Interest payment on government debt and public spending in Italy: An empirical analysis

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Abstract: This article investigates how the public expenditure structure, and the expenditures in specific fields of the public sector, are affected by the dynamics of interest payment on public debt, in the case of Italy. Italy has the third largest public debt in the world, and interest payments are of considerable size; though not steadily, however, their dynamics has been decreasing over the last two decades. This could have represented an opportunity for restructuring public expenditure. However, our results show that there is no effect of the dynamics of interest payments upon the dynamics of primary public expenditure. The result is based on the analysis of both Granger-causality links and simultaneous relations between interest payments and primary public expenditure. Public expenditure is considered in aggregate terms in current and capital account, and as articulated in a number of specific areas.

Keywords: Public debt; Public expenditure; Interest payment; Debt cost; Italy.

JEL Classification: H50, H61.

1. Introduction

Interest payments on government debt is a great concern and a serious constraint for public spending, especially in countries with large stock of public debt. Contraction (or limited increase) of public expenditures in specific fields are often justified by policy-makers by resorting to obvious constraints deriving from interest payments; real or potential advantages deriving from interest payment reduction is an ever-green in election campaigns.

It is beyond any doubt that the variation of debt cost can have a deep impact on the political choices concerning public spending. Here we aim at evaluating whether and how interest payments really affect the dynamics and structure of primary public expenditure, taking Italy as the case study.

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Italy has the third largest stock of public debt in the world. Its interest payments have been decreasing, though not monotonically, over the last two decades. This pattern is substantially due to lower interest rates, firstly driven by the adoption of Euro and, subsequently, by the quantitative easing policy of the ECB. However, interest payment still represents a significant component of the Italian public expenditure, able to drive the primary surplus into a gross deficit in public balance.

The evaluation of the changes in primary public spending due to the dynamics of the interest payment is the issue of the present analysis. However, our results show that the dynamics of interest payment have exerted insignificant effect on the dynamics of primary spending, in Italy over the last twenty years. Section 2 provides a description of the data under consideration. Section 3 provides the econometric analysis, aimed to detect possible influence of interest payments on specific components of public expenditure. Robustness checks of our conclusion are offered by Section 4. Comments and concluding remarks are gathered in Section 5.

2. Data

The data under consideration are from official sources: data on interest payments and aggregate public accounting derive from AMECO (the database of the European Commission), while the data on specific government expenditures are from the Italian Ministry of Economic Development (database CPT - '*Conti Pubblici Territoriali*', i.e., RPA, 'Regional Public Account', in English). The latter databank, consistent with AMECO, provides data classified according to different criteria, including the sectoral criterion, and covering the expenses of the different layers of public administration (central State, regions, local administrations). The consideration of CPT as the data-source for analysing public expenditure structure is recommendable, because de-centralization processes have taken place in Italy over the time span under consideration, and some competencies and expenditures have been moved from the central state to regions or local administrations; this institutional change is immaterial to our purpose (and our data).[2] All data are freely downloadable from the web.[3]

[2] Note that we consider here the public expenditures from public administration (State, regions, local administration): CPT also provides data on expenditures of the so-called public administration in brad sense, which also include firms and enterprises under the control of state; however, the expenditures of these entities are not considered in our present analysis.

[3] See http://ec.europa.eu/economy_finance/db_indicators/ameco/index_en.htm for AMECO, and http://www.agenziacoesione.gov.it/it/cpt/ for CPT; however, a file containing only the relevant series is available from the Authors upon request.

Data from AMECO (namely, interest payments and total public spending in current and capital account, as well as social transfers) are available for the 1960-2015 timespan; the available timespan is restricted to 1996-2014 as to the CPT data (public expenditure for selected sectors). In this analysis we consider annual data over the period 1996-2014, even when longer time series are available.[4]

