Fiscal Policy and Credit Spreads: Evidence from a SVAR

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Abstract

We study the interaction between fiscal policy, economic activity and credit market conditions using a structural VAR approach similar to that in Blanchard and Perotti (2002). We show that failing to account for the endogenous response of credit spreads to fiscal policy shocks results in the real effects of these shocks being underestimated. We see our results as indicating the presence of a not yet well understood "credit channel of fiscal policy transmission".

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1 Introduction

With the effectiveness of monetary policy significantly compromised by interest rates at already very low levels, and with the fiscal consolidation efforts around the world that followed the global financial crisis, in the last decade the focus of macroeconomic policy has shifted towards fiscal policy. While the focus of policy on fiscal tools is not new, what is different this time is that the use of fiscal tools happened in the presence of strong financial frictions and increasing credit spreads (see Figure 1). This coexistence of large changes in government spending and stronger and more prevalent credit frictions is what we focus on in this paper. We study the effect that government spending as a countercyclical tool has on credit spreads in the United States, and the role of accounting for this endogeneity of spreads on the strength of the real effects of fiscal policy.

It is fair to say that there exists a consensus that fiscal expansions lead to higher interest rates and make it harder for firms to borrow (see Ramey and Shapiro (1998), Faini (2006) and Laubach (2009)). However, since in the data interest rates tend to move together, it is also the case that fiscal stimulus packages raise the return on firms' investments, potentially alleviating their credit constraints. Thus, the cost of borrowing is arguably not the best (and certainly not the only) measure of constraints in financial markets. We argue here that studying the response of spreads to macroeconomic policy is important to understand underexplored transmission channels of fiscal policy that might arise from the effects of policy on borrowers credit constraints.

Motivated by federal credit direct lending programs, lending guarantees, and programs like the markets tax credit, recovery zone economic development and "Build America" under the American Recovery and Reinvestment Act (ARRA), we hypothesize that while this type of fiscal expansions might have raised interest rates on loans, they also alleviated credit constraints for businesses receiving these funds. Therefore, our initial conjecture is that fiscal expansions work to alleviate credit constraints in the economy, allowing the real effects of public spending to be stronger than when implemented in economies with less financial frictions.

Barro and Redlick (2011) conclude that fiscal expansions lower credit spreads, and Aliaga-Díaz and Olivero (2010 and 2011) and Mandelman (2010) establish the countercyclical nature of these spreads. Despite this evidence, most VAR empirical treatments of the effects of fiscal policy disregard the endogenous response of credit spreads to government spending and tax shocks. We see this as an important gap since the effect of government spending on spreads may be shedding light on a new and not yet well understood *"credit channel of fiscal policy transmission"*.

This channel would work through fiscal expansions resulting in lower credit spreads. Based on the countercyclical nature of spreads documented in our own previous work, if fiscal expansions raise economic activity, then they should also be associated to lower spreads. Also, the increase in economic activity is linked to higher values of oustanding assets and collateral for borrowers. This should work to alleviate credit constraints such that lenders find it optimal to start charging lower spreads. Then, the cost of credit falls relative to models that lack this channel, making the real effects on output more pronounced. This would be so since, in addition to the standard and well-known effect of the policy on aggregate demand, there is a now an indirect supply-side effect working through lower cost of credit and therefore, higher productivity for borrowers.

Our results confirm this idea. They show that failing to account for the endogenous response of credit spreads to fiscal policy shocks yields an attenuation of the real effects of fiscal policy. This conclusion is along the lines of the results obtained by Caldara and Herbst (2019) regarding monetary policy.

Our work is also related to the large body of *empirical* literature devoted to measuring the real effects of fiscal policy. To the best of our knowledge, this work has paid very scant attention to the presence of a channel through which fiscal policy can affect credit spreads (see Auerbach and Gorodnichenko (2010), Barro and Redlick (2011), Ilzetzki et al (2013) and Kraay (2012), among others). What this work has done is to show that fiscal multipliers tend to be unusually high during times of financial crises (see Corsetti et al, 2012), but it has not studied the endogenous response of spreads to policy shocks. The *theoretical* literature has certainly done so. However, since in this work spending does not provide any direct production or consumption benefits, it is not straightforward to obtain an empirical prediction regarding the correlation between spending and spreads through the former's effect on borrowers' balance sheets or collateral.

