Low Growth and High (?) Sovereign Debt in Italy: Facts, Causes, and Cures.*

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Abstract

This paper points to assess the role of Italy's fiscal policy in the poor growth performance over the last three decades. It builds the empirical investigation on the predictions of a simple endogenous growth model to (1) estimate the relationships between changes in fiscal balance, debt, and growth during 1985-2019; and (2) rate the intertemporal viability of the government's budget. The paper finds that the feeble economic growth of Italy is closely related to the harshness of its fiscal policy, targeted primarily to meet EMU policy rules and hardly used countercyclically. It also shows that Italy's sovereign debt is highly sustainable and that the austerity policies always impacted negatively on the growth rate and on the debt-to-GDP ratio.

Key words: Fiscal policy, Fiscal austerity, Debt sustainability, Growth, Secular stagnation.

JEL Classifications: E60, E62, H60, H62, H63,

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I. Introduction

The issue of Italy's disappointing growth performance and soaring sovereign debt-to-GDP ratio (DGR) since the early 1990s has been debated extensively in the literature and shifted high on the policy agenda in the aftermath of the great financial crisis (GFC) of 2008-09. The reason looks to be obvious in the face of the following data

Table 1	Main Advanced Economies, 1990-2018					
Real GDP Growth Rates (%)						
Years	Italy	Germany	France	Japan	United Kingdom	United States
1991-2000	1.7	2.0	2.1	1.3	2.4	3.4
2001-2010	0.3	0.9	1.2	0.6	1.6	1.6
2011-2018	0.1	1.8	1.2	1.0	1.9	2.2
(Public) Debt-to-GDP Ratio						
1990	91.7	41.3	35.6	64.2	28.9	62.2
2000	105.1	58.9	58.9	137.9	37.0	53.2
2010	115.4	81.0	85.3	207.9	75.2	95.5
2018	131.1	60.1	98.7	236.2	86.0	105.8
Source: European Commission, Ameco database						

Table 1 is disquieting and is a source of precious support to the view of a coming phase of "secular stagnation" for Italy, similar to that of Japan if no radical and costly adjustments are taken.

This view is visible in a popular and well-established narrative emphasizing the adverse combination of a number of structural weaknesses affecting the supply-side - such as low competitive pressure, weak productivity growth, low labour and price flexibility, and inefficiency of public administration and civil justice - and an oversized State-player, held responsible for the high tax burden and the strong downward rigidity on the expenditure side.[1]

[1] See, e.g., Rossi and Toniolo (1996), European Commision (1999, 2014), Faini (2004), Toniolo and Visco (2004), Larch (2004), Faini and Sapir (2009), Bassanetti et al. (2014), Giordano et al. (2015), Pinelli, Székely, and Varga (2016), Bugamelli et al. (2018).

The policy implication to emerge from this literature is straightforward: structural reforms aimed to improve the supply side of the economy and downsize the public sector are crucial to cut back government spending and the fiscal burden, strengthen competition and productivity dynamics, and raise potential output.

The disappointing effectiveness of the wide-ranging reforms implemented since the end of the 1990s, and more intensely after 2011 in an attempt to boost economic growth in the wake of the European Sovereign Debt crisis, call into question the accuracy of the mainstream diagnosis and its policy strategy. In particular, two issues arise directly: *a*) is the sluggish growth rate of the Italian economy basically driven by supply-side factors?; *b*) is there too much debt?

Addressing the issues in *a*) and *b*) is the main contribution of the paper. Building the econometric analysis on the relationships between changes in fiscal balance, capital accumulation, growth and debt, described in endogenous growth models, we show that the switch to a long-lasting contractionary stance of fiscal policy in the 1990s and 2000s to meet EU fiscal rules played a key role in determining the dismal growth performance of Italy. The paper also shows that if properly measured, Italy's sovereign debt is highly sustainable and that the (unnecessary) austerity policies always impacted negatively on the growth rate and on the debt-to-GDP ratio.

The remainder of the paper is structured as follows. Section II compares the growth performance of Italy vis-a-vis the main advanced economies since 1960 and calls attention to the growth-unfriendly fiscal policies adopted in the last three decades to meet EU policy rules. Section III describes the econometric strategy for analyzing the links between budget balance, capital accumulation, and growth in Italy over 1985-2019 and discusses the empirical results. Section IV deals with the effects on the cumulative growth rate and the DGR dynamics of fiscal austerity measures implemented in Italy to meet the Maastricht thresholds. Section V deals with the critical issue of debt sustainability. Section VI concludes.

II. The Growth Slowdown

Data in Table 2 provides instrumental information to start off with point *a*). The table reports ten-year growth rate averages in the main advanced economies over 1960-2018, and splits the 2000s in the pre-crisis (2000-2007) and post-crisis (2008-2018) period. Two relevant features stand out from Tab. 2:

- Over the period 1960-2007 Italy's growth slowdown turns out to be commonplace when compared with the other advanced economies.
- The growth slowdown accelerates after 1990 and collapses in 2008-2018, which marks the phase of prolonged recession triggered by the GFC of 2008-09 and developed in the double-dip recession of 2011-13.

Table 2 Main Advanced Economies

Real GDP Growth Rates (%), 1960-2018

Years	Italy	Germany	France	Japan	United Kingdom	United States
1961-1970	5.7	4.4	5,7	10.1	3.1	4.3
1971-1980	3.8	2.9	3.6	4.4	2.1	3.2
1980-1990	2.4	2.3	2.5	4.6	2.9	3.3
1991-2000	1.7	2.0	2.1	1.3	2.4	3.4
2001-2010	0.3	0.9	1.3	0.6	1.6	1.7
2011-2018	0.1	1.8	1.2	1.0	1.9	2.2
2000-2007	1.5	1.5	2.1	1.5	2.8	2.7
2008-2018	-0.4	1.3	0.9	0.6	1.1	1.6

Source: European Commission, Ameco database

The first point is outside the scope of this paper being the subject of a growing number of studies warning of the possible return to a phase of secular stagnation for most developed countries in the next decades.[2] The second is our main concern and has been the subject of an extensive research on the alleged

[2] See, e.g., the papers gathered in Teulings and Baldwin (2014), and the overview in Pagano and Sbracia (2014).

decline of the Italian economy and the policy tools key to escape the low-growth trap and raise the growth potential.[3]

Figures 1-3 now help to make visible the role of fiscal policy (FP) in the prolonged stagnation of the last three decades and to cast doubts on the deep-rooted view that structural reforms are crucial to raise potential output and growth perspectives. Starting with Figure 1, which compares the evolution of GDP growth rate in Italy with that in the Eurozone (EZ|IT $\equiv$ EU19, excluding Italy) and the US, it is striking to observe that up to 2010 Italy's growth pattern was very similar to that experienced in the other two groups of countries.[4] In particular, Italy exited very quickly from the Great Recession by a mix of monetary and fiscal stimulus like the US and the Eurozone; thereafter it enforced harsh austerity measures that led to a new recession (2012-13) and a prolonged stagnation.[5] If Italy's poor growth performance is the result of structural weaknesses constraining the supply-side, then it is hard to understand how Italy recovered so quickly from the GFC despite its structural rigidities and why suddenly from 2011 on these same rigidities acted so powerfully to yield a strong divergence in the growth rate relative to the other developed countries.

Figure 2 makes tangible the output costs of fiscal austerity measures. The figure depicts the gap between actual and potential output estimated as of 2007 and 2010 for Italy and reveals that the output is far short of where its potential was expected to be as of 2007 ($\simeq -18\%$, in 2014, and -19.7% in 2018). More troubling, however, is the observation that most of the gap represents a permanent loss as shown by the downward revision of potential output ($\simeq -13\%$, in 2014, and -16%, in 2018).[6] In numbers and as of 2014 (the turning upward

[3] See, note 1.

[4] Adding to the chart other countries, such as Japan or EU countries not belonging to the Eurozone, does not change the whole story. Therefore, they were not included only to avoid blurring the lines.

[5] Notice that contrary to the US, also the other Eurozone countries experienced the double-dip recession of 2012-13, but Italy's downturn is deeper and longer.

