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Quantifying multipliers in Italy: does fiscal policy composition matter?

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Abstract

This article aims to estimate fiscal multipliers in Italy by assessing the effect of an increase in government expenditure and taxes on the Gross Domestic Product (GDP). By applying structural vector autoregressive modelling to Italian quarterly data for the 1995–2019 period, I show that expansionary fiscal policies produce positive effects on the GDP level. Estimated spending multipliers are higher than 1, and when government investment and consumption are compared, findings show that government investment has a larger effect on GDP than government consumption. Estimated tax multipliers are lower than 1, and tax-based policies are less effective in stimulating GDP than expenditure-based fiscal plans. My findings strongly support the Keynesian perspective and indicate that Italy should increase public investments considerably in order to foster economic growth.

JEL classifications: C32, E62, H30, H60.

1. Introduction

After the 2007 financial crisis and the sovereign debt crisis, EU policy was steered by austerity measures, especially in the peripheral Eurozone countries, to lower the large accumulated public debt and the high interest rates that have been considered an obstacle to economic growth. Furthermore, austerity policies, defined mainly as a reduction in government spending to stimulate private investment and consumption through decreases in the interest rate, were also supported by the so-called expansionary austerity theory according to which fiscal consolidation is supposed to foster economic growth (Alesina and Ardagna, 2013; Alesina *et al.*, 2015, 2019).[1] While the initial assumption was that austerity policies

1 According to another strand of literature, Eurozone troubles and the high long-term interest rate should be interpreted as determined by a balance of payment crisis in a context of fixed exchange rates. In such an interpretation, the increase in the rate of interest on government bonds is caused by the so-called redenomination risk (i.e., the risk of a country to leave the euro) rather than by a 'fiscal risk' (Cesaratto, 2013, 2015; Gros, 2013, 2015, 2018). In this context, austerity policies would

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would restore economic growth thanks to the existence of zero or even negative fiscal multipliers, the reality soon became clear in peripheral Eurozone countries: growth did not return, unemployment rates remained dramatically high, and the debt-to-GDP ratio increased.

In parallel to the expansionary austerity literature, flourishing literature has emerged questioning the foundations of austerity. For instance, the International Monetary Fund (IMF) affirmed that consolidation policies failed because fiscal multipliers were higher than the scholarly literature assumed (see, among others, Blanchard and Leigh, 2013). In fact, the IMF has recently advocated for a public investment push to fight economic stagnation and to overcome the current crisis generated by thecoronavirus pandemic (COVID-19) pandemic (IMF, 2014, 2020). Several other contributions estimate fiscal multipliers associated with government expenditures showing that real GDP increases in response to government spending stimuli (see, among others, Blanchard and Perotti, 2002; Caldara and Kamps, 2008; Auerbach and Gorodnichenko, 2012). However, the magnitude of fiscal multipliers varies among different studies (Gechert, 2015). It is typically dependent on countries' peculiarities such as the degree of development, openness to trade, exchange rate regime, and the accumulated public debt (Ilzetzki *et al.*, 2013; Ramey, 2019). The existing literature mainly focuses on estimating multipliers associated with aggregate government expenditure, while only a few studies differentiate between public investment and consumption expenditures. For instance, Perotti (2004b), Pappa (2009a), Ilzetzki *et al.* (2013), and Boehm (2020) show that public investment is no more effective than government consumption in boosting GDP. In contrast, Burriel *et al.* (2010) and Auerbach and Gorodnichenko (2012) estimate a fiscal multiplier of government investment larger than the one related to government consumption. The latter findings are more in line with most of the empirical literature advocating the superiority of government investment in boosting economic growth (see, among others, Bénétrix and Lane, 2010; Tenhofen *et al.*, 2010; Tuladhar and Bruckner 2010; Gechert, 2015; Abiad *et al.*, 2016; Boitani and Perdichizzi, 2018; Deleidi *et al.*, 2021). Theoretically, the more considerable impact of public investment is justified by the idea that this policy tool would combine the short-run effects of supporting aggregate demand with the long-run supply effects and the creation of positive externalities on private sector (Baxter and King, 1993; Skidelsky, 2001; Ramey, 2020). Furthermore, after the pioneering research carried out by Auerbach and Gorodnichenko (2012), a vast debate on the state-dependent multipliers started. In their recent research, Auerbach and Gorodnichenko (2012, 2013, 2017) estimate fiscal multipliers higher during economic recessions than economic expansions. Several additional studies support such evidence using alternative empirical methods, samples, and by considering extreme recessions versus intense expansions (see, among others, Caggiano *et al.*, 2015; Fazzari *et al.*, 2015; Riera-Crichton *et al.*, 2015; Fernández-Villaverde *et al.*, 2019; Ghassibe and Zanetti, 2019). These findings are usually explained by assuming that the crowding-out effect on private consumption and investment is weaker during economic downturns because of slower responsiveness of prices and interest rates to spending shocks (Castelnuovo and Lim, 2019). On the contrary, Owyang *et al.* (2013) and Ramey and Zubairy (2018) questioned the idea of state-dependent multipliers estimating acyclical spending multipliers.

promote a current account adjustment in the euro area peripheral countries, rather than decrease their public debts.

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The article aims to estimate fiscal multipliers associated with government expenditures, government investment and consumption, and net taxes. To do this, I make use of structural vector autoregressive (SVAR) models on quarterly Italian data for the period 1995–2019. I apply the study of fiscal multipliers to the Italian case for a threefold reason. First, Italy is one of the European countries that since 2008 have been most affected by the economic crisis and later by the post-crisis austerity policies. In Italy, the GDP fell 9.8% during the 2008–13 period, government expenditure decreased by 11.7% during the 2009–15 period, public investment was cut by 51% in the 2009–17 period, and government consumption diminished by 7.3% during the 2010–15 period. Secondly, to the best of my knowledge, only a few studies assess the effect of fiscal policies on GDP in Italy (Giordano *et al*., 2007; Acconcia *et al*., 2014; Cimadomo and D'Agostino, 2016; Piacentini *et al*., 2016), while no analyses estimate fiscal multipliers associated with government investment and consumption by using SVAR models. Thirdly, no study carried out to date for the Italian economy deals with fiscal foresight when estimating fiscal multipliers.

My findings support the idea of a Keynesian effect: an increase in government expenditure and its components has positive effects on the GDP level. In general, spending multipliers are larger than 1, while those associated with public investment are higher than those obtained for government consumption. When looking at the effect of net taxes, estimated multipliers are lower than 1, and tax-based policies are less effective in stimulating GDP than expenditure-based fiscal plans. My results have strong policy implication especially in light of institutional documents released by the Italian Ministry of Economy and Finance (MEF, 2017), the Parliamentary Budget Office (UPB, 2017), and the Bank of Italy (Locarno *et al*., 2013; Busetti *et al*., 2019). Indeed, they assume multipliers close to 1, and no significant differences between government investment and consumption multipliers exist.

The remainder of the article is organized as follows. Section 2 provides a review of the empirical literature on fiscal multipliers. Section 3 presents data and methods. Section 4 presents the estimated models not taking fiscal expectations into account, and Section 5 presents the estimated multipliers, including fiscal foresight. Section 6 concludes by discussing some policy implications.