We hope that our evidence will provide a starting point to test the predictions of theoretical models with fiscal policy and frictions in credit markets. In terms of policy implications, our results strengthen the grounds for government intervention over and above standard demand-side arguments alone. In other words, when financial constraints are tight, fiscal expansions seem to be more effective at inducing economic stimulus.

2 Empirical Methodology and Data

2.1 Methodology

Preliminary evidence showing the countercyclical nature of spreads and government spending is presented in Figure 1 and Table 1.

To study the relationship between public spending, credit spreads and real economic activity, and to identify exogenous shocks to government absorption we resort to a structural vector autoregression (SVAR) approach similar to that in Blanchard and Perotti (2002) (hereafter, BP). We estimate a model of the form:

$$X_t = \alpha + \beta t + \delta t^2 + \sum_{l=1}^{4} \Gamma(l) X_{t-l} + \sum_{i=1}^{3} \gamma_i D_{i,t} + u_t \tag{1}$$

where $X_t \equiv [T_t \, G_t \, Y_t \, S_t]'$ is the vector of the endogenous variables, and T stands for tax revenue; G, for government spending; S, for credit spreads; and Y, for real GDP. The model in equation (1) also includes a dummy equal to one for the years of the great recession and global financial crisis to account for any particular effects during that period. With quarterly data, we allow for four lags in the polynomial $\Gamma(l)$.

In equation (1) $u_t \equiv [u_t^t \, u_t^g \, u_t^y \, u_t^s]'$ is the vector of reduced form residuals that are allowed to be contemporaneously correlated with each other. The elements in u_t are expressed as a linear combination of the structural shocks and the remaining reduced-form residuals in the following way:

$$u_t^t = \alpha_{ts} u_t^s + \alpha_{ty} u_t^y + \beta_{tg} e_t^g + e_t^t \tag{2}$$

$$u_t^g = \alpha_{gs} u_t^s + \alpha_{gy} u_t^y + \beta_{gt} e_t^t + \beta_{gs} e_t^s + e_t^g \tag{3}$$

$$u_t^y = \alpha_{yg} u_t^g + \alpha_{yt} u_t^t + e_t^y \tag{4}$$

$$u_t^s = \alpha_{sg} u_t^g + \alpha_{st} u_t^t + \alpha_{sy} u_t^y + \beta_{sy} e_t^y + e_t^s \tag{5}$$

where $e_t \equiv [e_t^t \, e_t^g \, e_t^y \, e_t^s]'$ are the structural shocks with mean zero and $E_{e_t, e_s'} = \Sigma_e, \; t = s$.

Following BP, the two fiscal reduced-form residuals in the policy equations (u_t^g and u_t^t) are functions of both the structural (i.e. exogenous) policy shocks (e_t^g and e_t^t) and the response to unexpected movements in output and spreads (u_t^y and u_t^s). Also as in BP, in equation (4) we assume that unexpected movements in output can be due to unexpected movements in taxes or spending, or to structural shocks to output itself e_t^y. Last, in equation (5) we assume that unexpected movements in spreads can be due to unexpected movements in taxes, spending, output or to structural shocks to spreads e_t^s.

This VAR has seventeen coefficients to estimate: the thirteen coefficients in the system (2)-(5) and the four variances of the structural shocks. With the variance-covariance matrix providing ten moments that can be used to estimate this set of coefficients, then seven assumptions are needed for identification of the structural shocks.

I explain these assumptions next. First, we know from the direct evidence on the conduct of fiscal policy discussed in BP that it takes policymakers more than a quarter to learn about GDP shocks, so that there are legislative and implementation lags that prevent a shock to GDP from affecting government spending within a quarter. With this in mind we set $\alpha_{gy} = 0$ just as in BP. Second and for the same reasons, we assume that within a quarter public spending is not affected by unexpected movements of the spread either so that $\alpha_{gs} = 0$. Third, we allow the output elasticity of net taxes, α_{ty}, to differ from zero because changes in output can automatically induce a change in the tax base. We set $\alpha_{ty} = 2.08$ using the average of the estimates obtained by previous work. Fourth, since in the data net taxes do not include interest rate payments so that spreads have no effect on taxes, I impose $\alpha_{ts} = 0$. Fifth, β_{gt} and β_{tg} cannot be identified from each other from the correlation between taxes and spending, i.e. it is not clear whether taxes response to changes in spending or the reverse. Thus, we assume that the former is true, i.e. that spending decisions come first, by setting β_{gt} to zero, and estimating β_{tg}. The last two assumptions involve imposing $\alpha_{st} = 0$ and $\alpha_{sg} = 0$. We justify these by assuming that fiscal policy does not directly and contemporaneously affect spreads, but only through induced changes in output. With seven identification assumptions, this leaves us with six of the thirteen parameters in the above system to estimate. We estimate α_{yt}, α_{yg},α_{sy},β_{tg},β_{gs} and β_{sy}.