Figure 1.a,b,c show the pattern of interest payments, in nominal and real terms, and as the share in total public spending, over the long run (1960-2015) in Italy. The pattern is driven by the amount of the stock of public debt, joint with the dynamics of interest rates – influenced by internal and external factors. We are not interested in discussing here the reasons that have driven the Italian public debt to peak at beyond 115% of GDP in 1996, starting from 65% in mid-1980s (this ratio has reached its maximum in 2014 at 132%, following the financial and economic crisis started in 2008). Nor are we interested in dealing with the macroeconomic effects of the fiscal consolidation policies, that have taken place in first decade of 2000s, in Italy as well as in most European countries.[5] As far as the unit cost of debt is concerned, we are clearly aware that it is endogenous to policy decisions, at least to some extent. However, its long-run movements are largely led by exogenous (international) factors, such as the increase of interest rates over the Reaganomics years (during the 1980s), or the decrease started in mid 1990s; the drop has been particularly high for Italy, thanks to its adhesion to Euro, and in the most recent years thanks to the ECB monetary policy. Figure 2 focuses on the last twenty years, and reports the pattern of interest payments in the recent period 1996-2014, in nominal and real terms. In nominal terms, expenditure for interest payments on public debt moved from 115 billion Euros in 1996 to 74.3 in 2014. Consider that, in this period, the price dynamics has been very moderate, so that dealing with nominal or real figures is pretty similar –as the graph makes clear. In what follows, we consider nominal figures, while the consideration of real figures will be done as a robustness check in the final section of our investigation.

[4] When lagged variables are involved in the analysis, the first observations are missing for series available from 1996, while they are used for series available from 1960.

[5] See, e.g., Alesina and Ardagna (2010), Corsetti et al. (2012), Perotti (2013), Acosta-Ormaechea and Morozumi (2013), Cafiso and Cellini (2014) on these issues.

Figure 1 - Pattern of public debt interest payments (nominal, real, as a share of total public spending)

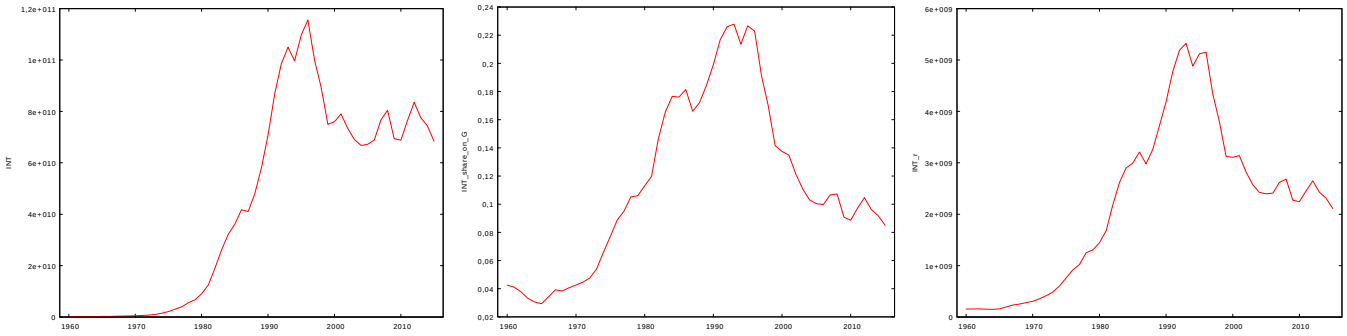
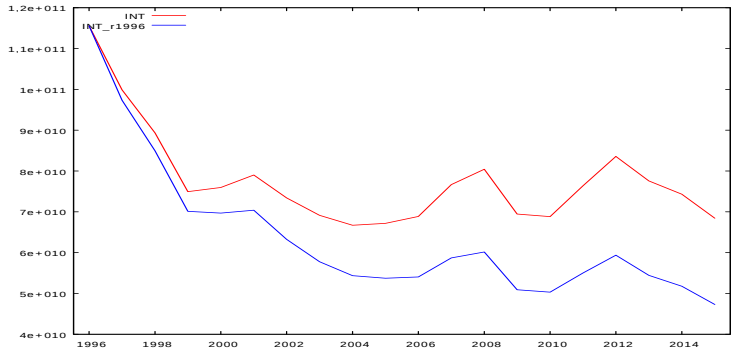


Figure 2 - Pattern of public debt interest payment over 1996-2015 (in nominal and real terms, price 1996)



The series of payments for interest on the public debt (*INT*) will be treated as the explanatory variable (*x*-variable), and its effects will be investigated on a set of dependent *y*-variables. Table 1 provides the descriptive statistics of all series under consideration, in level and in first-difference.

