Ministerio de Hacienda

Gobierno de Chile

Documento de Trabajo N° 4

Effects of Fiscal Policy on Private Consumption: Evidence from Structural-Balance Fiscal Rule Deviations

Juan A. Correa, Christian Ferrada, Pablo Gutiérrez, Francisco Parro

Diciembre 2013

Effects of Fiscal Policy on Private Consumption: Evidence from Structural-Balance Fiscal Rule Deviations*

Juan A. Correa† Christian Ferrada‡ Pablo Gutiérrez§
Francisco Parro¶

Abstract

We use a new narrative measure of fiscal shocks to study how private consumption reacts to government spending increases. Our fiscal shocks arise from three announcements of expansionary fiscal rule deviations in a small and open economy where fiscal policy follows a structural-balance fiscal rule. All those deviations were announced to be mainly on the spending side. We find a negative response of private consumption in the face of those announcements. Our findings are consistent with the existence of consumers expecting some irreversibility in government spending increases and, as a consequence, a rise in future taxes to make the newly announced fiscal spending path consistent with the intertemporal government budget constraint.

Keywords: fiscal policy, fiscal rule, government spending, unexpected shock
JEL Classification: E20, E62, H50

I. Introduction

Macroeconomic implications of fiscal shocks are subject to debate. Neoclassical models predict a positive fiscal multiplier due to a wealth effect on labor supply but an always

*We would like to thank Michael Boskin, Juan Bravo, Rodrigo Cerda, José De Gregorio, Barry Eichengreen, Robert Engle, Stanley Fischer, Laurence Kotlikoff, Nouriel Roubini, Jeffrey Sachs, Salvador Valdés, and all participants at the Central Bank of Chile Workshop, Chilean Ministry of Finance Workshop and the Fourth International Conference "Chile toward the Development" for their useful suggestions and comments. We would also like to thank Raúl Morales for his helpful research assistance.

†Research Department, Ministry of Finance; Santiago, Chile, e-mail address: jlcorrea@hacienda.gov.cl.
‡Central Bank; Santiago, Chile, e-mail address: cferrada@bcentral.cl.
§Universidad de Chile; Santiago, Chile, e-mail address: pgutiecu@gmail.com.
¶Research Department, Ministry of Finance; Santiago, Chile, e-mail address: fparro@hacienda.gov.cl.

contractionary impact on private demand, such that the multiplier tends to be less than unity. Allowing for distortionary taxes, the wealth effect is offset and the impact to output may even result in a contractionary response. In contrast, models built around Keynesian theories allow for output to be partly determined by demand, and under certain conditions this can lead to a multiplier greater than one.

A crucial component of the conclusions derived from those theories is how consumers respond to government spending increases. Agents that behave in a Ricardian fashion[1] expect future tax increases to finance fiscal expansions; thus, they increase their levels of savings. The fall in private consumption crowds out the expansionary effects of fiscal policy, resulting in only a modest increase in the aggregate demand. On the contrary, if agents are non-Ricardian, fiscal expansions that are financed with debt do not produce any depressing effect on private consumption, making expansionary fiscal policy more effective.

These opposing views regarding the effectiveness of fiscal policy are explained by very different assumptions that support different theories; for example, assumptions about the rigidity of markets, the existence of financial constraints in the economy, economic agents' degree of myopia, and so forth. Therefore, the question about consumers' response to fiscal policy is, in the end, an empirical one.

However, empirical studies also deliver controversial results. Using techniques based on vector autoregressive (VAR) methods, some works derive positive effects of fiscal spending expansions on private consumption. This evidence suggests the presence of non-Ricardian agents. Among these works, we have Blanchard and Perotti (2002), Galí, López-Salido, and Vallés (2007), Perotti (2008), Mountford and Uhlig (2009), Auerbach and Gorodnichenko (2010), Gordon and Krenn (2010), Céspedes, Fornero, and Galí (2011), and Caldara and Kamps (2012). On the other hand, works based on narrative methods find a decline in private consumption following a fiscal expansion, supporting the existence of Ricardian agents (see Ramey and Shapiro [1998], Edelberg, Eichenbaum, and Fisher [1999], Burnside, Eichenbaum, and Fisher [2004], Cavallo [2005], Romer and Romer [2010], and Ramey [2011a], among others). One explanation for the conflicting results in the literature is that fiscal shocks may often be anticipated in advance of their actual implementation. Ramey (2011b) and Leeper, Walker, and Yang (2013) emphasize the importance of timing to properly identify the effects of fiscal events.