2.2 Data

We use quarterly data for the United States on NIMs from 1984 to 2017.[1] Since our main goal is to understand the role of fiscal expansion during periods of significant credit constraints, we purposefully included the global financial crisis as part of our sample. As a robustness check, we rerun some of the experiments with data only up to 2007 and we obtain qualitatively similar results. These results are available upon request.

Government spending (G) is defined as the sum of government consumption and gross public capital formation. Taxes (T) are defined as the sum of federal personal taxes, federal corporate income taxes and state and local taxes net of federal transfer payments. An important feature of these data is that both government spending and tax revenues exclude interest payments and receipts. This is to avoid our measures of the stance of fiscal policy to be directly impacted by the state of financial markets. The main source of the data for G, T and GDP are the NIPA Accounts for the United States published by the Bureau of Economic Analysis. To work with stationary series, we express the macroeconomic variables government spending, tax revenue and GDP as a percentage of potential GDP. Data on potential GDP is obtained from the Budget and Economic Outlook publication of the Congressional Budget Office.

We use three alternative measures of credit spreads. The first is net interest margins (NIMs) for all US banks. The source data is from the Call Reports on Condition and Income for all insured

[1] For our robustness measures, data on GGZ are available from Gertler, Gilchrist and Zakrasejk (2012) only up to 2010.

commercial banks in the US published by the Federal Financial Institutions Examination Council of the United States, and the series for NIMs is calculated by the Federal Reserve Bank of St Louis. The second spread (GGZ) is obtained from Gertler, Gilchrist and Zakrasejk (2012), which they calculate as the cross-sectional average credit spread on senior unsecured corporate bonds issued by non-financial firms in their sample. The third measure of credit risk (Baa-Aaa) is the spread between yields on Baa and Aaa-rated long-term corporate bonds issued by industrial firms.

We test for stationarity in the data using augmented Dickey-Fuller tests with four lags and allowing for drift in all variables. We confirm that the three spreads and the ratios of macroeconomic variables to potential GDP are all stationary (see Table 2 for the results of these stationarity tests).[2]

3 Results

We use the estimated parameters from the structural VAR specification to obtain impulse response functions to a 1% exogenous structural shock to government spending. In Figure 2 we present the impulse responses of both real GDP and spreads to a 1% increase in government spending for the baseline case when spreads are measured by NIMs in the banking sector. The results are consistent with the transmission channel that we had in mind. The net interest margins that banks charge on loans to firms in the private sector decreases on impact after the unexpected and exogenous policy shock. Moreover, the response remains negative and significant for several quarters before it returns to its long-run equilibrium. This implies a drop in firms' cost of credit and therefore, to an increase in output stronger than what would be obtained in a framework that lacks this channel. In Figures 3 and 4 I show the robustness of these results when GGZ and Baa-Aaa are used as alternative measures of credit spreads.

The endogenous response of spreads to structural shocks in government spending matters if it means that the real effects of fiscal policy are mismeasured when not accounting for this endogeneity. I test for this next. In Figures , and I show the impulse responses for output in the model with endogenous spreads and I compare them to those from a model in which financial variables do not play a role (Figure 5), in the sense that spreads are included only as an exogenous control variable and the vector X_t is three-dimensional only, i.e. $X_t \equiv [T_t \, G_t \, Y_t]$. Take for example the responses when financial market conditions are proxied by NIMs. The response of output is

[2]Even though the p-value of the Dickey-Fuller test statistic for the NIMs is 0.1625 which strictly does not allow us to reject the hypothesis of a unit root, we follow BP and include both a linear and a quadratic term in time in the VARs.

more persistent, and close to three times as much as that in the model without credit market considerations. While, quantitatively, the difference in the impact on GDP are not as marked when credit conditions are measured by GGZ or Baa-Aaa, it is still true that the effects of fiscal expansion are underestimated when the endogenous response of credit spreads is not accounted for.