Note that nominal total primary public expenditure has been steadily increasing over 1996-2014: the minimum values for both current and capital expenses in nominal terms occur in 1996, while the maximum values are at the end of the time sample; the pattern in real terms is also steadily increasing (with exceptions for 2011 and 2012). At a first approximation, public expenditure in Italy has grown in nominal terms, also for any specific item under consideration, and the average value of the first-difference is positive for any considered item. However, at a closer look, the picture concerning the amount and the timing of increases and drops in nominal spending for specific items is mixed, and it makes sense to ask whether some relations exist between the dynamics of the expenditure on specific items and the pattern of interest payment.

It is worth underlying once again that CPT aggregates the public expenditures of different layers of government (State, regions, local administration) for any specific item. Thus, it should appear not strange that, say, culture entails a similar amount of public expenditure as defence: at the central state level, defence expenditure is larger than the public spending for culture, but the

opposite is true when considering expenses of regions and local administrations. Social transfers are mainly made by pension payment, and account by about one-third of public expenditure.

Table 1 - Series under consideration (1996-2014)

VARIABLE	Description: public expenditure in	Mean	Min (year)	Max (year)	Mean	Min (year)	Max (year)
		Level			First-difference		
INT	Interests on public debt	78.29	66.72 (2004)	115.58 (1996)	-1.87	-15.70 (1997)	7.79 (2007)
GCCN	Current account (net of interests)	554.15	379.63 (1996)	690.90 (2014)	17.85	14.31 (2011)	28.66 (2001)
GCK	Capital account	34.89	23.29 (1996)	44.43 (2013)	1.14	-0.28 (2014)	2.04 (2002)
GSOCT	Social transfer	246.15	165.77 (1996)	326.86 (2014)	8.95	4.13 (1998)	14.36 (2009)
GDEFEN	Defence (military)	13.93	8.64 (1997)	18.51 (2009)	0.28	-3.56 (2010)	3.24 (2008)
GHEALTH	Health	85.07	50.00 (1996)	115.30 (2012)	3.03	-10.58 (2014)	11.54 (2012)
GEDU	Education	49.22	36.17 (1996)	57.68 (2008)	0.85	-2.43 (2007)	6.44 (2001)
GCULT	Culture	11.09	7.16 (1996)	18.71 (2004)	0.05	-3.52 (2008)	5.87 (2004)
GTUR	Tourism	1.34	0.94 (2014)	1.65 (2006)	-0.07	-0.29 (2010)	0.25 (1998)

Note: all figures are in billion Euros, current value.

3. Regression analysis

First, we evaluate whether Granger-causality links (Granger, 1969, 1988) exist. Of course, we expect no-Granger causality from the expenditure on specific items to the payment for interests on debt, since the latter variable is largely depending on external factors, and has an exogenous nature. Admittedly, specific policy choices concerning the public balance and the expectations on debt sustainability may influence the interest payment, but this aspect is hard to be captured by the dynamics of the expenditure on specific areas of government action. It is more interesting to evaluate whether the payments for interest on debt have an influence (in the sense of Granger causality) upon specific areas of public spending. The motivation behind this research question is to evaluate whether or not the reduction (or the increase) of the interest payment has an impact on the dynamics of the public expenditure in specific areas. Table 2 provides the results of this simple exercise.

Table 2.- Granger-causality

	$\Delta Interest \rightarrow \Delta y$			$\Delta y \rightarrow \Delta Interest$	
y-variable:	1A (one lag)	1B (two lags)		2A (one lag)	2B (two lags)
GCCN	$F_{1,17}$=2.66 p=0.121	$F_{2,15}$=2.38 p=0.126		$F_{1,17}$=1.61 p=0.221	$F_{2,15}$=1.81 p=0.198
GCK	$F_{1,17}$=0.58 p=0.455	$F_{2,15}$=0.55 p=0.591		$F_{1,17}$=0.09 p=0.761	$F_{2,15}$=0.78 p=0.477
GSOCT	$F_{1,14}$=11.15*** p=0.005	$F_{2,11}$=2.62 p=0.117		$F_{1,14}$=0.003 p=0.954	$F_{2,11}$=0.95 p=0.416
GDEFEN	$F_{1,14}$=0.70 p=0.416	$F_{2,11}$=0.35 p=0.712		$F_{1,14}$=3.09 p=0.100	$F_{2,11}$=1.87 p=0.200
GHEALTH	$F_{1,14}$=0.02 p=0.878	$F_{2,11}$=0.98 p=0.405		$F_{1,14}$=1.70 p=0.213	$F_{2,11}$=1.38 p=0.292
GEDU	$F_{1,14}$=0.14 p=0.717	$F_{2,11}$=0.85 p=0.453		$F_{1,14}$=1.52 p=0.238	$F_{2,11}$=0.87 p=0.448
GCULT	$F_{1,14}$=4.78** p=0.046	$F_{2,11}$=2.77 p=0.106		$F_{1,14}$=0.28 p=0.603	$F_{2,11}$=0.67 p=0.530
GTUR	$F_{1,14}$=0.94 p=0.350	$F_{2,11}$=0.36 p=0.357		$F_{1,14}$=0.91 p=0.603	$F_{2,11}$=0.88 p=0.440

