital Formation, and Economic Growth in India: a Nonlinear ARDL Model. *Decision: Official Journal of the Indian Institute of Management Calcutta, 46*(4), 353–363. https://doi.org/10.1007/s40622-019-00223-8

Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling Asymmetric Cointegration and Dynamic Multipliers in a Nonlinear ARDL Framework. In R. Sickles, & W. Horrace (Eds.), *Festschrift in Honor of Peter Schmidt*. Springer. https://doi.org/10.1007/978-1-4899-8008-3_9

Wierzbowska, A., & Shibamoto, M. (2018). Cross-country Evidence on Determinants of Fiscal Policy Effectiveness: The Role of Trade and Capital Flows. *Applied Economics, 50*(32), 3493–3514. https://doi.org/10.1080/00036846.2018.1430332

Ali obstaja asimetrija v razmerju med dinamiko državne potrošnje in ekonomsko aktivnostjo? Analiza na vzorcu držav skupine G7

Izvleček

V tem članku preverjamo prisotnost kratkoročne in dolgoročne asimetrije v razmerju med državno potrošnjo in ekonomsko aktivnostjo na osnovi četrtletnega podatkovnega niza za države iz skupine G7 z uporabo nelinearnega ARDL modela. Glavni namen te raziskave je analizirati razmerje med državno potrošnjo in ekonomsko aktivnostjo v dveh ločenih scenarijih, prvič, v obdobjih, ko se državna potrošnja povečuje, in drugič, v obdobjih, ko se državna potrošnja zmanjšuje. Naše ključne ugotovitve so, prvič, linearni model prepoznava pozitivno razmerje med državno potrošnjo in ekonomsko aktivnostjo, drugič, v nelinearnem modelu je več kot polovica kratkoročnih in dolgoročnih koeficientov statistično značilnih, tretjič, kratkoročna in dolgoročna asimetrija je bila ocenjena v štirih primerih od skupno sedmih, s tem da lahko na osnovi grafične analize sklepamo o prisotnosti kratkoročne asimetrije tudi v preostalih treh primerih. In nazadnje, ugotovljena je negativno usmerjena kratkoročna asimetrija. Rezultati tako kažejo na močnejši odziv outputa v obdobjih, ko vladna potrošnja upada. Nadaljnje raziskovanje je smiselno usmeriti na širitev vzorca držav vključenih v analizo in na razširitev modela z dodatnimi spremenljivkami.

Ključne besede: fiskalna politika, nelinearni ARDL model, države G7