This paper presents additional evidence showing that private consumption decreases in response to announcements of fiscal expansions. Our main contribution is the use of a new narrative measure of fiscal shocks, arising from three fiscal rule deviations that occurred in a small and open economy where the government follows a structural-balance

[1]Strictly speaking, the Ricardian equivalence refers to agents that expect higher future taxes after a deficit-financed cut in current taxes, given a path of government spending. In this context, we define Ricardian agents as consumers who expect higher future taxes in the face of a permanent increase in government spending beyond the intertemporal government budget constraint.

fiscal rule. All those deviations were announced to be mainly on the spending side. Most of the previous literature using a narrative approach identifies fiscal shocks coming from variations in defense spending (for instance, Blanchard and Perotti [2002] and Barro and Redlick [2011]). However, a problem with these types of shocks is that conflict has an impact on the economy beyond the fiscal dimension. Thus, the study of fiscal shocks of a completely different nature than those previously studied in the literature might be valuable to gain further understanding of the empirical effects of fiscal policy.

Chile's fiscal policy has been conducted in accordance with a structural-balance fiscal rule since 2001. A fiscal target of 1% of GDP existed from 2001 until 2007. Since then, three expansionary deviations from the target of the rule have been announced by the fiscal authority. The first announcement occurred in the fourth quarter of 2007, when the fiscal authority officially announced that the fiscal surplus target would be reduced from 1% to 0.5% of GDP. The second announcement occurred in the first quarter of 2009, when the fiscal authority publicly announced that a stimulus package equivalent to 2.7% of GDP would be implemented and, as a consequence, that the target for the structural surplus would be reduced from 0.5% to 0% of the GDP. The third announcement occurred during the third quarter of 2010, when an external advisory committee revealed that the structural balance of 2009 was -3.1% of the GDP, far from the announced target of 0%. As a consequence of the new fiscal figures, the Minister of Finance announced that the structural-balance target would be changed from 0% to -1%. These three announcements constitute the fiscal shocks studied in this paper.

We use a narrative-based approach, in the spirit of Ramey and Shapiro (1998), to identify the exact timing of the shocks. We find a negative response of private consumption to the announcements of expansionary deviations of the structural-balance fiscal rule. The evidence presented in this paper supports the idea that any unexpected change in the path followed by government spending should change agents' expectations about future taxation and therefore affect their consumption decisions. Specifically, in the face of expansionary fiscal announcements, rational individuals expect higher taxes in the future and thus decrease their current level of consumption in response to the negative wealth effect. Our results seem to be in accordance with a balanced-budget fiscal rule, because the government is obliged to balance its budget in the short or medium term if government spending is not consistent with the intertemporal government budget constraint. As shown by Hercowitz and Strawczynski (2004), pressure by interest groups restrains governments from reversing temporary spending increases, thus making part of the temporary spending increase permanent. Taking this into the context of a structural-balance fiscal rule, it is more likely that a government would increase taxes rather than reduce spending; therefore, agents can expect an increase in taxes and will thus decrease their consumption. Indeed, this is what actually occurred in Chile when the government increased taxes during the first quarter of 2013.[2]

[2]Some presidential candidates proposed, in the fourth quarter of 2013, a new tax increase, in part to

A key requirement of a narrative approach is the exogeneity of the fiscal announcements. It is likely that the three fiscal rule deviations identified in this paper might be affected by endogenous factors. In order to address this methodological issue, we include a set of control variables for both internal and external conditions of the economy. Therefore, our main identifying assumption is that controlling for the set of variables which capture the state of the economy, our empirical model estimates the causal effect of the three fiscal rule deviations on private consumption. Additionally, as a robustness check, we estimate our empirical model considering only the first and third fiscal announcements (those in the fourth quarter of 2007 and the first quarter of 2009, respectively). This empirical exercise aims at evaluating whether the fall exhibited by private consumption in our empirical estimates is only driven by the effects of the global financial crisis. Even discarding the fiscal shock that is relatively contemporary to the global financial crisis, we find a negative response of private consumption to the announcements of expansionary deviations of the structural-balance fiscal rule.