2. Fiscal multipliers: an overview

The macroeconomic literature has usually implemented two main methods to study the effect of government expenditure on the GDP level: (i) the first one is defined as the model-based approach, grounded on simulations elaborated using Dynamic Stochastic General Equilibrium (DSGE) models and (ii) the second one uses econometric techniques typically based on vector autoregressive (VAR) models.[2]

2 More recently, several studies estimate fiscal multipliers through the so-called Local Projections (LPs) approach (Jordà, 2005), using military expenditure, public investment, forecast errors of the rate of growth of government spending, and fiscal consolidation episodes identified through the narrative approach. More recently, fiscal multipliers have been estimated by combining SVAR models with the LPs approach by introducing the shocks identified in the SVAR to the LPs equation. For an in-depth review of these estimates, see, among others, Owyang *et al.* (2013), Dell'Erba *et al.* (2014), Ramey (2016), Auerbach and Gorodnichenko (2017), Ramey and Zubairy (2018), Boehm (2020), and Deleidi *et al.* (2020).

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The model-based approach is grounded on Real Business Cycle (RBC) and New-Keynesian (NK) DSGE models. The magnitude of fiscal multipliers varies considerably according to the specific hypotheses assumed in the models, namely the existence or not of Ricardian households (Galí *et al.*, 2007; Hall, 2009; Furceri and Mourougane, 2010), the introduction of monopolistic competition and rigidities (Hall, 2009; Leeper *et al.*, 2017), the possibility of a monetary policy reaction function (Furceri and Mourougane, 2010; Christiano *et al.*, 2011; Davig and Leeper, 2011; Leeper *et al.*, 2017), and the existence of a Zero Lower Bound (Eggertsson, 2011; Woodford, 2011; Flotho, 2015; Ercolani and Azevedo, 2019). In general, NK–DSGE models provide larger multipliers than those obtained through RBC–DSGE by allowing for sizable short-run demand-side effects usually dependent on the presence of market rigidities (McManus, 2015). However, multipliers estimated using DSGE models suffer from some weaknesses. DSGE models 'impose a lot of restrictions, not always in line with the statistical properties of the data' (Canova and Ciccarelli, 2013, p. 206) and findings crucially depend on different assumptions, choice of parameters and calibration of the models. In other words, findings are inextricably model-dependent.[3]

A large part of the empirical literature on fiscal multipliers uses VAR models to identify fiscal policy shocks by imposing suitable identification strategies on a reduced-form VAR (see, among others, Blanchard and Perotti, 2002; Perotti, 2004a,b, 2007, 2014; Caldara and Kamps, 2008, 2017; Auerbach and Gorodnichenko, 2012). Studies based on VAR methods use fewer restrictions than DSGE models and typically implement four main identification strategies (Caldara and Kamps, 2008): (i) the recursive approach (e.g. Fatás and Mihov, 2001; Beetsma *et al.*, 2008; Bilbiie *et al.*, 2008); (ii) the Blanchard and Perotti approach that is similar to recursive ordering although it includes an external coefficient characterizing the elasticity of net taxes to GDP (e.g. Blanchard and Perotti, 2002; Perotti, 2004a; Burriel *et al.*, 2010); (iii) the sign restriction approach where fiscal policy shocks are identified by imposing restrictions on the sign of the response functions (e.g. Pappa, 2009a,b; Mountford and Uhlig, 2009; Chian Koh, 2017); (iv) the 'narrative approach' that builds dummy variables by using published documents (e.g. Business Week articles and legislative documents), and public announcements about historical episodes of changes in the fiscal policy stances. These are typically determined by military build-ups or exogenous tax changes (e.g. Ramey and Shapiro, 1998; Romer and Romer, 2010; Ramey, 2011a,b, 2016; Mertens and Ravn, 2013). While the first three of these methods use SVAR to identify unexpected fiscal policy shocks, the narrative approach adds dummy variables to a reduced-form VAR model to identify innovation in the government fiscal stance. While the narrative approach allows to evaluate the effects of a specific class of fiscal shocks and the construction of the dummies relies on a more qualitative assessment of the nature of the fiscal episodes, the SVAR approach allows to consider the effects of a broader set of fiscal policies, thus providing an objective quantitative estimate of the effects of an average increase in different categories of government spending.[4]

3 For an in-depth review on fiscal multipliers estimated through the model-based approach, see, among others, Batini *et al.* (2014) and Deleidi *et al.* (2020). For comparing DSGE and SVAR models, see Kilian and Lütkepohl (2017, Ch. 6).

4 For a comparison of the narrative approach and SVAR models, see Perotti (2007) and Kilian and Lütkepohl (2017, Ch. 6).

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The relevant empirical literature focuses on multipliers associated with total spending. Few works focus on selected classes of public expenditures, namely public consumption versus government investment (Perotti, 2004b; Pappa, 2009a; Ilzetzki *et al.*, 2013; Boehm, 2020), and military versus non-military spending (Auerbach and Gorodnichenko, 2012; Burriel *et al.*, 2010).[5] For instance, Blanchard and Perotti (2002) find an impact multiplier of government expenditure of 0.84 with a peak effect of 1.29 for the US economy. Similarly, Galí *et al.* (2007) estimate an impact multiplier of 0.91, which reaches a value equal to 1.31 eight-quarters after the shock occurs. Caldara and Kamps (2017) estimate a multiplier ranging between 1 and 1.3, whereas Auerbach and Gorodnichenko (2012) estimate a peak multiplier of government spending equal to 1. Perotti (2004a) finds negative multipliers when considering five Organization for Economic Co-operation and Development (OECD) countries, and Beetsma *et al.* (2008) estimate an impact multiplier of 1.17 in EU countries which reaches a peak effect of 1.50 after 1 year. Bilbiie *et al.* (2008) find fiscal multipliers higher in the pre-1979 period than those obtained after 1983. Looking at the effect of government consumption and investment, Perotti (2004b), Pappa (2009a), Ilzetzki *et al.* (2013), and Boehm (2020) show that government investment is no more effective than government consumption in fostering output growth.[6] Contrarily, Auerbach and Gorodnichenko (2012) estimate a peak multiplier of government investment equal to 2.12 and a government consumption multiplier of 1.21. Moreover, when they distinguish between military and non-military spending, the former generates a larger effect on GDP than the latter. Similar results are obtained by Burriel *et al.* (2010) who find an investment multiplier close to 2 for the US economy. Boitani and Perdichizzi (2018) estimate fiscal multipliers in Eurozone countries by showing that government investment multipliers are higher than 4, and those associated with public consumption are close to 3.20. Deleidi *et al.* (2020) calculate a fiscal multiplier of government investment in selected euro area countries equal to 1 on impact, which reaches a peak effect of 3.43. When Southern and Northern EU countries are considered, public investment produces the largest effect in the southern ones where it reaches a peak multiplier of 4.63. Similarly, Bénétrix and Lane (2010) and Tenhofen *et al.* (2010) estimate an investment multiplier close to 3.5 in selected European countries.[7]

When multipliers are estimated for the Italian economy, Afonso *et al.* (2018), using a threshold VAR model for considering different financial regimes, find multipliers in low stressed regimes that range between 0.12 and 0.27, whereas multipliers in high stressed regimes range between 0.6 and 1.36. Acconcia *et al.* (2014) estimate a multiplier ranging from 1.5 to 1.9 by using a quasi-experiment approach where shocks are identified through a law aimed at fighting political corruption and organized crime, leading to large contractions in local public spending. Baldini and Causi (2019) use afactor augmented vector

5 An additional distinction between different classes of government expenditures is made by Deleidi *et al.* (2019), and Deleidi and Mazzucato (2021) who focus on R&D and non-R&D government expenditures.