[6] This is the so-called hysteresis effect supported by several empirical studies ran after GFC; see, e.g., European Commission, 2009; Ball, 2014; Blanchard, Cerutti, and Summers, 2015; Reifschneider, Wascher, and Wilcox, 2015; Stiglitz (2016); Fatás and Summers, 2018;

point) and 2018, this means for Italy a total loss in output of €324 and €366 billion, respectively.[7]

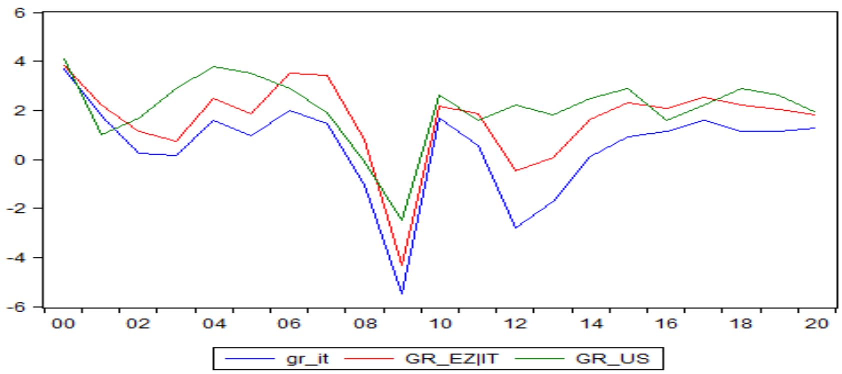

Figure 1. Real GDP growth rates (%) in Italy, EZ|IT, and US, 2000-18.

Source: European Commission, Ameco database

Finally, Figure 3 which displays the primary balance-to-GDP ratio visibly shows that Italy's fiscal stance over the last three decades was persistently restrictive. Compared with the other advanced economy, Italy stands out as the only country never running a deficit for almost 30 years: apart from 2009, the primary budget balance has been always in surplus with an average surplus-to-GDP ratio of more than 2% (see, Figure 4).[8] It is, therefore, puzzling to learn that Italy is ranked among the countries with the highest debt/GDP ratio: something wrong is somehow locked up with this measure, as we shall show below when speaking about point *b*).

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[7] Identical computations for the whole Euro Area (EU19) show a total loss of €1.76 (15.8%) and €2.05 (17.2%) trillion in 2014 and 2018, equal to the aggregate output of Italy, Greece, and Portugal or Spain, Ireland, Belgium, and Portugal. Losses of this magnitude swamp the damage done by even World War II and should be reported as the worst policy mistake of the last century. Similar estimates can be found, e.g., in IMF (2015), Stiglitz (2016), Fatás and Summer (2018).

[8] Over the same period the primary balance-to-GDP ratio averaged: 0.6% in Germany, −1.0% in France, −2.5% in Japan, −1.3% in UK, −0.8% in US.

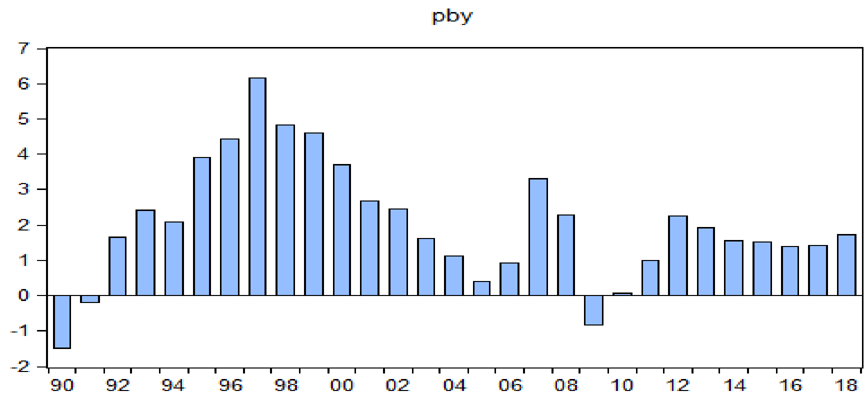

Figure 3. Primary balance/GDP (%) Italy,1990-2018. Source: European Commission, Ameco database

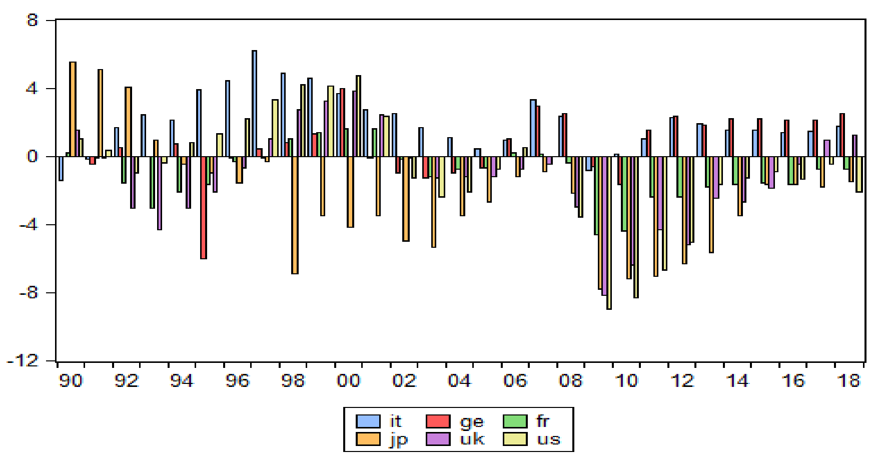

Figure 4. Primary balance/GDP ratio (%) in Italy, Germany, France, Japan, United Kingdom, United States. Source: European Commission, Ameco database

Against this background, which at-a-glance looks somewhat at variance with the dominant storytelling focusing on the supply-side flaws of the Italian economy, the next section makes use of the theoretical approach provided by endogenous growth models to examine and test the predictions about the growth effects of the fiscal policy stance in Italy during 1985-2019.

III. Fiscal Policy and Growth

A suitable analytical framework to think about the growth effects of fiscal policy stance in Italy is provided by the endogenous growth theory, pioneered by Romer (1986) and further developed by Barro (1990), King and Rebelo (1990), and Lucas (1990). A key feature of this approach is the role assigned to fiscal policy as a determinant of capital accumulation and economic growth (see, e.g., Rebelo, 1991; Jones, Manuelli, and Rossi, 1993; Pecorino, 1993; Ireland, 1994; Stokey and Rebelo, 1995; Mendoza, Milesi-Ferretti, and Asea, 1997; Bruce and Turnovsky, 1999; Turnovsky, 1996, 2000, 2004). The theory predicts that changes in fiscal policy relative to some initial policy stance have substantial and enduring effects not only on the levels of basic economic variables, such as the capital stock and output but also on the growth rates.

A simple approach to test the above-theorized impact on growth rates consists in running a regression with a growth indicator (output or capital stock) as a dependent variable and an indicator of the fiscal policy stance and a set of control variables as explanatory variables. A generic linear specification is

$$\mu_t = \alpha + \beta \Delta FS_{t-1} + \gamma Z_{t-1} + \epsilon_t, \tag{1}$$

where μ is the growth rate of interest, FS a measure of fiscal stance, Z a vector of control variables that affect the growth rate, and ϵ the error term.

To identify discretionary changes in fiscal policy (ΔFS) we used a variety of measures built on the *conventional* or *data-based approach.* More fully, we used the following indicators: the primary balance-to-GDP ratio (PB), held as a benchmark and three alternative measures of the cyclically-adjusted primary balance-to-GDP ratio (CAPB), which corrects for cyclical effects in the case of expenditure-to-GDP-ratios (CAPB_X), applies the semi-elasticity approach used by the European Commission (EC) and OECD to correct for the cycle (CAPB_EC), or adjust the CAPB for one-off and temporary measures and labelled structural primary balance (STPB).[9] Notice that in order to disclose the relative weight of the two main components of PB, a distinction between the effects of total government expenditures and revenues can be added into (1). The vector of controls includes lags in the growth rate indicator, the real effective exchange rate, the current account balance-to-GDP ratio, the inflation rate, the real interest rate and the size of government, defined as the sum of total government revenues and expenditures as a share of GDP.[10]

The fiscal policy indicator

To measure discretionary changes in fiscal policy and assess the 'underlying' fiscal stance, the empirical research built around the conventional (data-based) approach calls into play the CAPB indicator widely used in the international institutions framework for fiscal surveillance such as the IMF, OECD, or EC. The reason is straightforward: the CAPB allows for decomposing the fiscal position into the automatic reaction of the budget to changes in economic activity and the impact of discretionary fiscal policy.