The rest of the paper is organized as follows. Section 2 describes the main fiscal events that occurred in Chile during 2007-2011. Using a narrative approach, we identify the fiscal shocks studied in this paper. Section 3 presents and discusses the framework for the empirical analysis and describes the data. Section 4 shows and discusses the main empirical findings. Finally, Section 5 concludes.

II. The Fiscal Rule Deviations

Chile's fiscal policy has been conducted in accordance with a structural-balance rule since 2001.[3] This rule covers only the central government, excluding the Central Bank, public firms, and local governments. Originally, the fiscal rule declared that the central government's overall structural surplus must be equal to 1% of actual GDP in every year. The 1% of GDP level for the target was calculated considering the levels of public debt, the external vulnerability of the Chilean economy, the levels of contingent liabilities, and the financial position of the Central Bank. Thus, the fiscal target was consistent with the intertemporal budget constraint of the government.[4]

The structural balance equals structural revenues plus interest on net government assets minus actual spending on goods, services, and transfers. Structural revenues are the revenues that the central government would have collected in a particular year if GDP

reduce the structural deficit of -1%.

[3]Marcel et al. (2001) provide a complete description of Chile's fiscal rule.

[4]For instance, Marcel et al. (2001) explain that "the structural surplus target of 1% of GDP ensures a dynamic asset accumulation that makes it possible to meet future financial commitments of the public sector, which grow at a higher rate than revenues and expenses, in addition to expenditures derived from contingent liabilities. Within this latter category, the most relevant are the guarantees of minimum income for concessions, those arising from lawsuits against the Treasury, the guarantees to ensure minimum pensions in the pension system, and potential financial losses by the Central Bank."

had been at its trend level and if copper and molybdenum prices[5] had been running at their long-term levels (both prices affect central government income). Potential output and the long-term reference price for copper are determined by a panel of experts in order to isolate the operation of the rule from the political cycle. The long-term reference price for molybdenum is estimated by the Budget Office.

The rule is publicly announced and verifiable, serving as an anchor for the credibility of the fiscal policy. Additionally, the rule allows the operation of automatic stabilizers that smooth the business cycle. Whereas actual fiscal revenues fluctuate according to the business cycle, the expansion of fiscal spending is smooth and consistent with the evolution of the productive capacity of the economy. Therefore, fiscal spending does not excessively expand or contract the economy during expansive or contractive phases of the business cycle. As empirically shown in Larraín and Parro (2008), this fiscal behavior has contributed to making the Chilean economy less volatile.

The 1% fiscal target existed until 2007. In that year, the government reduced the fiscal target from 1% to 0.5% of GDP.[6] The change to the fiscal rule target was officially announced in a report released by the Budget Office in October 2007. This deviation from the fiscal rule was announced to be on the spending side not having any explicit announcement of tax reform in the report released by the Budget Office. This announcement constituted the first fiscal shock.

On September 15, 2008, the global financial services firm Lehman Brothers declared bankruptcy. This episode marked the beginning of the subprime mortgage crisis. Chile was not immune to the effects of this crisis. In anticipation of a deep deceleration of the economy, the Minister of Finance, Andrés Velasco, announced two changes to the fiscal policy during the first quarter of 2009. First, he announced the implementation of a fiscal stimulus package that included new subsidies targeted to low-income families, several fiscal programs aimed to foster investment and employment, and a reduction in taxes. Second, Velasco announced that, as a consequence of the fiscal package, the target for the structural surplus would be reduced from 0.5% to 0%. The total cost of this stimulus package was 2.7% of GDP, of which 1.8% corresponded to a direct increase in fiscal spending and 0.9% corresponded to temporary tax reductions.