6 Even though Perotti (2004b) concludes that no significant differences between public consumption and investment exist, it is also worth noting that Perotti (2004b) estimates an impact multiplier of 4.81 for Germany, which reaches a peak of 5.46.

7 For an in-depth review of the magnitude of estimated fiscal multipliers, see, among others, Gechert (2015), and Deleidi *et al.* (2020, 2021). A comprehensive review of tax multipliers' estimates is reported in Ramey (2016, 2019) and Gechert and Rannenberg (2018).

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autoregressive (FAVAR) model to obtain a 1-year government consumption multiplier ranging between 0.3 and 0.45, with a long-run multiplier of 0.2–0.3. Batini *et al.* (2012), using regime-switching VARs, show that multipliers are larger during recessions than expansions and in a linear model, multipliers of government spending range between 0.6 and 0.9. Caprioli and Momigliano (2013) estimate a multiplier of government consumption equal to 1.04 on impact, which reaches a peak effect close to 1.8 after 3 years with a threshold VAR. By applying a time-varying VAR for the 1988–2013 period, Cimadomo and D'Agostino (2016) estimate a peak spending multiplier ranging from 0.8 to 1.5. Giordano *et al.* (2007), using an SVAR model, estimate that a 1% increase in government purchases increases real GDP by 0.6% after three quarters. The corresponding multipliers in the 4th, 8th, and 12th quarters are equal to 2.4, 2.4, and 1.7, respectively. Piacentini *et al.* (2016) study the effect of fiscal policies in Italian macro-areas and observe that spending cuts produce larger negative effects in the Southern Italian regions than in the Northern ones. Deleidi *et al.* (2021) estimate fiscal multipliers in Italy by applying Panel SVAR models to Italian regional data and show that government investment produces a higher impact on GDP than government consumption, and multipliers are larger in Northern regions than in the Southern ones.

Additional methods are used to assess multipliers for the Italian economy. For instance, Barrell *et al.* (2012) compute a first-year government consumption multiplier of 0.62 using the National Institute Global Econometric Model. By applying the same method, Carreras *et al.* (2016) find the first-year fiscal multiplier of government expenditures lower than 1, with no significant differences between public consumption and investment. De Nardis and Pappalardo (2018) estimate fiscal multipliers by employing a structural macro-econometric model (MeMo-It model). Their findings suggest that multipliers calculated by including the crisis period are higher than pre-crisis estimates. Indeed, when they consider the whole sample, multipliers are close to 1, while when assessing the effectiveness of public consumption and investment, they compute larger multipliers for consumption and close to 3 for government investment. Kilponen *et al.* (2019) show that the first-year consumption fiscal multiplier is equal to 0.79 in normal times and 0.86 when the zero lower bound is assumed in a DSGE model.

Looking at multipliers estimated by the Parliamentary Budget Office (UPB, 2017), and the Italian Ministry of Economy and Finance (MEF, 2017) using the Italian Treasury Econometric Model (ITEM, version 2017), multipliers are positive over a horizon of 5 years, and there are no significant differences between government consumption and investment.[8] In more detail, government expenditure reaches a peak effect of 1.1 after 2 years. Government consumption generates a peak multiplier of 1.3 after 2 years and government investment a peak multiplier of 1.2 (MEF, 2017). The Bank of Italy estimates multipliers by using two main methods, namely a DSGE model and the quarterly econometric model (Locarno *et al.*, 2013; Bulligan *et al.*, 2017; Busetti *et al.*, 2019). While the latter provides estimates close to those obtained by the Italian Ministry of Economy and the Parliamentary Budget Office (Busetti *et al.*, 2019), those obtained using DSGE models show that government investment engenders a short-run fiscal multiplier of 0.7 and a medium-run effect of 1.5. Moreover, when monetary policy is accommodating, multipliers

8 The ITEM 2017 version generates a higher fiscal multiplier than the 2016 version (Ministero dell'Economia e delle Finanze [MEF], 2017). For an explanation of the ITEM model, see Cicinelli *et al.* (2010).

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increase by assuming values of 1.9 and 1.8, in the short and medium run, respectively. Locarno *et al.* (2013) estimate government consumption multipliers lower than 1, which are close to 0.8 in the first year and 0.6 in the second one.[9]

3. Data and methods

3.1 Data

To estimate fiscal multipliers in Italy, I use quarterly data provided by the OECD, and by the Istituto Nazionale di Statistica (ISTAT) for the 1995Q1–2019Q3 period. I use the Italian GDP (Y), government expenditures (G), government investment (G_I), and consumption (G_C), net taxes (T), the 10-year nominal interest rate on treasury bonds (i), and the government expenditure forecasts (G^F).[10,11] Variables have been provided in nominal terms and are converted to real ones using the GDP deflator (Y_{DEF}), the government consumption expenditure deflator (G_{DEF}), and the gross fixed capital formation deflator (INV_{DEF}). Y_{DEF} is used for deflating Y and T, INV_{DEF} is used for G_I, and G^F, G and G_C are deflated using G_{DEF}. All considered variables—excluding the 10-year nominal interest rate (i)—are considered in logarithmic form. The X-13 ARIMA method has been applied to non-seasonally adjusted series. All variables have been summarized in the Supplementary Appendix Table A1.

As shown in Figure 1, Italy has been one of the peripheral European countries most affected by the financial crisis and where austerity policies hit harder. The country experienced falls of real GDP of 9.8% in the 2008Q1–2013Q1 period; real government expenditures of 11.7% during the 2009Q3–2015Q3 period; real government investment of 51% in the 2009Q4–2017Q4 period; and real government consumption of 7.3% during the 2010Q3–2015Q3 period.

3.2 Methods

Fiscal multipliers in Italy are estimated using SVAR models. A reduced-form VAR(1) can be represented as follows in Equation (1):

9 Additional estimates of multipliers for the Italian economy implemented by national and international institutions are provided by UPB (2017) and Busetti *et al.* (2019).

10 Net taxes—or simply taxes for short—are defined as total government revenue less government transfers to households and firms. The use of the long-term treasury interest rate is in line with several contributions in the fiscal policy literature, such as Perotti (2004a,b, p. 114), Caldara and Kamps (2008), Canova and Pappa (2011), Miyamoto *et al.* (2018), and Amendola *et al.* (2020). The use of long-term interest rates will also allow me to consider monetary policy's stance since monetary policy can exert persistent effects on long-term interest rates (Deleidi and Levrero, 2021). Alternatively, one can use both the short-term interest rate (e.g. the 3-month treasury bill rate) and the nominal shadow interest rate, as recently proposed by Wu and Xia (2016, 2017), Amendola *et al.* (2020), and Ikeda *et al.* (2020).