These results lead to my main conclusion regarding the effects of fiscal policy on credit market conditions: When fiscal stimulus results in lower credit spreads, it also results in stronger real effects on aggregate output.

We obtain the same conclusion through the results shown in Table 3. Fiscal multipliers, both on impact and cumulative up to five quarters, are higher than in the models with exogenous spreads. I show the cumulative responses only up to five quarters since some of the responses become not statistically significant after that. However, notice that when spreads fall in a statistically significant way for a longer horizon, the response of real GDP remains stronger than when the state of credit markets is not explicitly taken into account in the empirical model for ten quarters after the shock.

These results are closely linked to those obtained by Caldara and Herbst (2019) for monetary policy. They use a Bayesian framework to estimate SVARs and find that monetary policy shocks are key drivers of fluctuations in corporate credit spreads, and that in turn, monetary policy systematically reacts to changes in spreads. Their results deliver a message very similar to ours in the sense that failure to account for the endogenous reaction of spreads induces an attenuation bias in the response of output to monetary shocks.[3] Moreover, the transmission mechanism is conceptually the same. They show that, in response to a monetary policy tightening, there is sustained increase in the credit spread and that this tightening in financial conditions and reduction in real activity induce a future fall in the federal funds rate as monetary policy endogenously reacts to the state of business and financial cycles.

4 Concluding Remarks

Our results from SVARs á la Blanchard and Perotti (2002) extended to include measures of credit spreads show that when accounting for the endogenous response of credit spreads to government spending shocks, the real effects of fiscal policy are more pronounced. We see this result as shedding some light on a potential *"credit channel of fiscal policy transmission"*. From a policy perspective, this result calls for caution when implementing fiscal consolidation measures during

[3] Caldara and Herbst (2019) use the excess bonds premium from Gertler et al (2012) as their main measure of financial conditions. We tried working with this measure but we could not achieve convergence in our estimations.

periods of distress in financial markets: The negative impact on economic activity of these policies would be more pronounced than that associated just to the well-known reduction in aggregate demand.

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Table 1: Cyclicality of Spreads

	$\frac{GDP}{potentialGDP}$	$\frac{G}{potentialGDP}$
NIM	0.1812	0.3744*
	(0.0348)	(0.0000)
GGZ	-0.2562*	-0.4188*
	(0.0015)	(0.0000)
Baa-Aaa	-0.6205*	0.2831*
	(0.0000)	(0.0003)

The table shows the unconditional and contemporaneous correlation coefficients between an indicator of economic activity (in the columns) and spreads (in the rows). Standard deviations are shown in parentheses. Stars indicate significance at the 1% level.

Table 2: Stationarity Tests

			Critical Values		
	statistic	p	1%	5%	10%
$\frac{T}{Y}$	-1.383	0.0841	-2.345	-1.652	-1.286
$\frac{G}{Y}$	-1.532	0.0637	-2.347	-1.653	-1.286
Ygap	-3.992	0	-2.343	-1.652	-1.285
NIM	-1.593	0.0572	-2.366	-1.661	-1.29
GGZ	-2.328	0.0107	-2.353	-1.656	-1.288
Baa-Aaa	-2.859	0.0024	-2.352	-1.655	-1.287

This table presents the results of the augmented Dickey-Fuller tests run on all variables in the model.