Additionally, in May 2010, the new Minister of Finance, Felipe Larraín, convened a committee of experts (hereafter "the Committee") to review the methodology used to calculate the structural balance. The Committee was chaired by the ex-governor of the Central Bank of Chile, Vittorio Corbo. The results of the Committee were published in August 2010. The Committee proposed some changes to the methodology and revealed

[5]Since 2005, the molybdenum price has been considered in the calculation of the fiscal structural revenues.

[6]Since the Chilean economy had been performing well, there was political pressure to increase government spending in certain areas, such as pensions and education.

that the structural balance of 2009 was -3.1% of GDP.[7] As a consequence of the new fiscal figures, Minister Larraín announced in August 2010 that the structural-balance target announced by the previous fiscal authority would be reduced from 0% to -1%.[8] The new information revealed by the Committee and the announcement of Minister Larraín constituted the third fiscal shock.[9]

III. Empirical Framework

Our fiscal shocks arise from three expansionary structural-balance fiscal rule deviations. We use a narrative approach in the spirit of Ramey and Shapiro (1998) to identify the exact timing of those fiscal shocks. As discussed in Section 2, the identified fiscal shocks come from the announcements in the fourth quarter of 2007, the first quarter of 2009 and the third quarter of 2010. Following Ramey and Shapiro (1998), our basic estimating equation is:

$$c_t = \alpha_0 + \sum_{i=1}^{T} a_i c_{t-i} + \sum_{i=0}^{T} b_i D_{t-i} + u_t, \tag{1}$$

where private consumption is denoted by c_t. Additionally, we include a dummy variable, denoted by D_t, that takes the value of one in the fourth quarter of 2007, in the first quarter of 2009, and in the third quarter of 2010 (the dates of the fiscal announcements) and zero otherwise. u_t is the vector of residuals.

Our estimation period covers the first quarter of 2001 (when the fiscal rule starts to operate) to the first quarter of 2012. We use quarterly data obtained from the Central Bank of Chile. Private consumption is in logarithms and deflated by their own deflator reported by official National Accounts. Data are seasonally adjusted by using the X-12 method.

Additionally, we include covariates to control for external and internal conditions

[7] From then on, the structural balance would be calculated using the methodology proposed by the Committee, which recommended treating as permanent any transitory fiscal policy considered difficult to revert in the future.

[8] In the fourth quarter of 2010, the Budget Office announced that, to achieve this goal, the structural-balance target for 2011 would be -1.8% of GDP and would gradually converge to -1% until the end of 2013.

[9] This shock is considered an expansionary deviation from the rule from two points of view. First, the information revealed by the Committee could have changed the expectations of agents about the levels of future taxes needed to rebalance the government budget. Specifically, agents realized that fiscal policy during Velasco's administration was more expansionary than the one officially announced in 2009. Therefore, a rise in taxes could be required to equilibrate public finances again given the difficulties of cutting several fiscal programs. Second, even though the information revealed by the Committee would not have been new for agents, Minister Larraín's announcement of the change in the fiscal target, from 0% to -1%, can also be considered a more expansionary path of fiscal policy than the one expected by agents.

of the economy. We include as covariates, a world output index and *The Economist* commodity price index as controls for the external macroeconomic conditions. To control for the internal conditions of the economy, we use the short-term interest rate and the Chilean stock price index as additional covariates.

We include a quadratic deterministic trend to estimate a stationary model with valid impulse-response functions. Then, denoting by X_t the additional covariates of the empirical model, our final baseline regression is the following:

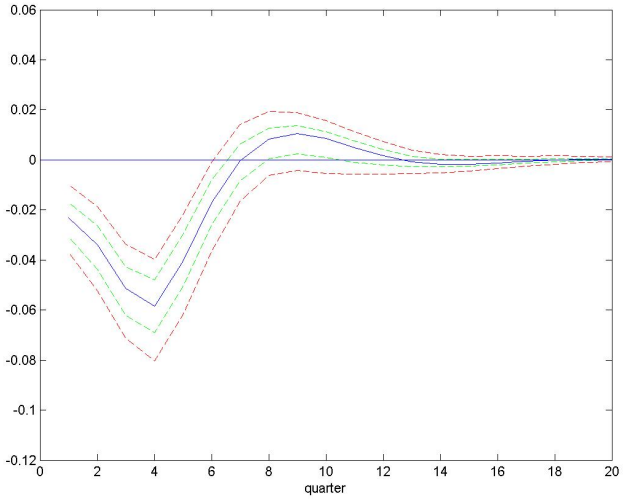
$$c_t = \delta_0 + \delta_1 t + \delta_2 t^2 + X_t\theta + \sum_{i=1}^{4} a_i c_{t-i} + \sum_{i=0}^{4} b_i D_{t-i} + u_t. \tag{2}$$

After we estimate the empirical model, we perform an Augmented Dicky-Fuller (ADF) test on the residuals. We reject the null hypothesis of unit root (the p-value of the ADF test is 0.0001).

IV. Results

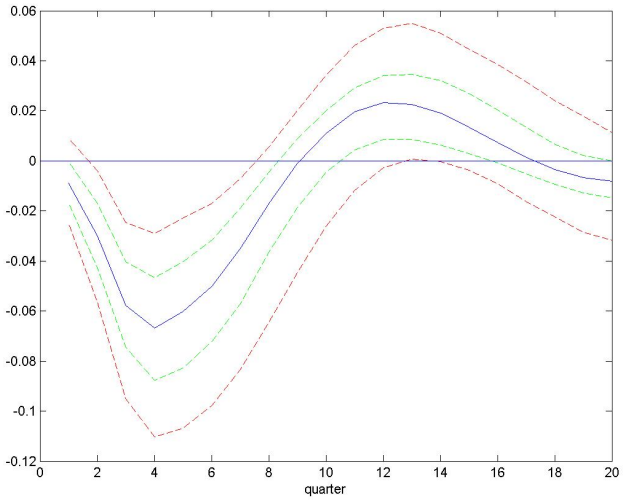
Figure 1 exhibits the impulse-response function for private consumption growth, including the world output, the commodity price index, the short-term real interest rate, and the stock price index as controls. Confidence intervals were built using the bootstrap-within-bootstrap method proposed by Kilian (1998). We observe that private consumption falls after the fiscal announcement and negative growth of consumption is observed during six quarters; after that, consumption growth is not statistically different from zero. Therefore, adjustment of private consumption lasts six quarters and then converges to the new level. Figure 2 presents the impulse-response functions for private consumption, excluding the second fiscal shock which is relatively contemporary to the global financial crisis. As discussed in the introduction of this paper, this robustness check aims at evaluating whether the fall exhibited by private consumption in our empirical estimates is only driven by the effects of the global financial crisis. As we can see in Figure 2, the conclusions are roughly the same as those observed in Figure 1. Thus, we can state that our result is not driven by the depressive conditions of the economy during the financial crisis.

Figure 1: Response of Private Consumption Growth



Note: The red and green dotted lines are confidence intervals at the 68% and 95% confidence levels, respectively.

Figure 2: Response of Private Consumption Growth (discarding the 2009-1 announcement)



Note: The red and green dotted lines are confidence intervals at the 68% and 95% confidence levels, respectively.

Our results show significant negative effects on private consumption after the structural-balance fiscal rule deviations were announced in the fourth quarter of 2007, the first quarter of 2009, and the third quarter of 2010. As discussed in section 2, those deviations

mainly came from the spending side. Thus, the evidence presented in this paper supports the idea that any expected change in the path followed by government spending should change agents' expectations about future taxation and therefore affect their consumption decisions. This evidence might not be surprising under a balanced-budget fiscal rule regime, since the government must adjust its budget in the short or medium term after any deviation from the rule. As it is unlikely that the government will reduce its spending, agents expect an increase in taxes.

V. Conclusion

This paper uses a narrative approach in the spirit of Ramey and Shapiro (1998) to test the existence of Ricardian effects of fiscal shocks. Previous narrative models identify fiscal shocks resulting from variations in defense spending. We study the effect of three fiscal announcements of expansionary deviations from a structural-balance fiscal rule on private consumption in a small and open economy. Our approach proposes a new way of identifying fiscal shocks, since it is of a very different nature than standard narrative models. Furthermore, our analysis is also novel in that we estimate the impact of fiscal policy in the framework of an economy where the government operates with a structural-balance fiscal rule.