Note: In Column 1A, the test on the null hypothesis $\beta_1 = 0$ is reported w.r.t. regression equation $\Delta y_t = \alpha_0 + \alpha_1 \Delta y_{t-1} + \beta_1 \Delta x_{t-1} + u_t$ where *x* denotes the interest payment, and *y* is the primary public expenditures under investigation. Column 1B considers Granger-causality with two lags, i.e., it reports the result of the test on the null $\beta_1 = \beta_2 = 0$ w.r.t. regression equation $\Delta y_t = \alpha_0 + \alpha_1 \Delta y_{t-1} + \alpha_2 \Delta y_{t-2} + \beta_1 \Delta x_{t-1} + \beta_2 \Delta x_{t-2} + u_t$. Column 2A and 2B report the test on the Granger-causality running from y to x, considering one or two lags, respectively. In all cases, the null is the absence of Granger-causality. Time sample is 1996-2014 for all variables; for INT,GCC and GCK observations are available for the 1960-2015 time-span, so that introduction of lagged variables do not imply missing observations.

It is not surprising that the variation of *y*-variable *does not* Granger-cause the variation of expenses for interests, and this holds for each of the *y*-variables under consideration. It is more interesting to note that, generally speaking, no Granger-causality links emerge, running from for the variation of interest payments to the variation of the considered *y*-variables. The two exceptions regards the social transfers and the public expenditure in culture, which appear to be Granger-caused by interest payment, in the case of one lag. However, in the case of social transfers, the corresponding regression provides a positive coefficient linking the social transfers to the one-year-lagged interest payments: an increase of interest payments leads to a subsequent increase in social transfers -which has no meaning from an economic point of view. For this reason, we are induced to believe that the emerging Granger-causality is the outcome from spurious relation. In the case of expenditure on culture, the regression coefficient shows a negative sign, indicating that a reduction in interest payment leads to a subsequent increase in public spending in culture. Admittedly, this outcome is interesting, and we have tried to investigate further, to understand whether it can tell a story. For instance, one could argue that Granger-causality may emerge for the expenditure on items whose size is limited while interest payment is not able to Granger-cause expenditure on items of large size. However, the story is far from being robust and convincing. Indeed, causality disappears

if two lags are considered (as the Table 2 makes clear). Moreover, the absence of causality emerges for a number of areas, of similar size as culture, for which we have checked: for instance, public expenditure in tourism. Again, at a closer look at data, the causality in the case of expenditure in culture is driven by the expenditures from the local administrations, while no causality emerges if we select the Central State expenditure in culture. Thus, the emergence of causality in this area appears to us as a spurious result, rather than a sign of a robust relation, or a part of a wider story.

The result of the absence of Granger-causality is robust to the consideration of one or two lags in all other cases. Thus, our first conclusion is clear-cut: the dynamics of interest payments did not affect the primary public expenditure (in aggregate terms, in current or capital account), nor the public expenditure in a number of specific areas. That is, the structure of primary public spending is not affected (in the sense of Granger-causality) by the dynamics of interest payment.

As far as simultaneous relations between variations of variables under scrutiny are concerned, we investigate the following regression equation:

$$(1) \qquad \Delta y_t = a_0 + a_1 \Delta y_{t-1} + b \Delta x_t + e_t$$

where x denotes the payments for interest, and y is any variable in the set of primary public expenditures under investigation. Though rather 'basic', such a specification is appropriate to our goal and our datasets; Table 3 provides the results.

Table 3.- Simultaneous relations (regression equation (1)).