In the official, standard methodology the CAPB is computed as the difference between the actual primary balance-to-GDP ratio and an estimated cyclical component, defined as the product of the output gap and a cyclical adjustment parameter. In symbols,

$$CAPB_t = PB - \varepsilon OG_t,$$

where PB is the primary balance-to-GDP ratio, ε the budgetary reactivity parameter and OG_t the output gap, measuring the economy's cyclical position and defined as the deviation of actual GDP (Y_t) from its potential $\left(Y_t^P\right)$, expressed

[9] Details on the computation of both CAPB_X, CAPB_EC, and STPB are in the next subsection.

[10] The relevance of government size for analyzing the effects of fiscal policy on growth is found in a wide body of literature masterfully overviewed by Bergh and Henrekson (2011).

as a percentage of potential GDP:

$$OG_t = \frac{Y_t - Y_t^P}{Y_t^P}.$$

The parameter ε is equal to the difference of the semi-elasticity of total revenues and the semi-elasticity of total expenditures, and computed as

$$\varepsilon = (\eta_R - 1)\frac{R}{Y} - (\eta_G - 1)\frac{G}{Y} = (\varepsilon_R - \varepsilon_G),$$

where $\eta_R = (dR/R)/(dY/Y)$ and $\eta_G = (dG/G)/(dY/Y)$ denote the elasticity of revenues (R) and expenditure (G) with respect to GDP, (R/Y) and (G/Y) are revenue- and expenditure-to-GDP ratios, 'minus one' the elasticity of the denominator of (R/Y) and (G/Y) to itself, and $\varepsilon_R \equiv (\eta_R - 1)(R/Y)$, $\varepsilon_G \equiv (\eta_G - 1)(G/Y)$ the semi-elasticity for total revenues and expenditures.[11]

Accordingly, using a budgetary sensitivity parameter averaging out to 0.55 over the last two decades for Italy we computed the fiscal indicator termed CAPB_EC and covering the 1980-2019 period as[12]

$$CAPB\_EC_t = PB_t - 0.55 OG_t.$$

In the empirical research on the macroeconomic effects of fiscal policy changes, the CAPB indicator has been challenged on the grounds that it does not adjust for the impact of factors other than cyclical fluctuations in GDP, such as those

[11] This means that the overall elasticity parameter is computed as a weighted sum of elementary elasticities, namely

$$\eta_R = \sum_{i=1}^{k} \eta_{R,i}\frac{R_i}{R}, \eta_G = \sum_{i=1}^{k} \eta_{G,i}\frac{G_i}{G},$$

where $\eta_{R,i}$ denotes the individual revenue elasticity (typically, personal income taxes, corporate income taxes, indirect taxes, social security contributions, non-tax revenue) and $\eta_{G,i}$ the individual expenditure elasticity (typically, unemployment-related expenditure). A comprehensive review of the official methodology can be found in Mourre et al. (2013). See, also, Girouard and André (2005) and Price, Dang, and Botev (2015) for OECD Member States, Fedelino, Ivanova, and Horton (2009) for IMF calculations.

[12] Estimates of the ε parameter can be found in Girouard and André (2005) and Price, Dang, and Botev (2015) for OECD countries, and Mourre et al. (2013) and Price, Dang, and Guillemette (2014) for EU countries.

related to asset or commodity price changes and one-off fiscal measures.[13] To account for these effects referred to as "one-offs", the EC, as well as the IMF and OECD, compute the so-called structural primary balance (STPB) obtained by subtracting one-off operations (OFF) from CAPB, namely[14]

$$STB_t = CAPB\_EC_t - OFF_t.$$

Finally, we used the indicator referred to as CAPB_X, which corrects for cyclical effects in the expenditure-to-GDP-ratio. To clear up the point, let us recall that the basic equation for computing the CAPB is

$$\begin{aligned} CAPB_t &= \frac{R_t}{Y_t}\left(\frac{Y_t^p}{Y_t}\right)^{\eta_R - 1} - \frac{G_t}{Y_t}\left(\frac{Y_t^p}{Y_t}\right)^{\eta_G - 1} \Longrightarrow \\ CAPB_t &= \frac{R_t}{Y_t}\left(1 + OG_t\right)^{-(\eta_R - 1)} - \frac{G_t}{Y_t}\left(1 + OG_t\right)^{-(\eta_G - 1)}. \end{aligned}$$

Under $\eta_R = 1$ (unit-elastic revenues) and $\eta_G = 0$ (inelastic expenditures), as found, e. g., in Girouard and André (2005), Mourre et al. (2013), Price, Dang, and Botev (2015), the equation boils down to

$$CAPB_t = \frac{R_t}{Y_t} - \frac{G_t}{Y_t}\left(1 + OG_t\right).$$

Hence, if revenues move alongside with output ($\eta_R = 1$) and expenditures are insensitive to output ($\eta_G = 0$), the computation of the CAPB would require adjusting expenditures (as a ratio of GDP), rather than revenues (as a ratio of GDP), in constrast to the approach proposed by Alesina and Perrotti (1995) and used in a large stream of the literature to investigate the effect of fiscal policy.[15] Furthermore, since under $\eta_G = 0$ the expenditure-to-GDP ratio behaves

[13] See, e.g., Girouard and Price (2004), Turner (2006), Morris and Schuknecht (2007), Jourmad et al. (2008), Guaiardo, Leigh, and Pescatori (2014).

[14] Notice that since data on STPB provided by the EC (Ameco) database goes back up to 1997, we set STB=CAPB_EC from 1996 to 1980. This because no significant one-off operations are known to be present or detectable in the Italian budget policy over the 1980-1996 period (see, e.g., Momigliano and Rizza, 2007; Rossi, 2011).

[15] See, e.g., Alesina and Perotti (1997), Alesina and Ardagna (1998, 2010, 2013), and Ardagna (2004, 2009). A detailed critical assessment of the Alesina and Perotti's strategy to the CAPB is in Breuer (2017).

inversely proportional to the output gap, it follows that the cyclical adjustment should be computed (e.g., Breuer, 2017) as

$$CAPB_t = \frac{R_t}{Y_t} - \frac{G_t}{Y_t}\left(1 - OG_t\right).$$

However, given that some expenditure items - like unemployment benefits - are affected by the economic cycle, it might be necessary to take into account elastic expenditures in adjusting the budget balance. Following this line, the standard approach assumes that unemployment-related expenditures, as well as revenues, follow the cyclical movements of output, whereas expenditures other than unemployment benefits or other social transfers are taken as discretionary and independent from GDP movements. Accordingly, the CAPB becomes

$$CAPB_t = \frac{R_t}{Y_t} - \frac{GU_t}{Y_t}\left(1 + OG_t\right)^{-(\eta_{GU}-1)} - \frac{GD_t}{Y_t}\left(1 - OG_t\right),$$

where GU denotes the unemployment-related expenditure, η_{GU} the elasticity of GU to the output gap, and GD the so-called discretionary spending.

In contrast to this view, a number of empirical investigations analyzing government spending and its categories have recently shown that not only unemployment compensation, but also age- and health-related social expenditure react to the cycle.[16] Hence, in order to properly adjust for the cyclical effect in the expenditure-to-GDP ratio a distinction between discretionary and automatic public outlays is required. Following Coricelli and Fiorito (2013), who evaluated the persistence and volatility properties of the expenditure series to identify the discretionary component, we let:

- discretionary government spending (GD) include public intermediate consumption (non-wage consumption), subsides paid to firms, public investment, and capital transfer; and

- automatic or non-discretionary government spending (GN) encompass public wages and salaries, retirement benefits and transfers (payments to in-

[16] See, e.g., Darby and Melitz (2008), Furceri (2009), Del Granado, Gupta, and Hajdenberg (2013), Coricelli and Fiorito (2013), Çulha (2017).

dividual health, subsistence, children care, invalidity and unemployment compensation).[17]

As a result,

$$CAPB_t = \frac{R_t}{Y_t} - \frac{GN_t}{Y_t}\left(1 + OG_t\right)^{-(\eta_{GN}-1)} - \frac{GD_t}{Y_t}\left(1 - OG_t\right),$$

whence, under $\eta_{GN} = 0$ as found in the estimated elasticity for Italy over 1980-2019,[18]

$$CAPB\_X0_t = \frac{R_t}{Y_t} - \frac{GN_t}{Y_t}\left(1 + OG_t\right) - \frac{GD_t}{Y_t}\left(1 - OG_t\right).$$

Despite its wide use in both empirical studies and official documents, the conventional approach has been challenged on several grounds. It has been argued that the indicators used to identify the effect of FP might be flawed by measurement error, spurious correlation, or simultaneity issues (see, e. g., Perotti, 2013; Holden and Midthjell, 2013; Hernández De Cos and Moral-Benito, 2013; Guajardo, Leigh, and Pescatori, 2014; Yang, Fidrmuc, and Ghosh 2015; Jordà and Taylor, 2016; Carrière-Swallow, David, and Leigh 2018). In line with these observations, a growing literature favors the so-called *narrative* or *action-based approach*, which draws on policy documents to identify exogenous changes in fiscal measures in a more direct and accurate way (e.g., Romer and Romer, 2010; IMF, 2010; Devries et al., 2011; Guajardo, Leigh, and Pescatori,

[17] The basic idea of this approach is that discretionary spending should be less persistent and more volatile than automatic expenditure. Coricelli and Fiorito (2013) test the new measure of discretionary government expenditure in a large panel of OECD countries (including Italy) over the period 1980-2011.