Table 3: Government Spending Multipliers

	Impact	**Q2**	**Q3**	**Q4**	**Q5**
benchmark	0.2419	0.7049	0.8390	0.9124	0.9423
exog NIM	0.1501	0.4589	0.5873	0.6811	0.7297
NIM	0.8306	2.4290	3.1908	3.9131	4.5012
exog GGZ	0.1791	0.5272	0.5971	0.6247	0.6297
GGZ	0.2175	0.6576	0.7524	0.7873	0.7905
exog Baa-Aaa	0.2956	0.8583	1.0875	1.2603	1.3876
Baa-Aaa	0.2975	0.8282	1.0264	1.1790	1.2891

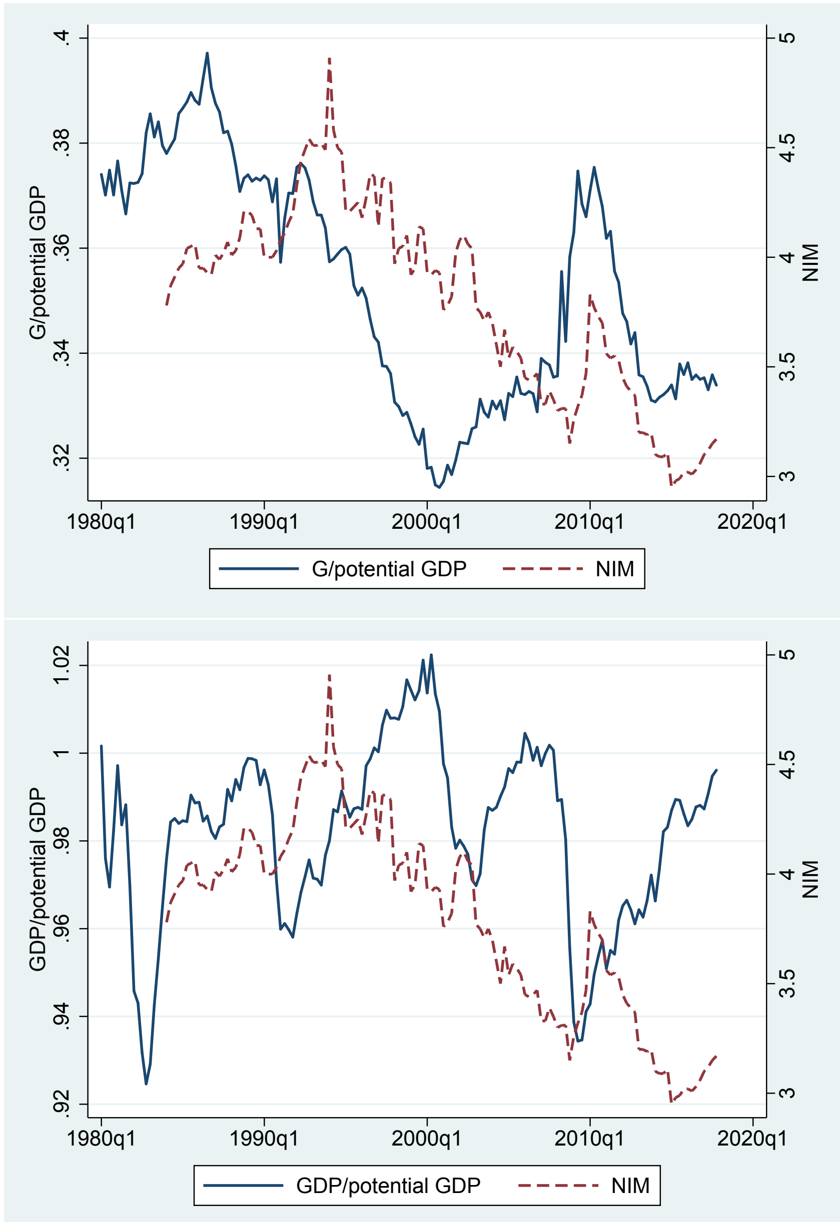