	GCCN	GCK	GSOCT	GDEFEN	GHEALTH	GEDU	GCULT	GTUR
a_0	6.59e+09 (1.59)	1.74 (0.67)	6.39e+06** (2.70)	446321 (1.02)	3.34e+06* (1.86)	1.08e+06 (1.47)	-31207 (-0.05)	-16682 (-0.57)
a_1	0.63 ** (2.74)	0.78*** (3.99)	0.26 (1.03)	-0.04 (-0.14)	0.07 (0.20)	-0.28 (-1.02)	-0.08 (-0.32)	0.06 (0.24)
b	0.21 (0.82)	0.0002 (0.02)	-0.019 (-0.178)	0.02 (0.300)	0.27 (1.43)	-0.03 (-0.03)	-0.05 (-0.48)	-0.006 (-1.329)
R^2	0.31	0.48	0.07	0.01	0.13	0.07	0.02	0.14
F	$F_{2,17}$=3.77 ** (p=0.04)	$F_{2,17}$=7.99 *** (p=0.003)	$F_{2,14}$=0.56 (p=0.58)	$F_{2,14}$=0.07 (p=0.93)	$F_{2,14}$=0.040 (p=0.93)	$F_{2,14}$=0.55 (p=0.59)	$F_{2,14}$=0.18 (p=0.84)	$F_{2,14}$=1.16 (p=0.34)
Autocor test	$F_{1,16}$=2.70 (p=0.12)	$F_{1,16}$=0.07 (p=0.79)	$F_{1,13}$=3.96* (p=0.07)	$F_{1,13}$=0.02 (p=0.88)	$F_{1,13}$=0.40 (p=0.53)	$F_{1,13}$=0.39 (p=0.55)	$F_{1,13}$=4.5* (p=0.053)	$F_{1,13}$=0.03 (p=0.958)
Test on b=0	$F_{1,17}$=0.67 (p=0.423)	$F_{1,17}$=0.0002 (p=0.987)	$F_{1,14}$=0.03 (0.860)	$F_{1,14}$=0.09 (0.768)	$F_{1,14}$=2.05 (0.174)	$F_{1,14}$=0.001 (0.978)	$F_{1,14}$=0.23 (0.640)	$F_{1,14}$=1.76 (0.205)

Note: t-statistics in parenthesis. */**/*** denote significance at the 10%, 5%, 1% level, respectively. Autocorrelation test is the Breush-Godfrey LM test on residual serial autocorrelation (one lag).

In no cases, coefficient *b* is statistically significant at the 95% confidence level. This means that the variation of interest payment does not exert any simultaneous effect on the public spending in the area under consideration. More in general, the regression equation is globally not significant in all cases concerning specific areas, as the very poor *F* statistics make clear.

4. Result robustness and further checks

The result of the absence of significant effect of the dynamics of interest payment upon both the whole primary public expenditure and the public expenditure in specific areas is robust to the consideration of different specification designs: the inclusion of a deterministic linear trend and/or the inclusion of further lags of the explanatory variable do not change the substantial outcome of the analysis. Neither the consideration of the variables in real terms –using the gross domestic product deflator– with reference to both *x* and *y* variables, drive to different pieces of evidence. Detailed results are available from the Authors.

A point worth investigating concerns the possibility of *asymmetric effects* of increase or decrease in the amount of interest payment upon the dynamics of public expenditures under scrutiny. To this end we consider the following specification:

$$(2) \qquad \Delta y_t = a_0 + a_1 \Delta y_{t-1} + b_1 \Delta x_t^{pos} + b_2 \Delta x_t^{neg} + e_t$$

where variable Δx is split into two separate variables, according to the occurrence of a positive or a negative value; that is,

$$\Delta x_t^{pos} = \begin{cases} \Delta x_t & if\ \Delta x_t > 0 \\ 0 & otherwise \end{cases} \quad ; \qquad \Delta x_t^{neg} = \begin{cases} \Delta x_t & if\ \Delta x_t < 0 \\ 0 & otherwise \end{cases}$$

In the sample under consideration, Δx is positive (negative) in 8 (10) out of 18 available observations.[6] We are interested in evaluating the statistical significance of coefficients b_1 and b_2,

[6] For the interest rate payments (as well as for public expenditure in current and capital account), we have observations for the sample 1960 to 2015, so that the observation referred to the first-difference in 1996 is available; however, the 1996 observation is not used in multiple regressions considering public spending in specific sectors, since these observations are available for the sample 1996-2014.

and in evaluating the result of a test on the equality $b_1=b_2$. Results are reported in Table 4. In all cases, *b*-coefficients are statistically insignificant, and no asymmetric effect between positive and negative differences emerges. Thus, once again, the variation in interest payment have not exerted any effect on the dynamics of specific primary expenditures. This result also applies to the regression equations pertaining real variables.[7]

Table 4.- Asymmetric simultaneous relations (regression equation (2)).