Controlling for the macroeconomic conditions, we find a negative response of private consumption. Our results in this paper support the evidence that, under a structural-balance fiscal rule, agents behave in a Ricardian fashion; that is, under any announcement of a change in the path followed by government spending, agents change their expectations about future taxation and, thus, change their consumption decisions. When the government announces expansions of fiscal spending, rational individuals expect higher taxes in the near future and thus decrease their current level of consumption in response to the negative wealth effect.

References

Auerbach, A.J., Gorodnichenko, Y. (2010) Measuring the output responses to fiscal policy, NBER Working Paper 16311.

Barro, R.J., Redlick, C.J. (2011) Macroeconomic effects from government purchases and taxes, *Quarterly Journal of Economics* 126(1), 51-102.

Blanchard, O., Perotti, R. (2002) An empirical characterization of the dynamic effects of changes in government spending and taxes on output, *Quarterly Journal of Economics* 117(4), 1329-1368.

Burnside, C., Eichenbaum, M., Fisher, J.D. (2004) Fiscal shocks and their consequences, *Journal of Economic Theory* 115(1), 89-117.

Caldara, D., Kamps, C. (2012) The analytics of SVARs: a unified framework to measure fiscal multipliers, Board of Governors of the Federal Reserve System, Washington, DC.

Cavallo, M. (2005) Government employment expenditure and the effects of fiscal policy shocks, Federal Reserve Bank of San Francisco, Working Paper 16.

Céspedes, L.F., Fornero, J., Galí, J. (2011) Non-Ricardian aspects of fiscal policy in Chile, *Revista de Economía Chilena* 14(2), 79-107.

Edelberg, W., Eichenbaum, M., Fisher, J.D. (1999) Understanding the effects of a shock to government purchases, *Review of Economic Dynamics* 2(1), 166-206.

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.

Gordon, R.J., Krenn, R. (2010) The end of the great depression 1939-41: policy contributions and fiscal multipliers, NBER Working Paper 16380.

Hercowitz, Z., Strawczynski, M. (2004) Cyclical ratcheting in government spending: evidence from the OECD, *Review of Economics and Statistics* 86(1), 353-361.

Kilian, L. (1998) Small-sample confidence intervals for impulse response functions, *Review of Economics and Statistics* 80(2), 218-30.

Larraín, F., Parro, F. (2008) Chile menos volátil, *El Trimestre Económico* 75(299), 563-596.

Leeper, E.M., Walker, T.B., and Yang, S.C.S. (2013) Fiscal Foresight and Information Flows, *Econometrica* , 81(3), 1115-1145.

Marcel, M., Tokman, M., Valdés, R., Benavides, P. (2001) Balance estructural: la base de la nueva regla de política fiscal chilena, *Revista de Economía Chilena* 4(3), 6-27.

Mountford, A., Uhlig, H. (2009) What are the effects of fiscal policy shocks?, *Journal of Applied Econometrics* 24(6), 960-992.

Perotti, R., (2008) In search of the transmission mechanism of fiscal policy, in NBER Macroeconomics Annual 2007, vol. 22. Chicago: University of Chicago Press, 169-226.

Ramey, V.A. (2011a) Can government purchases stimulate the economy?, *Journal of Economic Literature* , 49(3), 673-685.

Ramey, V.A. (2011b) Identifying government spending shocks: it's all in the timing, *Quarterly Journal of Economics* 126(1), 1-50.

Ramey, V.A., Shapiro, M.D. (1998) Costly capital reallocation and the effects of government spending, in Carnegie-Rochester Conference Series on Public Policy, vol. 48. Amsterdam: North-Holland, 145-194.

Romer, C., Romer, D.H. (2010) The macroeconomic effects of tax changes: estimates based on a new measure of fiscal shocks, *American Economic Review* 100(3), 763-801.