[18] As suggested in the literature, estimating an equation of the form

$$\Delta \ln(\mathfrak{X}_t/Y_t^p) = c + \eta \Delta \ln\left(Y_t/Y_t^p\right) + \varepsilon_t,$$

where $\mathfrak{X}_t$ is the variable of interest, we found a value for η_{GN} (t-statitcs in parentheses) of -0.152 (0.827) and a value for η_{GD} of -0.128 (0.241). Similar estimates are found, f.e., in Price, Dang, and Botev (2015). As an alternative, the opposite case where $\eta_{GN} = 1$ and implying

$$CAPB\_X1_t = \frac{R_t}{Y_t} - \frac{GN_t}{Y_t} - \frac{GD_t}{Y_t}\left(1 - OG_t\right),$$

was also considered.

2014; Carrière-Swallow, David, and Leigh, 2018). Nonetheless, such a method while overcoming the weaknesses of the standard approach, it is not without challenges itself, as it may be plagued by political biases, subjective and arbitrary reconstruction of selected episodes, or simultaneity issues (e.g., Romer and Romer, 2010; Perotti, 2013; Holden and Midthjell, 2013; Coricelli and Fiorito, 2013; Cugnasca and Rother, 2015; Hernández De Cos and Moral-Benito, 2016; Jordà and Taylor, 2016).

This explains why we opted for a set of indicators which whereas built around the conventional (data-based) approach takes into account the problems emphasized in the more recent empirical literature on fiscal policy. After all, if we find an indicator of fiscal impulse that is not affected by (i) GDP (no 'reverse causality'); and (ii) 'imperfect cyclical correction', we can manage or mitigate the challenges of the alternative, action-based measures.[19]

Estimation results

In this section, we summarise the main results of our empirical investigation, which uses data drawn from the European Commission Annual macro-economic (AMECO) dataset. To start off, let us consider Tables 3 and 4. Table 3 shows that the adjusted ($CAPB\_EC, STPB, CAPB\_X$) and unadjusted primary balances (PB) are strongly correlated, thus suggesting that the contrast between the various FS measures is overstated.[20]

Table 4 explores the cyclical pattern of the FS indicators by running the

[19] Another approach to measuring fiscal discretion is through the estimated residuals from feedback equations (e. g., Fatás and Mihov, 2003; Afonso, Agnello, and Furceri 2010; Corsetti, Meier and Müller, 2012). However, approximating discretion via residuals has major drawbacks as unpredictability and discretion are not synonymous (Coricelli and Fiorito, 2013). In fact, discretionary interventions may react to economic conditions and be therefore state dependent.

[20] Identical results for OECD countries are in Coricelli-Fiorito (2013). This feature also belongs to indicators relying on the narrative approach, which are highly correlated with those based on traditional methods. See, Carrière-Swallow, David, and Leigh (2018).

following regression

$$\Delta FS_t = \alpha + \gamma \Delta OG_t + \nu_t, \qquad (2)$$

and taking the estimated coefficient γ as a measure of cyclical behavior or faulty cyclical adjustment of ΔFS. It shows that the unadjusted primary balance (PB) entails, as expected, a cyclical pattern (no cyclical adjustment) and that the same is also true for the $CAPB\_X1$ indicator, thus implicitly rejecting the restriction $\eta_{GN} = 1$. This pattern is not visible in the $CAPB\_EC, STPB$, and $CAPB\_X0$ measures which appear to be uncorrelated to changes in the economic cycle. The $CAPB\_EC$, and $STPB$ even show a countercyclical behavior, being negatively correlated with the output gap, while the $CAPB\_X0$ depicts no relationship with the economic cycle.[21]

These findings signal that the $CAPB\_EC$, $STPB$, and $CAPB\_X0$ indicators do not suffer from the reverse causality and the imperfect cyclical adjustment problems; therefore, they should be used to avoid (potential) biases in the estimate of β in equation (1). Nonetheless, in the empirical strategy, we still retained the PB, and $CAPB\_X1$ measures as benchmark indicators. The results are displayed in Tables 5-9.

Table 5 reports the unit root test for the variables under consideration and shows that all the variables but inflation and primary expenditure-to-GDP ratio are first-difference stationary. Tables 6-9 report the estimated impact of FP changes on capital accumulation and GDP growth in Italy over 1985-2019. In particular, Tables 6 and 7 show that contractionary FP has a negative (short-term) impact on the growth rate of both output and capital stock, with fiscal multipliers averaging 0.54 for Y_t and 1.43 for K_t.[22] They also show that: *i*) the control variables display the right sign and statistical significance, the only exception being the inflation rate (π); *ii*) the coefficients associated to government spending are higher than those on government revenues; and *iii*) budget deficits and government expenditure do not crowd out but crowd in private capital ac-

[21] The results do not change if we use GDP growth as an alternative cyclical indicator, rather than the output gap.

[22] The cumulative (integral) effect of FP changes is discussed in the next section.

cumulation (Tab. 8).[23] Finally, Table 9 (indirectly) confirms the contractionary effect of restrictive FP (and the size of its multiplier) shown in Tables 6 and 7, by reporting the estimated positive impact of capital accumulation on GDP growth.

Notice that in the estimates of Tables 6-8, we addressed potential residual endogeneity bias, arising from government countercyclical purposes and time-to-build features, by choosing lagged variables, and the simultaneity issue affecting the estimates in Table 9 by comparing the OLS with the GMM estimator.

IV. Fiscal Consolidation, Debt and Growth

The enforcement of fiscal austerity measures during 2011-2013 with the primary objective of reducing government debt and boost economic growth has been a natural corollary of the dominant view about the root of Italy's poor growth performance. The basic argument is straightforward: fiscal adjustment will reduce the budget deficit and the government's demand on the economy's resources, thereby allowing the interest rate to fall and the private sector to make better use of these resources with positive effects on both demand and supply side. This view is the well-known *expansionary fiscal contraction* or *expansionary austerity* hypothesis, first expressed by Giavazzi and Pagano (1990) and then tested by Alesina and Perrotti (1995) and Alesina and Ardagna (1998, 2010, 2013) in a large panel of OECD countries.

As shown in section 2, *prima facie* evidence of Italian economic data does not appear to be consistent with the expansionary budget consolidation view. Nevertheless, a formal statistical analysis is required in order to go deeper into this issue. This is in Tables 10-12, which display the estimated relationships

[23] Since the estimated equations imply regressing a stationary variable on both stationary and non-stationary variables, we also checked for potential spurious relationships by applying the ADF and PP unit root tests to residuals. The tests, available upon request, strongly rejected (p-value=0.000) the null hypothesis of non stationarity in the regression residuals. The alternative of including control variables in first differences turned out in a coefficient either statistically insignificant or of the wrong sign.

between growth, austerity, and debt.