11 Following Boehm (2020) because the OECD Economic Outlook database is only published twice a year, the $t-1$ forecasts are used for the first and third quarter of each year, while forecasts for the second and fourth quarter are retrieved from information available in $t-2$.

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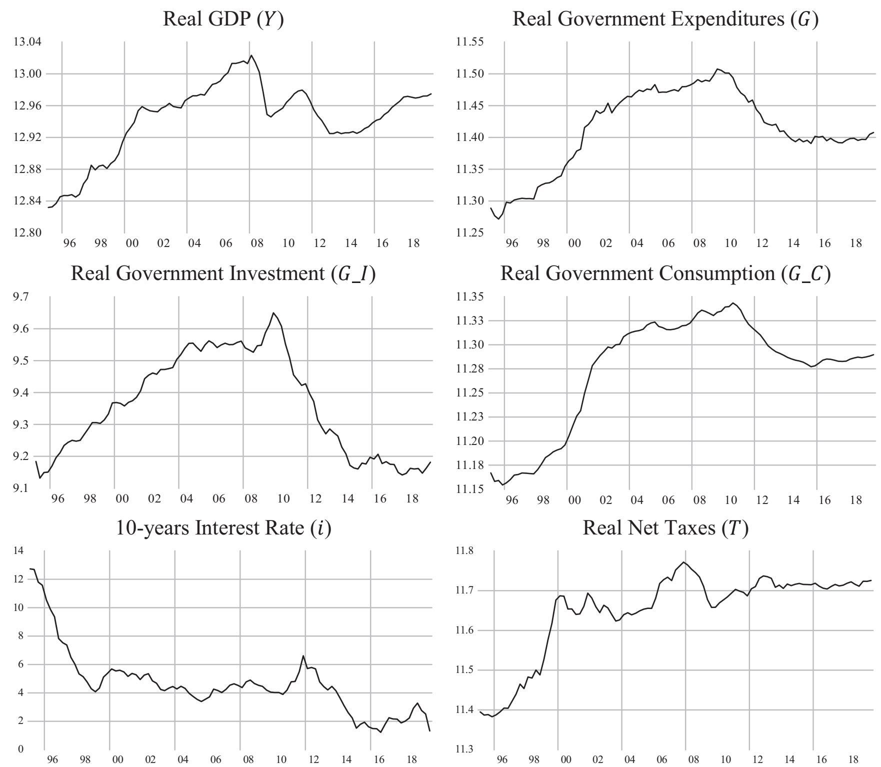

Fig. 1. Real GDP (Y), real government expenditures (G), real government investment (G_I), real government consumption (G_C), 10-years nominal interest rate (i) and real net taxes (T) (1995Q1–2019Q3 period).

$$X_t = C_1(L)X_{t-1} + u_t, \tag{1}$$

where X is the vector of endogenous variables, $C_1(L)$ is the matrix of lagged coefficients, and u_t is the vector of reduced-form residuals.[12] Precisely, $X_t \equiv [G_t; T_t; Y_t; i_t]$ and $u_t \equiv [u_{G,t}; u_{T,t}; u_{Y,t}; u_{i,t}]$ in the case of Model 1, while in Model 2 $X_t \equiv [G_I t; G_C t; T_t; Y_t; i_t]$ and $u_t \equiv [u_{G_I,t}; u_{G_C,t}; u_{T,t}; u_{Y,t}; u_{i,t}]$. All equations include four lags of each endogenous variable and a constant. An identification has to be imposed on the reduced-form VAR in Equation (1) to obtain an SVAR model. An SVAR(1) is represented in Equation (2):

$$AX_t = AC_1(L)X_{t-1} + Be_t, \tag{2}$$

where $Au_t = Be_t$ defines the relationship between the structural errors e_t and the reduced-form residuals u_t. The representation of the structural form reported in Equation (2) is based on the so-called AB-model (Lütkepohl, 2005, Section 9.1; Kilian and Lütkepohl, 2017, Section 8.1). Once restrictions are imposed and structural shocks are estimated, impulse response functions (IRFs) are calculated to show the dynamic effect produced by a

12 All considered variables are introduced in the VAR model at levels. The deterministic trend was found to be not significant and has been removed. At any rate, estimates of fiscal multipliers including the deterministic trend are similar to those obtained without including it.

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shock on the remaining variables included in the model. Standard errors are computed using the Monte Carlo method (1,000 repetitions), and IRFs are reported with one-standard error band, namely a 68% confidence interval.[13]

The implemented identification strategies, summarized in Equations (3) and (4), are built on the relevant empirical literature (Blanchard and Perotti, 2002; Perotti, 2004a; Giordano *et al*., 2007; Caldara and Kamps, 2008; Auerbach and Gorodnichenko, 2012). Specifically, the Blanchard and Perotti identification strategy is used and extended to consider the effect of long-term interest rates (Perotti, 2004a).

$$\text{Model1}: \begin{bmatrix} 1 & 0 & 0 & 0 \\ - & 1 & -0.75 & 0 \\ - & - & 1 & 0 \\ - & - & - & 1 \end{bmatrix} \begin{bmatrix} u_{G,t} \\ u_{T,t} \\ u_{Y,t} \\ u_{i.t} \end{bmatrix} = \begin{bmatrix} - & 0 & 0 & 0 \\ 0 & - & 0 & 0 \\ 0 & 0 & - & 0 \\ 0 & 0 & 0 & - \end{bmatrix} \begin{bmatrix} e_{G,t} \\ e_{T,t} \\ e_{Y,t} \\ e_{i.t} \end{bmatrix} \tag{3}$$

$$\text{Model2}: \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ - & 1 & 0 & 0 & 0 \\ - & - & 1 & -0.75 & 0 \\ - & - & - & 1 & 0 \\ - & - & - & - & 1 \end{bmatrix} \begin{bmatrix} u_{G_I,t} \\ u_{G_C,t} \\ u_{T,t} \\ u_{Y,t} \\ u_{i.t} \end{bmatrix} = \begin{bmatrix} - & 0 & 0 & 0 & 0 \\ 0 & - & 0 & 0 & 0 \\ 0 & 0 & - & 0 & 0 \\ 0 & 0 & 0 & - & 0 \\ 0 & 0 & 0 & 0 & - \end{bmatrix} \begin{bmatrix} e_{G_I,t} \\ e_{G_C,t} \\ e_{T,t} \\ e_{Y,t} \\ e_{i.t} \end{bmatrix} \tag{4}$$