Figure 1: Cyclicality of Spreads

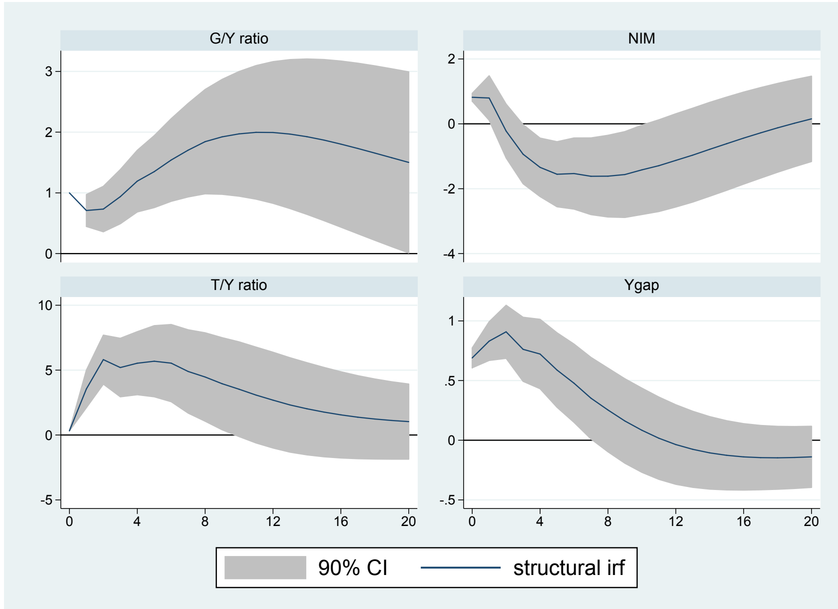

Figure 2: Impulse response functions to a 1% increase in $\frac{G}{Y}$ ratio when spread = NIM.

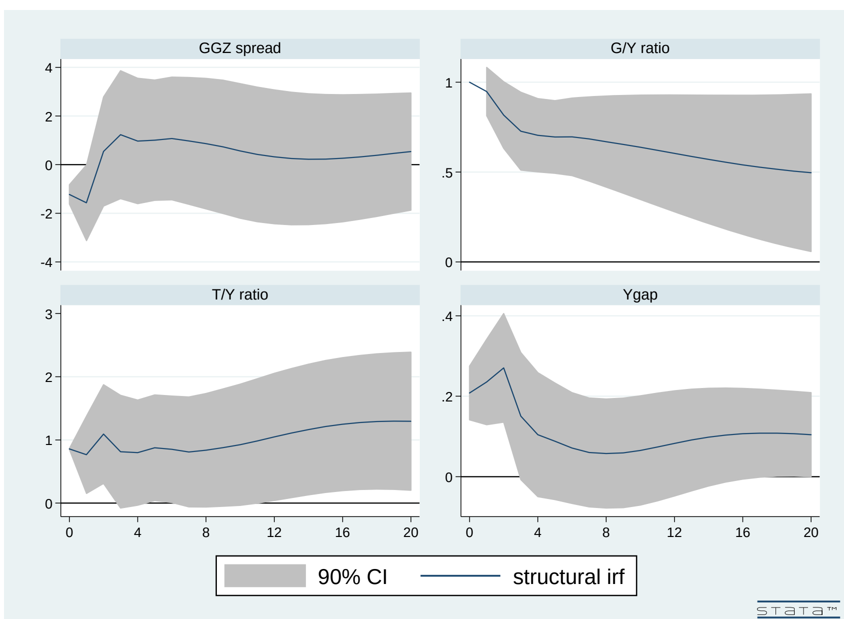

Figure 3: Impulse response functions to a 1% increase in $\frac{G}{Y}$ ratio when spread = GGZ.

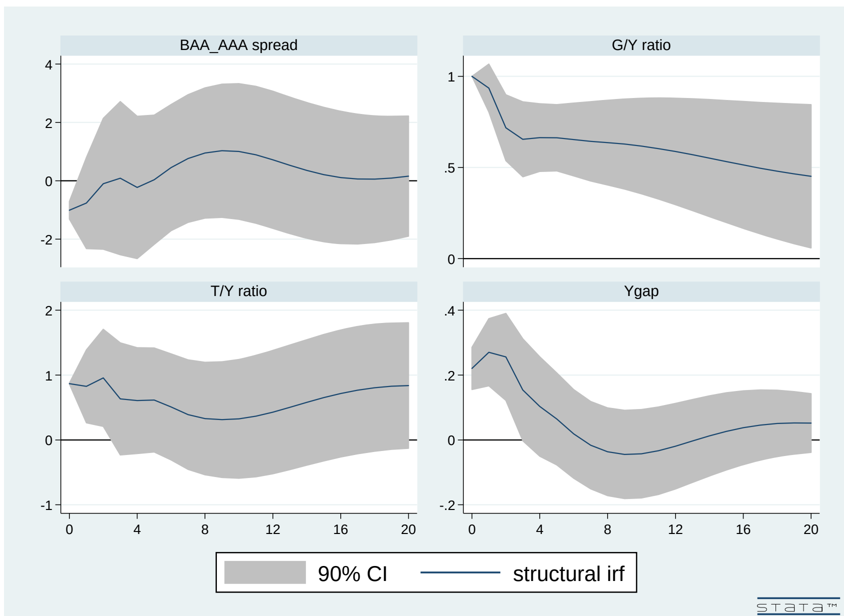

Figure 4: Impulse response functions to a 1% increase in $\frac{G}{Y}$ ratio when spread = Baa-Aaa.