Tables 10-11 report the estimated short-run and cumulative responses of Italy's GDP growth to large fiscal consolidation measures captured with regressions of the following form:[24]

$$y_t - y_{t-(i+1)} = \alpha_0 + \alpha_1 \left(y_{t-1} - y_{t-1-(i+1)}\right) + \alpha_2 FC_t + \alpha_3 D_t + \alpha_4 S_t + \epsilon_t, i = 0, 1, 2, \quad (3)$$

where $y_t = \ln(Y_t)$ is the log of real GDP, D_t is the debt-to-GDP ratio, S_t is the government size, and $FC_t = \sum_{j=0}^{2} \Delta FS_{t-j}$ is the change in the primary budget balance (as a percentage of GDP) in periods large fiscal adjustments ($FC_t \geq 1.5\%$ p. of GDP) and zero otherwise.[25] Table 12 reports the effect of budget consolidations on debt accumulation obtained from the following regression equation:

$$(D_t - D_{t-1}) = \beta_0 + \beta_1 (D_{t-1} - D_{t-2}) + \beta_2 FC_t + \beta_3 (y_t - y_{t-1}) + \beta_4 S_t + \upsilon_t. \quad (4)$$

We estimated both equations via GMM (General Method of Moments) under the assumption that fiscal decisions are endogenous to the state of the economy, since cyclical correction cannot remove and time-to-build features impinge on the contemporaneous correlation between fiscal adjustment and growth (see, e.g., Jayadev and Konczal, 2010; Hernández de Cos and Moral-Benito, 2013; Holden and Midthjell, 2013; Yang, Fidrmuc, and Ghosh, 2015; Jordà and Taylor, 2016). This means that we cannot exclude that $E(\epsilon_t \mid FC_t) \neq 0$ in equation (3); similarly, we expect that $E(\upsilon_t \mid \Delta y_t) \neq 0$, $\Delta y_t \equiv (y_t - y_{t-1})$, in equation (4).

The emprical results strongly reject the 'expansionary austerity' hypothesis, pointing to traditional Keynesian effects of budget consolidations. In particular,

[24] As stressed in the literature (e.g., Blanchard and Leigh, 2013; Fatás and Summers, 2018; Gechert, Horn, and Paetz, 2018; Carrière-Swallow, David, and Leigh, 2018), determining the integral (or cumulative) reaction of output to a cumulative fiscal shock over a given horizon is key to understanding the effects of fiscal policy, since these can either build or be reverted over time.

[25] Following Alesina and Perotti (1995), and Alesina and Ardagna (2010), this complies with the measure of consolidation conventionally used in the literature.

- tables (10) and (11) show that fiscal consolidation leads to an output growth contraction averaging 0.4 percent on impact and 0.7 percent after three years, while seriously questioning the negative relationship between public debt, government size, and growth predicted in the dominant narrative;
- table (12) brings to light the perverse effect of large budget corrections on debt accumulation: they not only appear to miss the basic goal of reducing the debt but even to raise it, contrary to expectations.

The reason for this anti-austerity result is straightforward: fiscal changes move the two components of the debt-to-GDP ratio in the opposite directions, thus leading to a rise in DGR under budget consolidations.

V. The issue of sovereign debt (un)sustainability

As argued in the introduction, the belief that Italy has built up a huge and harmful (for economic and financial stability) sovereign debt over the last 3 decades is a leading pillar of the dominant storytelling. As a consequence, reducing the high level of debt through spending cuts and/or tax increases is a policy priority.

The critical point is that Italy's fiscal balance does not originate debt since 1992 (Fig. 3), casting serious doubts about the DGR indicator and raising the puzzling issue of how to measure and assess Italy's sovereign debt position (i.e., our point *b*).

The literature on debt sustainability has developed a battery of indicators and tests (see, e.g., Miller, 1983; Buiter, 1985; Blanchard, 1990; Horne, 1991; Croce and Juan-Ramon, 2003; for empirical strategies based on indicators, and Hamilton and Flavin, 1986; Trehan and Walsh, 1988; Bohn, 1998; for strategies based on tests). A key feature of this research is that the most generally used synthetic indicator to gauge a country's fiscal discipline and debt sustainability builds around the evolution of DGR. Nevertheless, as argued in Canofari, Piergallini and Piersanti (2018) - hereafter CPP (2018) - the problem with this measure is that it is seriously flawed and may lead to wrong and possibly harmful policy measures.

According to CPP (2018), there are at least two major reasons why the DGR is a spurious metrics of sustainability:

(i) it is not logically consistent to compare a stock relative to a flow variable, although obvious relationships exist between the two;

(ii) the implied debt sustainability index is not theoretically consistent with the transversality conditions obtained from dynamic optimizing macroeconomic frameworks which instead pertain to the asymptotic behavior of pure stock variables.[26]

To highlight the implications of these critical points, CPP (2018) uses an endogenous growth model to show that forward-looking agents' optimizing behavior typically gives rise to a wealth-based sustainability index of government policy of the form:

$$F_t \equiv \frac{VT_t}{W_t} = \frac{B_t}{W_t} + \frac{VP_t}{W_t}, \tag{5}$$

where F_t denotes the sustainability index of fiscal policy, $VT_t \equiv \int_t^{\infty} \Gamma_v e^{-r(v-t)} dv$ the present value of all current and future tax payments and/or spending cuts (Γ_v) required to ensure the long-run sustainability of government debt (B_t), $VP_t \equiv \int_t^{\infty} (TPX_v - TR_v)\, e^{-(r-g)(v-t)} dv$ the present value of government primary balance ($TPX_v - TR_v$), r and g the (real) interest rate and the GDP growth rate, respectively, and W_t the current size of national wealth.[27]

[26] The drawbacks of the DGR indicator have been frequently recognized in the literature, prompting many to search for alternative measures, such as the debt-to-revenues ratio, the debt-to-exports ratio, or the debt-to-GNI ratio (see, e.g., Balassone, Franco, and Zotteri 2007; Giammarioli et al., 2007; Wyplosz, 2011, Greenwood, 2018; Blot, 2018). Nevertheless, as does the DGR, these other ratios also display a stock variable measured relative to a flow variable.

[27] Equation (5) builds in the interest-growth differential restriction $(r - g) > 0$. This con-

A number of advantages follow from the above F_t indicator. First, all values are derived relative to the current size of wealth (W_t), thus avoiding the shortcoming of the DGR indicator where a stock variable is measured relative to a flow variable. Second, the right-hand side of (5) includes two (correctly normalized) components: the current stock of government debt (B_t), and the present value of the primary budget deficit (VP_t). Hence, the left-hand side gives the present value of fiscal policy adjustments required to warrant the viability of the long-run fiscal balance as reflected by the two components in the right-hand side of (5). Lastly, being based on endogenous growth model, the index provides a dynamic scoring of the long-run government balance that takes into account the intertemporal nature of fiscal policy and its impact on the growth rate and other macroeconomic variables, and by which we can assess a country's fiscal position as follows:

- If $F_t \leq 0$, fiscal policy is valued to be strongly sustainable, meaning that the long-run government's budget requires no corrective action;
- if $0 < F_t \leq (B_t/W_t)$, fiscal policy is valued to be weakly sustainable, meaning that the government is running a primary surplus, but of insufficient magnitude to fully pay off its debt;
- if $F_t \geq (B_t/W_t)$, fiscal policy is valued to be strongly unsustainable, as the government is running a primary deficit which adds to its outstanding debt, thus requiring a corrective action to ensure the intertemporal viability of the government's budget.

Additional worthy features of equation (5) are that: (i) it does not imply any threshold level on debt, which is puzzling and highly questioned in the

dition determines the rate at which the debt rises relative to its output and implies that the debt ratio will explode in the future unless the government runs a large budget surplus to compensate. Hence, in order to stay in a non-explosive path, the total value of the debt outstanding must be paid off by future budget surpluses. The relevance of the interest-growth gap in a country's maximum sustainable debt level has recently been established in Barret (2018).

academic literature;[28] (*ii*) it is consistent with and strictly reflects via VP_t the government budgetary policies, differently from the DGR indicator; (*iii*) yields a simple, transparent and standardized indicator that can be easily implementable to all countries; (*iv*) switches emphasis from levels to paths and computes how much adjustment is required to converge to the stability path; (*v*) implies that the adjustment process need not occur immediately, but better spanned over a longer planning horizon to avoid the deep recessions resulting from huge fiscal contractions and the risk of possible devilish dynamics driven by self-fulfilling expectations of debt unsustainability (see, e.g., Wyplosz, 2011; De Grauwe and Ji, 2012; DeLong and Summers, 2012; Cafiso and Cellini, 2014; Canofari, Marini and Piersanti, 2015; House, Proebsting, and Tesar, 2017).

Using (5), we computed the values of F_t for Italy over 1999-2017 and compared it with those obtained over the same period for the other advanced economies shown Tab.1.[29] All variables in the sample are sourced from the Ameco Database (last update, 7 May 2019) except the following: data on total net wealth come from the OECD Dataset; budgetary forecasts over 2021-2024 come from IMF World economic Outlook (April, 2019).[30] The main results are in Table 3 and Figures (5)-(6).