The identifications in Equations (3) and (4) are based on the idea that government expenditures are not affected by the output level, taxes, and interest rates in the contemporaneous relationship. Regarding the zero restrictions imposed in the relationship from output to government expenditures, this is due to the following: (i) information delays in releasing GDP data, which are available a few quarters after the reference period[14] and (ii) an implementation lag as a discretionary fiscal policy takes more than one quarter to be decided, approved, and implemented (Kilian and Lütkepohl, 2017). In the identification (4), the assumption is that government investment is more exogenous than government consumption. The underlying idea is that government investment depends on strategic decisions, usually based on long-term political goals, as well as on bureaucratic and institutional decisions based on feasibility studies that involve different policy-making institutions and take a long time to be implemented (Deleidi *et al*., 2020). In the equation describing net taxes in Equations (3) and (4), I impose an external coefficient capturing the automatic response of fiscal variables to GDP, as in Blanchard and Perotti (2002), Perotti (2004a), Giordano *et al.* (2007), and Auerbach and Gorodnichenko (2012). This coefficient has been estimated following the method proposed by Giordano *et al.* (2007, Appendix B, p. 732) for the Italian case.[15] The estimated elasticity is equal to 0.75, and it is introduced in Equations (3) and (4). Finally, focusing on the interest rate in Equations (3) and (4), I

13 I follow standard procedures to estimate and identify SVAR models, as illustrated by Lütkepohl (2005), and Kilian and Lütkepohl (2017). The choice of 68% error bands is used in several contributions (see, among others, Blanchard and Perotti, 2002; Perotti, 2004a,b; Caldara and Kamps, 2017). Furthermore, Sims and Zha (1999) and Giordano *et al.* (2007) pointed out that error bands corresponding to 0.68 probability is often more useful than 0.95 bands since they provide a more precise estimate of the true coverage probability.

14 Data on GDP are collected quarterly and are typically released two months after the end of a quarter (Jovanovski and Muric, 2011).

15 The elasticity of net revenue to GDP (e^Y_{nr}) is estimated as the product of the elasticity of revenue to GDP (e^Y_r) and the average ratio of revenue over net revenue (r/nr) in the period examined. This can be summarized by the following equation: $e^Y_{nr} = e^Y_r * r/nr$.

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follow the identification used by Perotti (2004a) as well as by the monetary economics literature which studies the transmission mechanisms of monetary policy (see, among others, Bernanke *et al.*, 2005; Castelnuovo and Surico, 2010). The main idea behind this assumption is that the interest rate may react within the same quarter to fiscal policy variables and output. At the same time, both the public and private sectors respond slowly to changes in interest rates. Three robustness checks have been carried out to provide a sound picture of the magnitude of multipliers in Italy. First, a different identification strategy assuming government consumption ordered first and government investment ordered as a second variable is adopted. Secondly, I use the elasticity of net revenue to GDP of 0.5 estimated by Giordano *et al.* (2007, p. 733).[16] Thirdly, following Giordano *et al.* (2007), I include suitable dummy variables to assess findings' stability and account for feasible structural breaks. These findings are reported in the Supplementary Appendices B, C, and D.

Before describing the empirical findings, additional considerations on the estimates of multipliers are necessary. Since variables are in logarithmic form and IRFs are interpretable as elasticities, each normalized coefficient must be multiplied by the corresponding *ex post* conversion factor to obtain partial derivatives, namely '*dynamic multipliers*'.[17] The *ex post* conversion factors are calculated as average ratios of Y to the considered government expenditures, and Y to net taxes.[18] After this transformation do coefficients express dollar change in Y, in response to an initial one-dollar increase in the selected government expenditure. Besides, when estimating dynamic multipliers, the associated government spending shock is equal to one dollar on impact, while the dynamic of the shock can change throughout the selected period and be different from one in the periods after the initial shock. This clarification is needed to comprehend the difference between IRFs and dynamic multipliers, which shows the dynamic effect at some horizon of the response variable after an initial shock, and the so-called '*cumulative multiplier*', which represents the response of Y per unit of government spending. Cumulative multipliers represent the most appropriate measure for evaluating the effect of fiscal policies on GDP and are estimated through the ratio

16 Estimated tax multipliers assuming an elasticity of 0.5 (see, the Online Appendix C) are lower than those obtained with the primary identification strategy. The magnitude of tax multiplier crucially depends on the value assumed by the elasticity of net revenue to GDP (e^{Y}_{nr}): the higher is the elasticity assumed, the larger is the value of the tax multiplier. This validates the idea that the tax multiplier is very sensitive to the value of the external tax elasticity used (Caldara and Kamps, 2008, 2017; Mertens and Ravn, 2014; Ramey, 2019).

17 According to Owyang *et al.* (2013) and Ramey and Zubairy (2018), the use of *ex post* conversion factors may lead to a potential bias when estimating fiscal multipliers since the average of the ratio of GDP to government spending may vary highly over the considered period. The literature on multipliers has proposed a twofold method to avoid potential bias, allowing estimating multipliers directly when computing the IRFs. The first method, proposed by Gordon and Krenn (2010) and Ramey and Zubairy (2018), divides all considered variables by a measure of the trend or potential GDP. The second approach multiplies government spending changes by G/Y at each point in time before estimating the model (see Hall, 2009; Barro and Redlick, 2011; Owyang *et al.*, 2013). However, these two methods have some drawbacks too. While the former approach has been questioned because the potential output is sensitive to business cycle fluctuations (Auerbach and Gorodnichenko, 2017; Coibion *et al.*, 2017), the latter is hard to be implemented when using VAR models (Owyang *et al.*, 2013; Ramey and Zubairy, 2018).

18 Y/G and Y/T in Model 1, while Y/G_I, Y/G_C and Y/T in Model 2. The average value of Y/G is equal to 4.62, while Y/G_I, Y/G_C and Y/T are equal to 36.5, 5.3, and 3.64, respectively.

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between the cumulative variation of Y and the cumulative change in fiscal expenditure (Spilimbergo *et al.*, 2009; Ramey and Zubairy, 2018). Sections 4 and 5 report cumulative multipliers associated with government expenditure, government consumption and investment, and taxes.

4. Findings of models without fiscal foresight

IRFs of Models 1 and 2 estimated not including fiscal foresight are reported in Figures 2 and 3, while multipliers in Table 1. IRFs show that the government spending shocks are equal to 1% on impact, while its dynamics change throughout the selected period by assuming values different from 1%. The IRFs related to spending shocks are positive, confirming that an increase in government expenditure (Model 1) and its components (Model 2) positively affects the output level. When looking at the IRFs related to a tax shock, a rise in taxes leads to a decrease in the GDP level.

When IRFs of Model 1 are converted in cumulative multipliers (see Table 1), G produces a significant impact multiplier of 0.34, a significant multiplier of 1.82 after 10 quarters, which reaches a significant peak of 1.87 after 12 quarters. An increase in T generates a significant impact multiplier of –0.30, a significant multiplier of –0.48 after 10 quarters, and a non-significant peak effect of –0.80 after 17 quarters. Looking at the effect of government consumption and investment in Model 2, G_I and G_C impact multipliers are equal to 1.47 and 0.52, respectively. G_I produces a significant peak effect of 4.72 after 13 quarters, while G_C generates a non-significant peak of 3.17 after 20 quarters. When the effect of taxes is analyzed in Model 2, findings are similar to those obtained in Model 1. When tax-based policies are compared with spending-based fiscal plans, changes in taxes generate a lower effect on GDP than government expenditures.