	GCN	GCK	GSOCT	GDEFENSE	GHEALTH	GEDU	GCULT	GTUR
a_0	9870e+06 (1.57)	532e+06 (1.08)	5.015e+06	-484806 (-0.64)	2.77e+06 (1.09)	2.38e+06** (2.01)	352484 (0.29)	-33237
a_1	0.48** (1.84)	0.62*** (2.33)	0.32 (1.20)	0.08 (0.30)	0.06 (0.16)	-0.22 (-0.82)	-0.12 (-0.42)	0.09 (0.32)
b_1	-0.01 (-0.002)	-0.04 (-0.66)	0.20 (0.65)	0.27 (1.49)	0.43 (0.82)	-0.35 (-1.28)	-0.15 (-0.52)	-0.002 (-0.12)
b_2	0.16 (0.40)	0.02 (0.54)	-0.13 (-0.72)	-0.10 (-0.96)	0.19 (0.57)	0.20 (1.09)	0.008 (0.05)	-0.008 (-1.12)
R^2	0.22	0.39	0.11	0.15	0.14	0.19	0.04	0.15
F	$F_{3,15}$=1.44	$F_{3,15}$=3.14*	$F_{3,13}$=0.56	$F_{3,13}$=0.78	$F_{3,13}$=0.68	$F_{3,13}$=1.02	$F_{3,13}$=0.16	$F_{3,13}$=0.77
Autocorr test	$F_{1,14}$=3.45* (p=0.08)	$F_{1,15}$=0.17 (p=0.69)	$F_{1,12}$=11.2*** (p=0.006)	$F_{1,12}$=0.10 (p=0.76)	$F_{1,12}$=0.19 (p=0.67)	$F_{1,12}$=0.27 (p=0.61)	$F_{1,12}$=2.14 (p=0.17)	$F_{1,12}$=0.02 (p=0.90)
Test on $b_1=b_2$	$F_{1,15}$=0.021 (p=0.88)	$F_{1,15}$=0.47 (p=0.51)	$F_{1,13}$=0.58 (p=0.46)	$F_{1,13}$=2.19 (p=0.16)	$F_{1,13}$=0.11 (p=0.75)	$F_{1,13}$=1.89 (p=0.19)	$F_{1,13}$=0.14 (p=0.71)	$F_{1,13}$=0.15 (p=0.71)

Note: *t*-statistics in parenthesis. */**/*** denote significance at the 10%, 5%, 1% level, respectively.

5. Conclusions

In this paper we have aimed to evaluate the link between the dynamics of interest payments on public debt and primary public expenditure in Italy, over the last twenty years. We have found no relation between the dynamics of interest payments, on one side, and the dynamics of primary public expenditure, on the other side. The absence of influence regards the global amount of primary public spending in current and capital account, as well as the specific amount of public expenditure in a number of selected areas. The absence of links emerges as evaluated both according to the Granger-causality perspective and in a simultaneous relation framework. The absence of clear links also emerges if we consider separately increase and drop of interest payments: smaller or larger cost of public debt do not appear to exert any significant impact on the

[7] There is one exception, namely, the relation between real interest payment and real primary spending in current account, where the positive variation of interest payment emerges to exert a negative, statistically significant, effect on real current expenditure; however, the specification suffers from residual autocorrelation, and a proper treatment of autocorrelation leads to the usual insignificant relation between interest payment and specific spending; moreover, the negative variation of real interest payment (which represents the largest part of cases in the sample over scrutiny) does not exert any significant effect on the dynamics of real primary current expenditure.

dynamics of primary public expenditure in Italy. Thus, a sound conclusion of our analysis can be drawn: there are not specific sectors of government action which have suffered or benefitted in specific way from the increase or drop of interest payment on public debt; again, the potential advantages linked to lower interest payments –which have characterised the last decades of economic life of Italy, in a long-run perspective– have not translated into a clear revision of public expenditure. The difficulty of Italian policy-making in achieving a convincing spending review, documented in several economic and politic analyses,[8] is a coherent piece with the picture coming from our present analysis.

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[8] See, inter alia, Bibbee and Goglio (2002), Giordano et al. (2007), Muraro (2015).