[28] See, e.g., Cordella, Ricci, and Ruiz-Arranz (2010), Wyplosz (2011), Panizza and Presbitero (2014), Pescatori, Sandri, and Simon (2014), Egert (2015), Schadler (2016), and Chudik et al. (2017).

[29] These computations are an extension of those found in CPP (2018) for the G-7 countries over 1999-2013.

[30] Since forecasts from the IMF are available up to 2024, the computation of the sustainability index uses averages of fiscal variables over eight years. Rate of changes on IMF forecasts was used to obtain data on PB, sourced from the Ameco dataset, over 2021-2024.

Table 3				
Country	B/W	F	$r-g$	B/Y
Germany	0.1682	-0.1458	0.0106	0.6836
Italy	0.2239	0.0907	0.0213	1.1325
United States	0.1543	0.4889	0.0165	0.8033
France	0.1758	0.5189	0.0098	0.7690
United Kingdom	0.1241	0.6304	0.0082	0.5951
Japan	0.3455	1.1148	0.0078	1.9214
Aggregate	0.1986	0.4496	0.0124	0.9841

Legend: $B/W =$ debt-wealth ratio; $F =$ fiscal sustainability index; $r-g =$ interest-growth differential; $B/Y =$ debt-GDP ratio. Averages over 1999-2017

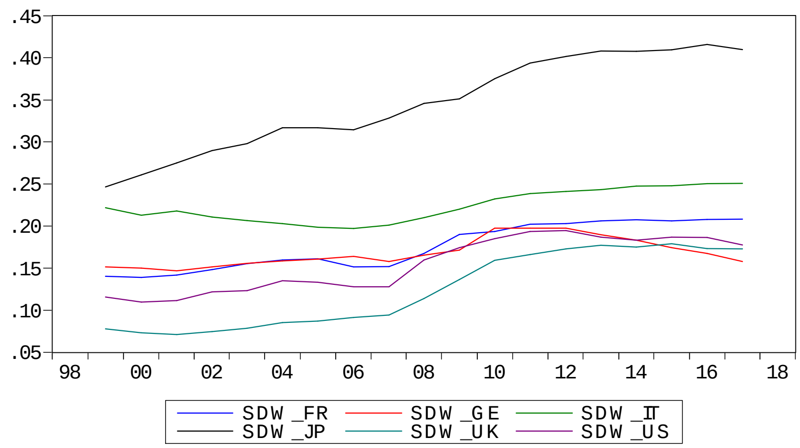

Figure 5: The Government Debt-Wealth Ratio, 1999-2017.

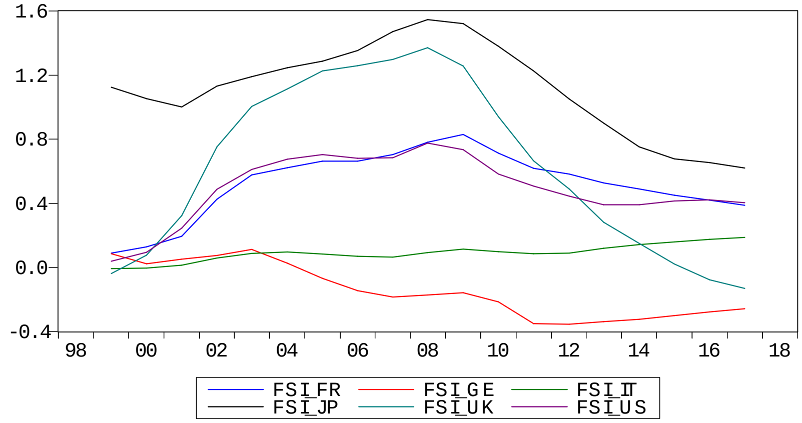

Figura 6. The Wealth-based Sustainability Indicator,1999-2017

Table 3 reports the average values of the debt-wealth ratio (B_t/W_t), the fiscal sustainability index (F_t), and the interest rate-growth differential ($r-g$) over the period 1999-2017, along with the traditional debt-to-GDP indicator (B_t/Y_t). The following distinctive features are worthy of remark from this table. First, when consistently measured relative to the current level of wealth, public debt levels appear much less threatening than the corresponding debt-to-GDP ratios, as they now amount to only one-fifth of total wealth on average in contrast to the close to 100% (98.4%) of total output. Obviously, this simply reflects the different scaling factor used to measure the level of indebtedness, but no doubt the picture in Table 3 is less gloomy and compelling than commonly supposed in most Fiscal Sustainability Reports released by national and international institutions or grades issued by rating agencies.[31] Second, Italy ranks as the

[31] A 'dangerous debt obsession' (Blot, 2018) and a 'single-minded focus on government liabilities' (Stiglitz, 2016) is also the side-effect of DGR. Such an obsession is visible, in the economics literature, in Reinhart and Rogoff (2010), Ghosh et al. (2012), Reinhart, Reinhart and Rogoff (2015), Cottarelli (2016, 2017), Bernardini et al. (2019) to name only a few; in international policy institutions, in the Fiscal Compact of the European Union, and in the emphasis given to public debt thresholds in debt sustainability assessment made by the IMF,

country with the most sustainable fiscal position after Germany, despite the higher interest-growth differential, as the index shows an average value close to zero (0.091) and much lesser than the corresponding debt-wealth ratio (0.224). In view of the critical role played by the $r - g$ gap, this is quite remarkable and again brings to light the impressive effort of Italy's fiscal consolidation over the last decades, a feature not easily seen in the DGR indicator. Finally, the US, France, UK, and Japan show, on the contrary, an unsustainable debt position as $F_t > (B_t/W_t)$ on average.

More details about debt sustainability are given in Figures 5 and 6, which display the path of B_t/W_t and F_t over the same period. According to the Figures, the path of F_t for Germany turns out to be strongly sustainable, because the index converges to a value of $F_t < 0$. In this case, primary surpluses along the equilibrium growth path are sufficient to finance the outstanding debt-wealth ratio. The path for Italy proves to be weakly sustainable since the index lingers in the range $(0, B_t/W_t)$ with a value well below to the current level of debt and costantly close to zero. The path for France, Japan and US is unsustainable, because the index systematically displays a value $F_t > (B_t/W_t)$. In this case, the underlying fiscal policy does not guarantee the intertemporal viability of the government's budget, meaning that large tax corrections and/or spending cuts will ultimately be necessary to ensure fiscal viability. Finally, the index for the UK, after following an unsustainable path up to 2010 reverses the running direction to fall back to strong sustainability ($F_t < 0$) from 2015.

The above results are very different from consolidated beliefs about public debt sustainability in these countries and suggest that indicators and tests of government solvency, used in the current fiscal policy literature and based on the dynamics DGR, are strongly biased and misleading. Spelled out more clearly, the results show that the fiscal position is sustainable for both Germany and Italy, and strongly unsustainable for France, Japan, and the US once private wealth is taken into account for an empirical evaluation of the long-run fiscal balance. These findings are obscured if we focus on the dynamics of DGR and

the World Bank and the OECD.

may lead to wrong and perverse policy strategies. The case of Italy to which unnecessary fiscal restrictions, and hence undue worsening off effects on output and growth, are imposed according to the DGR indicator and the Stability and Growth Pact's rules (SGP) in the EU, is markedly instructive.[32]

VI. Conclusions

This paper has investigated the role of fiscal policy in Italy's poor growth performance over the last three decades. The econometric evidence on the links between changes in fiscal balance, capital accumulation, growth and debt, described in endogenous growth models, points to a strong negative association, as the growth slowdown over 1985-2019 is closely related to the long-lasting contractionary stance of fiscal policy targeted primarily to meet EMU policy rules and hardly used countercyclically.

The paper also finds that government spending does not crowd out, but crowds in private investment and that fiscal consolidations are typically contractionary, both in the short- and medium-term with an average multiplier of 0.4 on impact and 0.7 after three years. Given that Italy's primary budget balance has been always in surplus since 1992 with an average surplus-to-GDP ratio of more than 2%, these results fully explain the less (> 1.0% p., on average) GDP growth rate of Italy relative to other EZ countries with less restrictive budget measures.

Finally, the paper shows that Italy's sovereign debt, when properly measured using a consistent, model-based sustainability indicator turns out to be sustainable, meaning that the long-run budget policy requires no corrective action and thus signaling the fallacy and riskiness of the DGR indicator.