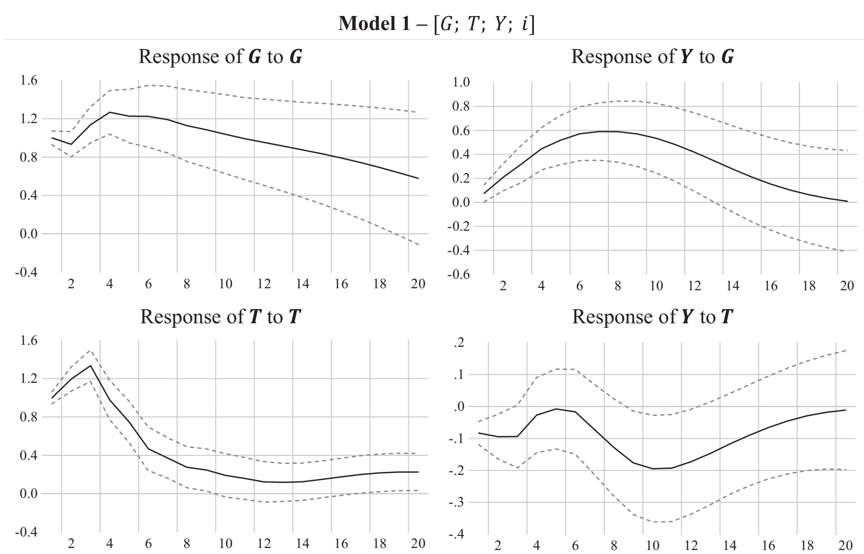

Fig. 2. IRFs, Models 1 without fiscal foresight. Tax elasticity of 0.75. Normalized shocks. Figures display elasticities. Dotted lines 68% confidence bands estimated though a Monte Carlo procedure (1,000 repetitions). (**a**) Response of G to G, (**b**) Response of Y to G, (**c**) Response of T to T, and (**d**) Response of Y to T.

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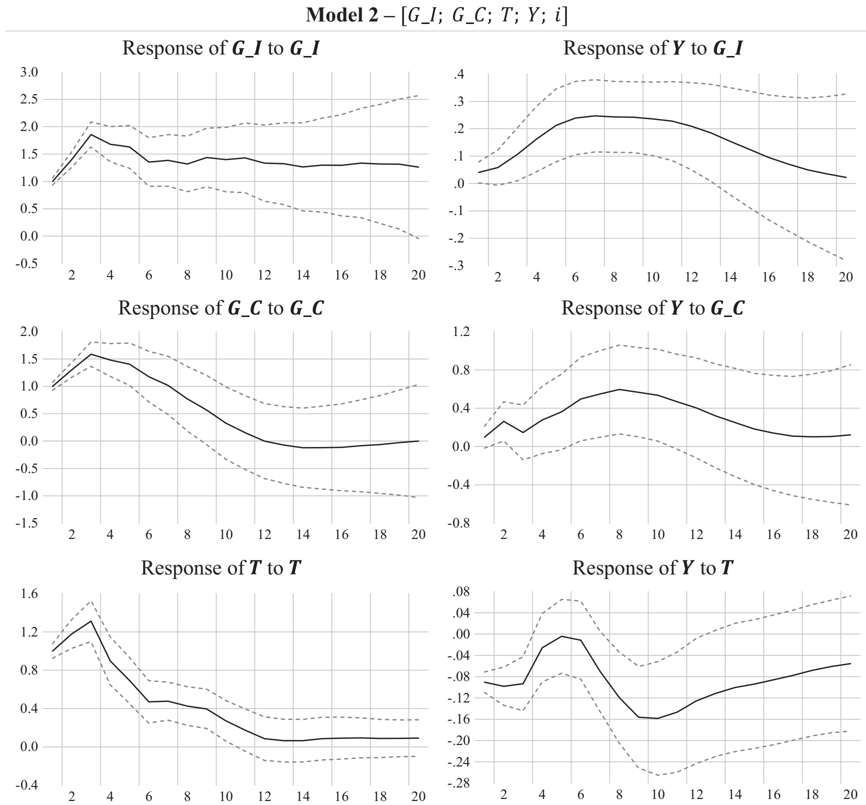

Fig. 3. IRFs, Models 2 without fiscal foresight. Tax elasticity of 0.75. Normalized shocks. Figures display elasticities. Dotted lines 68% confidence bands estimated though a Monte Carlo procedure (1,000 repetitions). (**a**) Response of G_I to G_I, (**b**) Response of Y to G_I, (**c**) Response of G_C to G_C, (**d**) Response of Y to G_C, (**e**) Response of T to T, and (**f**) Response of Y to T.

Table 1. Cumulative multipliers, models 1 and 2 without fiscal foresight

Cumulative multipliers	1Q	5Q	10Q	15Q	20Q	Peak	Av 20Q
Model 1							
G	**0.34**	**1.31**	**1.82**	1.80	1.57	**1.87 (Q12)**	1.51
T	**–0.30**	–0.21	**–0.48**	–0.78	–0.76	–0.80 (Q17)	–0.52
Model 2							
G_I	**1.47**	**2.79**	**4.50**	4.63	3.90	**4.72 (Q13)**	3.71
G_C	0.52	0.90	**1.94**	2.79	3.17	3.17 (Q20)	1.95
T	**–0.33**	–0.22	**–0.42**	–0.68	–0.79	–0.79 (Q20)	–0.48

Tax elasticity of 0.75. Significant multipliers are in bold. 1Q is the impact multiplier; 5Q–20Q are the multipliers associated with different quarters; Peak represents the maximum effect; Av-20Q is the average on 20 quarters. *Source*: Authors' calculations.

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Table 2. Granger causality test, among $\Delta G^F_{t|t-1}$ and $e_{G,t}$. Lags 1 and 2

Null hypothesis	*F*-statistic	Probability
Lag 1		
$\Delta G^F_{t\|t-1}$ does not Granger Cause $e_{G,t}$	3.379	0.069
$e_{G,t}$ does not Granger Cause $\Delta G^F_{t\|t-1}$	0.129	0.720
Lag 2		
$\Delta G^F_{t\|t-1}$ does not Granger Cause $e_{G,t}$	2.472	0.090
$e_{G,t}$ does not Granger Cause $\Delta G^F_{t\|t-1}$	0.030	0.971

Source: Authors' calculations.

My findings suggest that an increase in government spending has a Keynesian effect, producing positive effects on the GDP level. When government consumption and investment are considered separately, the multiplier related to investment is larger than the consumption one. The value assumed by multipliers of government expenditure and its components is similar to those obtained by Giordano *et al.* (2007), Caprioli and Momigliano (2013), Boitani and Perdichizzi (2018), and Deleidi *et al.* (2020). Furthermore, the appraised superiority of government investment is in line with the findings obtained by Burriel *et al.* (2010), Auerbach and Gorodnichenko (2012), Gechert (2015), and Deleidi *et al.* (2021) and in sharp contrast to those obtained by Perotti (2004b), Pappa (2009a), Ilzetzki *et al.* (2013), and Boehm (2020). However, it is worth noting that the value of investment multipliers presented in this study is close to that obtained by Perotti (2004b) for Germany.[19] Moreover, findings reported in Table 1 show that fiscal multipliers are 1 to 4 points larger than those used by the Italian Ministry of Economics and Finance, the Parliamentary Budget Office and the Bank of Italy. Finally, as shown in the Supplementary Appendices B, C, and D, the magnitude of multipliers is confirmed even when additional robustness checks are performed.