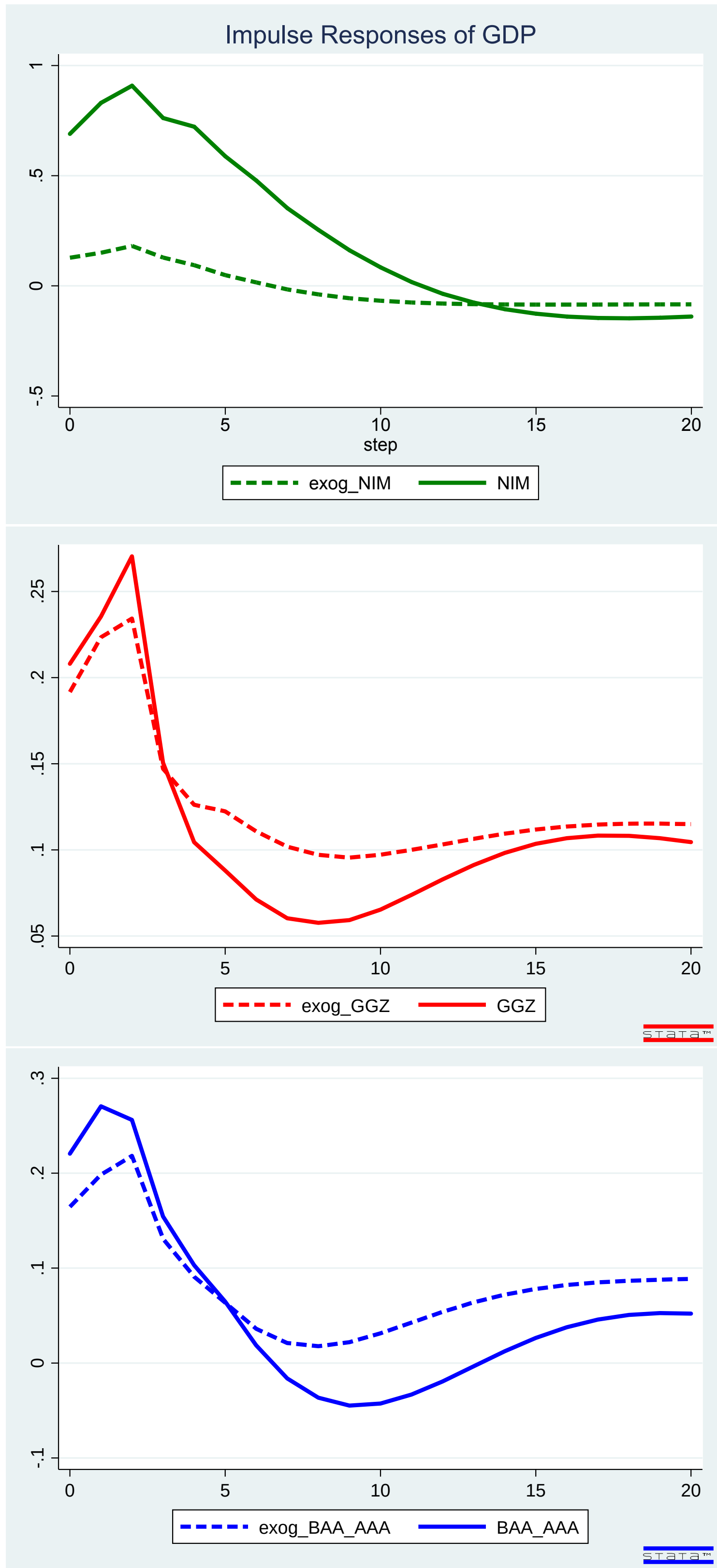

Figure 5: Impulse response functions for GDP - Comparison to case of exogenous spreads.