[32] This is hardly understood, e. g., by Codogno and Galli (2017), Bernardini et al. (2019), who using a standard Keynesian model where the intertemporal aspects of fiscal policy are simply ignored, still believe and want to show that running strong primary surpluses is the "only viable option" to reduce the public debt ratio.

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Table 3	**Correlation matrix: 1985-2019**				
	PB	CAPB_EC	STPB	CAPB_X0	CAPB_X1
PB	1.000				
CAPB_EC	0.909	1.000			
STPB	0.871	0.982	1.000		
CAPB_X0	0.991	0.956	0.924	1.000	
CAPB_X1	0.993	0.854	0.813	0.969	1.000

Table 4	**OLS estimates of equation (2): 1985-2019**				
	Meausure of ΔFS_t				
	PB	$CAPB\_EC$	$STPB$	$CAPB\_X0$	$CAPB\_X1$
α	0.092 (0.529)	0.092 (0.529)	0.067 (0.391)	0.095 (0.551)	0.092 (0.532)
γ	0.252 (1.972)	-0.298 (2.341)	-0.155 (1.157)	0.093 (0.732)	0.395 (3.107)
ΔFS_{t-1}			0.318 (1.934)		
$\bar{R}^2$	0.076	0.113	0.137	-0.013	0.198
$LM(1)$	0.114	0.114	0.753	0.112	0.110
$LM(4)$	0.395	0.395	0.951	0.382	0.378
$CUSUMSQ$	✓	✓	✓	✓	✓

Legend: t-statistics in parentheses; $\bar{R}^2$ = Adjusted R-squared; LM(i) = i-th order serial correlation LM test: p-values of $\chi^2(i)$; CUSUMSQ=Cusum of squares test for parameters stability: ✓ denotes parameters stability. Plots of CUSUMSQ against t and the pair of 5% critical lines are available upon request.

Table 5 Unit root test: 1985-2019				
	ADF		**PP**	
Variable	Level	1st diff.	Level	1st diff.
PB	0.801	0.001	0.801	0.001
$CAPB\_EC$	0.599	0.012	0.812	0.014
$STPB$	0.519	0.016	0.727	0.016
$CAPB\_X0$	0.858	0.002	0.816	0.002
$CAPB\_X1$	0.738	0.000	0.766	0.000
Y	0.751	0.008	0.740	0.007
K	0.542	0.021	0.742	0.018
RER	0.685	0.002	0.538	0.003
CA	0.794	0.000	0.648	0.000
π	0.023	0.010	0.024	0.000
$RLINT$	0.163	0.000	0.162	0.000
$RSINT$	0.091	0.000	0.086	0.000
TR	0.787	0.000	0.756	0.000
TPX	0.085	0.000	0.066	0.000
$SIZE$	0.652	0.001	0.544	0.001

Legend: ADF=Augmented Dickey-Fuller test ; PP=Phillips-Perron test: p-values (tests include a constant and a linear trend); Y=Real GDP (2010 reference level); K=Gross fixed capital formation total economy at constant (2010) price; RER=Real effective exchange rate total economy (based on unit labor costs); CA= Current account balance-to-GDP ratio; π=inflation rate (annual changes in price deflator total consumption, 2010=100); $RLINT$=Real long-term interest rate,deflator private consumption; $RSINT$=Real short-term interest rate, deflator private consumption; TR=Total government current revenues-to-GDP ratio; TPX=General government total primary expenditure-to-GDP ratio; $SIZE$=TR+TX, TX=General government total expenditure-to-GDP ratio.

Table 6	FP and GDP growth in Italy, 1985-2019. OLS estimates of equation (1)				
Variable	Dependent variable: $\Delta y_t \equiv (y_t - y_{t-1})$				
Δy_{t-1}	0.625 (3.644)	0.343 (1.929)	0.381 (2.170)	0.520 (3.101)	0.725 (4.052)
ΔPB_{t-1}	-0.581 (2.121)				
$\Delta CAPB\_EC_{t-1}$		-0.574 (1.786)			
$\Delta STPB_{t-1}$			-0.439 (1.522)		
$\Delta CAPB\_X0_{t-1}$				-0.610 (2.063)	
$\Delta CAPB\_X1_{t-1}$					-0.586 (2.289)
TR_{t-1}	-0.274 (1.936)	-0.255 (1.512)	-0.311 (1.922)	-0.261 (1.614)	-0.265 (2.129)
TPX_{t-1}	0.520 (2.139)	[a] 0.477 (1.606)	[a] 0.575 (2.029)	[a] 0.490 (1.736)	[b] 0.503 (2.428)
RER_{t-1}	-0.115 (1.921)	-0.104 (1.494)	-0.121 (1.773)	-0.107 (1.603)	-0.111 (2.093)
π_{t-1}	-0.167 (0.977)	-0.139 (0.780)	-0.145 (0.803)	-0.175 (0.988)	-0.172 (1.020)
$RLINT_{t-1}$	0.521 (2.708)	0.581 (2.706)	0.534 (2.526)	0.559 (2.747)	0.486 (2.624)
$\bar{R}^2$	0.404	0.346	0.328	0.367	0.428
$LM(1)$	0.288	0.483	0.999	0.350	0.230
$LM(4)$	0.355	0.509	0.510	0.397	0.303
$CUSUMSQ$	✓	✓	✓	✓	✓

Legend: Δy= Annual percentage change of GDP; y= log of real GDP. Similar results (available upon request) can be found if the current account-to-GDP ratio (CA), the real short-term interest rate (RSINT), or the government size (SiZE) is substituted for (RER), (RLINT), or *TR* & *TPX* in OLS estimates. [a] stands for cyclically adjusted *TPX* under $\eta_{GD} = 0$ (see the equation for CAPB_X0); [b] for cyclically adjusted *TPX* under $\eta_{GD} = 1$ (see the equation for CAPB_X1).

Table 7 FP and capital accumulation in Italy, 1985-2019.

OLS estimates of equation (1)

Variable	Dependent variable: $\Delta k_t \equiv (k_t - k_{t-1})$				
Δk_{t-1}	0.636 (4.273)	0.406 (2.525)	0.443 (2.764)	0.552 (3.738)	0.704 (4.583)
$\Delta\ PB_{t-1}$	-1.129 (1.765)				
$\Delta CAPB\_EC_{t-1}$		-1.654 (2.105)			
$\Delta STPB_{t-1}$			-1.267 (1.781)		
$\Delta CAPB\_X0_{t-1}$				-1.366 (1.942)	
$\Delta CAPB\_X1_{t-1}$					-1.001 (1.704)
TR_{t-1}	-0.554 (1.569)	-0.413 (1.019)	-0.574 (1.475)	-0.506 (1.282)	-0.535 (1.678)
TPX_{t-1}	1.371 (2.267)	[a]1.060 (1.483)	[a]1.345 (1.969)	[a]1.261 (1.838)	[b]1.334 (2.524)
RER_{t-1}	-0.377 (2.548)	-0.304 (1.826)	-0.353 (2.165)	-0.348 (2.164)	-0.369 (2.746)
π_{t-1}	-0.111 (0.291)	-0.223 (0.573)	-0.218 (0.549)	-0.185 (0.472)	-0.068 (0.180)
$RLINT_{t-1}$	0.696 (1.465)	0.955 (1.873)	0.822 (1.628)	0.809 (1.633)	0.593 (1.276)
$\bar{R}^2$	0.404	0.399	0.375	0.386	0.408
$LM(1)$	0.364	0.326	0.589	0.488	0.288
$LM(4)$	0.771	0.791	0.693	0.869	0.646
$CUSUMSQ$	✓	✓	✓	✓	✓

Legend: Δk= Annual percentage change of gross fixed capital formation at 2010 prices (K): total economy; k= log of K. Similar results are found if the current account-to-GDP ratio (CA), the real short-term interest rate (RSINT), or the government size (SiZE) is substituted for (RER), (RLINT), or *TR* & *TPX* in OLS estimates.