5. Expectations and fiscal multipliers

In the baseline formulation of the empirical model reported in Section 4, I do not consider the role of fiscal foresight when assessing the effectiveness of different fiscal policies on the output level. This section analyses this issue by following the strategy carried out by Ramey (2011b) and Auerbach and Gorodnichenko (2012).

The recent literature on fiscal multipliers widely recognizes that fiscal foresight plays a fundamental role in estimating fiscal multipliers (see, among others, Blanchard and Perotti, 2002; Ramey, 2011b; Auerbach and Gorodnichenko, 2012; Leeper *et al.*, 2012, 2013). Due to legislative and implementation lags of fiscal policy, a certain amount of time usually elapses between the moment in which fiscal policy is announced, and the moment it becomes effective. This implies that private agents may anticipate their consumption and investment expenditures when receiving information on future changes in fiscal expenditures. Econometrically, when only government expenditure is included in the model, the substantial information arising from fiscal policy news is not duly considered, leading to

19 Even though Perotti (2004b) concludes that the superiority of public investment in boosting GDP does not exist, he estimates an investment multiplier larger than 4 in Germany (see also footnote 6).

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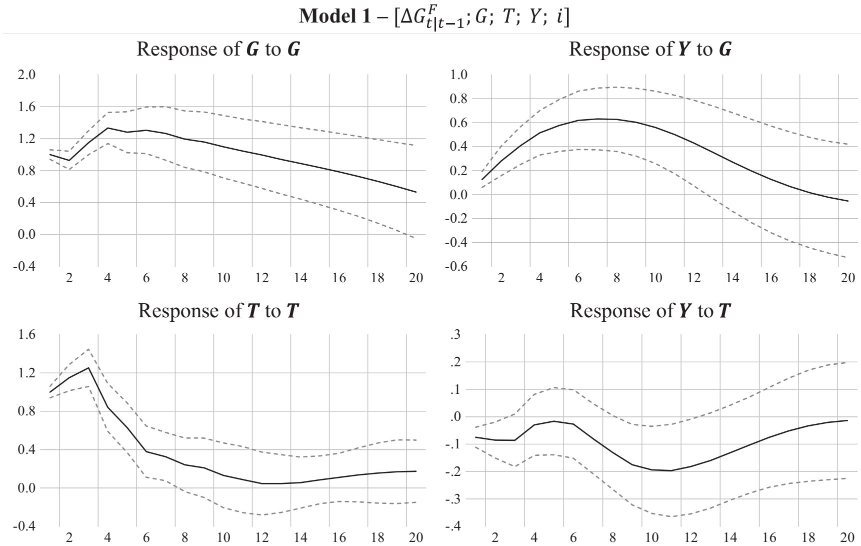

Fig. 4. IRFs, Models 1 with fiscal forecasts $\Delta G^F_{t|t-1}$. Tax elasticity of 0.75. Normalized shocks. Figures display elasticities. Dotted lines 68% confidence bands estimated though a Monte Carlo procedure (1,000 repetitions). (**a**) Response of G to G, (**b**) Response of Y to G, (**c**) Response of T to T, (**d**) Response of Y to T.

draw flawed conclusions. The inclusion of variables capturing fiscal foresight isolates what the literature has defined as an unanticipated or unexpected fiscal policy shock (Auerbach and Gorodnichenko, 2012). To consider that, Models 1 and 2 are augmented with a variable capturing fiscal foresight, namely the growth rate of the government expenditure forecast ($\Delta G^F_{t|t-1}$) that have been calculated by using the spending forecasts (G^F) released by the OECD Economic Outlook database. $\Delta G^F_{t|t-1}$ is ordered first, both in Models 1 and 2.

Before presenting findings of models augmented by expectations, I follow the procedure adopted by Ramey (2011b) by performing a Granger causality test to assess whether the fiscal forecasts $\Delta G^F_{t|t-1}$ Granger-cause the SVAR shocks estimated in the model not including expectations ($e_{G,t}$). Findings are reported in Table 2 and show that government spending shocks are Granger-caused by fiscal policy forecasts $\Delta G^F_{t|t-1}$, while forecasts are not Granger-caused by government spending shocks. Therefore, structural residuals estimated in the SVAR not including expectations are foreseen by fiscal forecasts $\Delta G^F_{t|t-1}$. This, in turn, implies that the identified shocks comprise both an anticipated (expected) and an unanticipated (unexpected) components (Ben Zeev and Pappa, 2017).

To be clear on this issue, the structural residuals—estimated for instance in Model 1 and corresponding to G—are $e_{G,t} = e_{G_{Ex},t} + e_{G_{Unex},t}$, where $e_{G_{Ex},t}$ is the expected or anticipated shock, whereas $e_{G_{Unex},t}$ is the unexpected one. The introduction of fiscal expectations $\Delta G^F_{t|t-1}$ allows distinguishing between predictable and unpredictable fiscal shocks and assessing the effect of an unexpected fiscal policy shock on GDP. In so doing, the estimated structural shocks associated with effective fiscal variables do not include the effect of predictable changes in government expenditures. Indeed, while the shock corresponding to $\Delta G^F_{t|t-1}$ represents an anticipated fiscal policy shock ($e_{G_{Ex},t}$), the ones associated with

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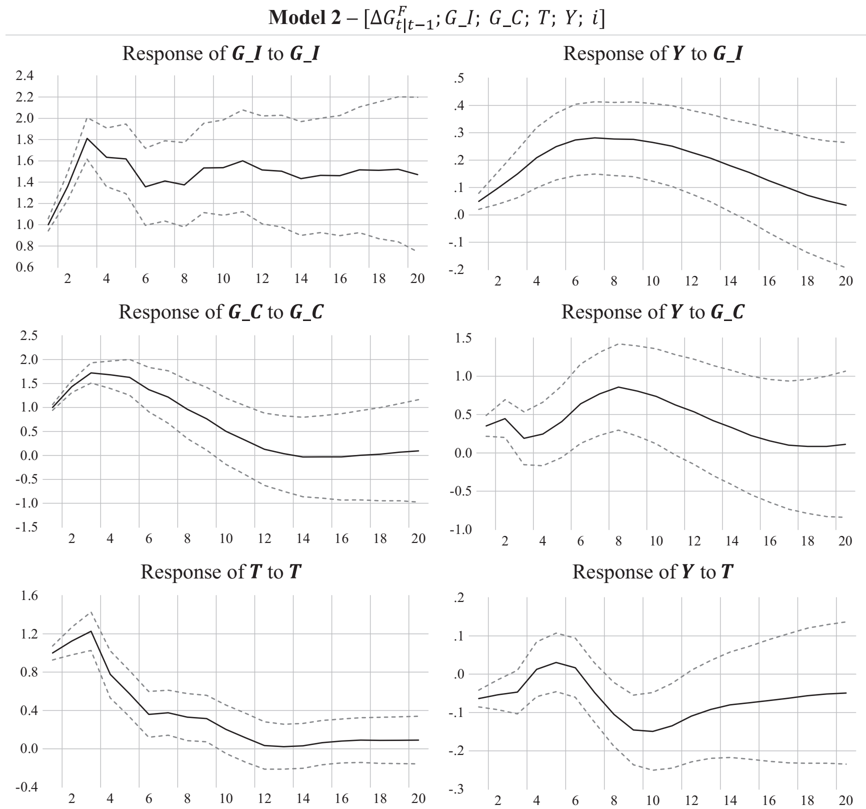