Table 8	**Crowding out (in) effect of FP in Italy, 1985-2019. OLS estimates of equation (1)**				
Variable	Dependent variable: $\Delta pk_t \equiv (pk_t - pk_{t-1})$				
Δpk_{t-1}	0.526 (3.248)	0.256 (1.572)	0.300 (1.829)	0.437 (2.782)	0.595 (3.505)
$\Delta\ PB_{t-1}$	-1.566 (1.982)				
$\Delta CAPB\_EC_{t-1}$		-2.235 (2.482)			
$\Delta STPB_{t-1}$			-1.673 (2.025)		
$\Delta CAPB\_X0_{t-1}$				-1.831 (2.158)	
$\Delta CAPB\_X1_{t-1}$					-1.411 (1.905)
TR_{t-1}	-0.675 (1.586)	-0.507 (1.071)	-0.731 (1.582)	-0.637 (1.355)	-0.638 (1.666)
TPX_{t-1}	1.548 (2.122)	^{a}1.190 (1.427)	^{a}1.586 (1.960)	^{a}1.459 (1.780)	^{b}1.478 (2.329)
RER_{t-1}	-0.404 (2.262)	-0.324 (1.660)	-0.392 (2.024)	-0.380 (1.972)	-0.390 (2.399)
π_{t-1}	-0.261 (0.577)	-0.435 (0.957)	-0.418 (0.891)	-0.368 (0.796)	-0.192 (0.425)
$RLINT_{t-1}$	0.981 (1.702)	1.348 (2.231)	1.155 (1.909)	1.147 (1.925)	0.855 (1.505)
$\bar{R}^2$	0.295	0.317	0.275	0.287	0.290
$LM(1)$	0.114	0.088	0.283	0.152	0.081
$LM(4)$	0.595	0.459	0.745	0.652	0.495
$CUSUMSQ$	✓	✓	✓	✓	✓

Legend: Δpk= Annual percentage change of gross fixed private capital formation (PK) at 2010 prices: total economy; pk(=log of PK)$\equiv$K_total economy-K_general government. Results with the current account-to-GDP ratio (CA), the real short-term interest rate (RSINT), and size replacing (RER),(RLINT), and R & TPX are available upon request.

Table 9 Capital accumulation and GDP growth in Italy, 1985-2019.		
Equation estimated: $\Delta y_t = \alpha_0 + \alpha_1 \Delta y_{t-1} + \alpha_2 \Delta k_t + \alpha_3 \Delta k_{t-1}$		
Variable	OLS	GMM
α_0	0.507 (2.448)	0.529 (3.095)
Δy_{t-1}	0.333 (2.026)	0.300 (1.815)
Δk_t	0.362 (8.659)	0.360 (3.762)
Δk_{t-1}	-0.147 (2.076)	-0.140 (3.695)
$\bar{R}^2$	0.740	0.739
$LM(1)$	0.815	
$LM(4)$	0.138	
$CUSUMSQ$	✓	
$J-statistic$		0.498
$Weak\ Instr.\ test$		18.401*
$Instr.\ orth.\ test$		0.498
$Instruments$		α_0, Δy_{t-1}, Δk_{t-1}, SIZE, SIZE$_{t-1}$

Legend: The HAC (Heteroskedasticity and Autocorrelation Consistent Covariance, or Newey-West) estimator is used in GMM estimates. J-statistic= Sargan test for identifying restrictions (p-value); Weak Instr. test=Craig-Donald F-statistic: * denotes statistical significance >10%. Instr. orth. test: Eichenbaum-Hansen-Singleton (EHS) C-test of orthogonality conditions (p-value): (H_0: orthogonality conditions hold for SIZE).

Table 10	**Short-run effect of FC on GDP growth in Italy, 1985-2019. GMM estimates of equation (3)**				
Variable	Dependent variable: $\Delta y_t \equiv (y_t - y_{t-1})$				
Δy_{t-1}	0.444 (3.341)	0.298 (3.025)	0.331 (3.033)	0.428 (3.239)	0.477 (3.561)
FC_B_t	-0.434 (2.897)				
FC_EU_t		-0.501 (3.469)			
FC_ST_t			-0.422 (3.152)		
FC_X0_t				-0.431 (3.096)	
FC_X1_t					-0.347 (2.105)
D_t	-0.023 (1.363)	-0.030 (2.044)	-0.027 (1.690)	-0.023 (1.425)	-0.017 (0.971)
$SIZE_t$	0.038 (1.722)	0.048 (2.513)	0.045 (2.093)	0.039 (1.796)	0.029 (1.316)
$\bar{R}^2$	0.179	0.203	0.168	0.177	0.165
$J-statistic$	0.632	0.676	0.641	0.638	0.230
$Weak\ instr.\ test$	41.346**	25.195**	34.231**	37.245**	38.634**
$Instr.\ orth.\ test$	0.708	0.865	0.730	0.750	0.614
$Instruments$	α_0, Δy_{t-1}, ΔPB$_{t-1}$, ΔPB$_{t-2}$, SIZE, SIZE$_{t-1}$, D$_t$, D$_{t-1}$, DummyFC				

Legend: FC_Z (Z=B, EU, ST, X0, X1)= fiscal consolidation based on PB, CAPB_EC, STB, CAPB_X0, CAPB_X1, respectively; DummyFC=1 if FC$\geqslant$1.5% p. of GDP and 0 otherwise. The HAC estimator is used in GMM estimates; J-statistic=Sargan test for identifying restrictions (p-value); Weak Instr. test=Craig-Donald F-statistic: ** denotes statistical significance>5%. Instr. orth. test: EHS C-test of orthogonality conditions (p-value): (H_0:orthogonality conditions hold for D and SIZE).

Table 11 Cumulative effect of FC on GDP growth in Italy, 1985-2019. GMM estimates of equation (3)

Variable	Dependent variable: $\Delta y_t \equiv (y_t - y_{t-3})$				
Δy_{t-1}	0.857 (21.523)	0.793 (17.709)	0.781 (16.260)	0.850 (21.314)	0.854 (22.384)
FC_B_t	-0.580 (2.107)				
FC_EU_t		-0.745 (3.710)			
FC_ST_t			-0.681 (4.142)		
FC_X0_t				-0.648 (2.607)	
FC_X1_t					-0.338 (1.230)
D_t	-0.012 (0.470)	-0.027 (1.339)	-0.022 (1.134)	-0.013 (0.551)	-0.005 (0.174)
$SIZE_t$	0.025 (0.796)	0.048 (1.791)	0.043 (1.605)	0.028 (0.906)	0.015 (0.453)
$\bar{R}^2$	0.713	0.758	0.731	0.716	0.712
$J-statistic$	0.543	0.760	0.746	0.576	0.465
$Weak\ instr.\ test$	40.760^{**}	32.118^{**}	41.410^{**}	39.108^{**}	37.004^{**}
$Instr.\ orth.\ test$	0.724	0.553	0.379	0.675	0.924
$Instruments$	α_0, Δy_{t-1}, ΔPB$_{t-1}$, ΔPB$_{t-2}$, SIZE, SIZE$_{t-1}$, D$_t$, D$_{t-1}$, DummyFC				

Legend: see Tabs 9 and 10.

Table 12 **FC and government debt growth in Italy, 1985-2019.**

GMM estimates of equation (4)

Variable	Dependent variable: $\Delta D_t \equiv (D_t - D_{t-1})$				
β_0	40.570 (4.025)	45.761 (4.636)	42.190 (4.042)	40.558 (4.099)	41.007 (4.038)
ΔD_{t-1}	0.703 (9.386)	0.559 (8.126)	0.617 (8.551)	0.685 (9.557)	0.717 (9.003)
FC_B_t	0.546 (2.785)				
FC_EU_t		0.976 (4.000)			
FC_ST_t			0.660 (2.958)		
FC_X0_t				0.626 (3.191)	
FC_X1_t					0.452 (2.193)
Δy_t	-1.422 (10.451)	-1.147 (8.618)	-1.308 (10.083)	-1.396 (9.512)	-1.513 (11.314)
$SIZE_t$	-0.415 (3.902)	-0.476 (4.540)	-0.434 (3.926)	-0.416 (3.979)	-0.419 (3.907)
$\bar{R}^2$	0.648	0.728	0.681	0.664	0.627
$J-statistic$	0.452	0.319	0.344	0.418	0.469
$Weak\ instr.\ test$	18.003*	18.843*	17.048*	17.910*	14.889*
$Instr.\ orth.\ test$	0.923	0.548	0.824	0.898	0.961
$Instruments$	β_0, Δy_{t-1}, $\Delta \mathrm{PB}_{t-1}$, $\Delta \mathrm{PB}_{t-2}$, SIZE, SIZE_{t-1}, ΔD_{t-1}, FC_t, Inf_t, CA_t, Δk_t, DummyFC				

Legend: see Tabs 6-10. EHS C-test of orthogonality conditions (p-value): (H_0:orthogonality conditions hold for SIZE, FC, INF, CA, Δk)