Fig. 5. IRFs, Models 2 with fiscal forecasts $\Delta G^F_{t|t-1}$. Tax elasticity of 0.75. Normalized Shocks. Figures display elasticities. Dotted lines 68% confidence bands estimated though a Monte Carlo procedure (1,000 repetitions). (**a**) Response of G_I to G_I, (b) Response of Y to G_I, (**c**) Response of G_C to G_C, (**d**) Response of Y to G_C, (**e**) Response of T to T, (**f**) Response of Y to T.

Table 3. Cumulative multipliers, models 1 and 2 with fiscal forecast $\Delta G^F_{t|t-1}$

Cumulative multipliers							
	1Q	5Q	10Q	15Q	20Q	Peak	Av 20Q
Model 1 – $\Delta G^F_{t|t-1}$							
G	**0.59**	**1.55**	**1.95**	1.88	1.60	**1.97 (Q12)**	1.66
T	**–0.27**	–0.22	**–0.53**	–0.94	–0.94	–0.97 (Q17)	–0.59
Model 2 – $\Delta G^F_{t|t-1}$							
G_I	**1.80**	**3.70**	**5.29**	5.17	4.33	**5.34 (Q12)**	4.39
G_C	**1.86**	1.17	**2.35**	3.17	3.35	3.35 (Q20)	2.38
T	**–0.23**	–0.09	**–0.32**	–0.58	–0.69	–0.69 (Q20)	–0.37

Tax elasticity of 0.75. Significant multipliers are in bold. 1Q is the impact multiplier; 5Q–20Q are the multipliers associated with different quarters; Peak represents the maximum effect; Av-20Q is the average on 20 quarters.
Source: Authors' calculations.

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effective fiscal variables represent unexpected fiscal policy shocks ($e_{G_{Unex},t}$) where $e_{G_{Unex},t}$, $e_{G_I Unex,t}$ and $e_{G_C Unex,t}$ are the structural shocks related to$G$, G_I and G_C, respectively.

IRFs of Models 1 and 2 augmented by expectations are shown in Figures 4 and 5, while cumulative multipliers are reported in Table 3. IRFs are equal to 1% on impact, whereas their dynamics change throughout the selected period by assuming values different from 1%. Even when expectations are considered, an increase in government expenditure and its components leads to a rise in the GDP level, while a rise in taxes decreases the output level.

Estimated multipliers considering fiscal expectations are reported in Table 3. G produces a significant impact multiplier of 0.59 and a significant multiplier of 1.95 after 10 quarters, which reaches a significant peak of 1.97 after 12 quarters. G_I is associated with a significant impact multiplier of 1.80, a significant multiplier of 5.29 after 10 quarters, and a significant peak of 5.34 after 12 quarters. G_C is accompanied by a significant impact effect of 1.86, a significant multiplier of 2.35 after 10 quarters, and a non-significant peak multiplier of 3.35 after 20 quarters. When considering the effect of taxes in Model 1, T generates an impact multiplier of –0.27, a significant multiplier of –0.53 after 10 quarters, and a non-significant peak multiplier of –0.97 after 17 quarters. In Model 2, T produces an impact multiplier of –0.23, a significant multiplier of –0.32 after 10 quarters, and a non-significant peak multiplier of –0.69 after 20 quarters. Additional findings obtained through different model specifications are reported in the Supplementary Appendices B, C, and D, and are similar to those described in this section.

Findings obtained in models augmented by expectations provide a clear picture showing that an increase in government expenditures and its components produces Keynesian effects on the output level. In models augmented by expectations, estimated multipliers are also greater than 1 and government investment generates a larger effect on GDP than government consumption. An increase in taxes engenders negative effects on GDP, and tax multipliers are lower than 1. When comparing spending-based plans with tax-based fiscal policies, government expenditure exhibits a larger effect on output than net revenues. Multipliers reported in this section are generally larger than those obtained in models that do not include expectations. Comparing models with and without expectations, the largest difference found—of about 0.8 points—is between cumulative multipliers of government investment.

6. Conclusion and policy implications

The idea that austerity policies produce expansionary effects is grounded on the expansionary austerity theory according to which fiscal consolidation policies—mainly based on the reduction of government expenditures—foster economic growth. This narrative assumes fiscal multipliers to be close to zero or even negative. Consequently, an increase in public expenditure is regarded as inconsequential or even recessive. The main policy implication of such a perspective is that a reduction in government expenditures would lead to an economic expansion. On the contrary, according to the long-standing Keynesian tradition, and the more recent literature on fiscal multipliers, a decrease in public expenditure exerts a negative effect on GDP via a reduction in private expenditures. Following these perspectives, fiscal multipliers are positive, and countries will experience recessions when fiscal consolidation policies are implemented.

This article aims to assess the effect of different fiscal policies by estimating multipliers of government expenditure, public consumption and investment, and taxes in Italy, one of

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the peripheral Eurozone countries most affected by post-crisis austerity measures. To do this, I apply SVAR modelling to data provided by the OECD and ISTAT for the 1995–2019 period. I also appraise the role of fiscal foresight by adding government spending expectations to model specifications. Findings support the idea that an increase in government expenditures produces a Keynesian effect by engendering a GDP rise. When evaluating fiscal policy composition, government investment is associated with multipliers higher than those obtained for government consumption and tax-based policies have a lower effect on GDP than spending-based fiscal plans. When all models are augmented by government expenditure expectations, fiscal multipliers generally increase compared with those obtained in models that do not include expectations. Although my findings support the theoretical and empirical literature sustaining the superiority of government investment in stimulating the GDP level, the positive effects produced by public consumptions should not be disregarded. Further development of this research may be the assessment of fiscal multipliers using FAVAR models and by considering the state of the business cycle, namely economic recessions and expansions.

My findings suggest that governments should carry out expansionary fiscal policies to foster Italian economic growth. Findings reported in this article are 1–4 points larger than multipliers computed by the Italian Ministry of Economics and Finance, the Parliamentary Budget Office and the Bank of Italy, depending on the type of government expenditure taken into consideration. The study also shows that the most effective way to employ public funds is through government investments. Such a perspective is backed by the IMF (2020), according to which a public investment plan would facilitate the economic recovery after the COVID-19 pandemic. For instance, this translates to massive infrastructure spending and the reinforcement of the public health system: both sectors are, at the time of writing, experiencing critical conditions.

Supplementary material

Supplementary material is available online at the OUP website.

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