ECONOMIC PERFORMANCE IN A HIGH DEBT COUNTRY: THE CASE OF ITALY

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Abstract

In this paper we examine the relationship between the dynamics of government debt-to-GDP ratio and economic performance in Italy over 1861-2007. We use both empirical analysis (based on a standard production function) and a narrative approach. The empirical results highlight a generally negative link between public debt and GDP growth, stronger for the foreign component of debt before World War I. We focus on the different reaction of per capita GDP growth to the debt-ratio observed in the years around two local peaks of the debt ratio at the turn of the past two centuries: 1880-1913, when the negative correlation between debt and growth appears to be particularly strong, and 1985-2007, when the correlation appears to break down when debt starts declining. Differences in debt composition (domestic vs. foreign) and in capital accumulation patterns in the two periods have a bearing on the respective growth trajectories. The descriptive analysis of fiscal policy provides important complementary evidence and suggests that the timing of fiscal consolidation as well as the size and composition of the budget are additional relevant explanatory factors.

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1. Introduction[§]

The surge in public debt across industrial countries during the on-going global crisis has revived the interest on whether high debt levels might have an impact on economic performance and how they might interact with other economic variables. The debate on this issue has become lively with several contributions published in recent years.

The topic is not new: from a theoretical point of view, a large literature ascribes potential adverse effects of high government debt to higher long-term interest rates, and expectations of higher future distortionary taxation (Elmendorf and Mankiw 1999). Other channels that have been studied are increased macroeconomic uncertainty and discouraged investment (Servén 1997), as well as reduced scope for counter-cyclical fiscal policy, which may increase output volatility and lower growth (Aghion and Kharroubi 2007; Woo 2009).

The issue has been analysed empirically as well. A negative correlation between debt and growth seems to characterise a wide range of countries. Reinhart and Rogoff (2009) for example examine a sample of forty-four countries spanning about two hundred years and find a negative correlation between debt and growth for both advanced and emerging economies. But the causality underlying the correlation between debt and growth could run either way: from low growth to high debt, rather than from high debt to lower growth.[1]

Other authors have used panel analysis including both advanced and emerging economies (Kumar and Woo, 2010; Cecchetti, Mohanty and Zampolli, 2011) or focussing on euro area countries (Checherita and Rother, 2010). These studies generally consider debt developments over the last three to four decades. They use different tools try to address the issue of causality, including regressing per capita real GDP growth against lagged values of the debt-to-GDP ratio as in Kumar and Woo, 2010.[2,3] Their results suggest an inverse relationship between initial debt and subsequent growth, which operates via a drop in investment and reduced productivity growth. Cecchetti, Mohanty and Zampolli (2011)

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1 On this point see for instance Irons and Bivens (2010).

2 Kumar and Woo (2010) use both OLS and GMM estimation. Control variables are a standard set from the empirical growth literature (Aghion and Durlauf 2005) including: average years of secondary schooling, as a proxy for human capital; initial government size as measured by the government consumption share of GDP; initial trade openness (the sum of export and import as a share of GDP); initial financial market depth (quasi-liquid liabilities as a share of GDP); initial inflation; terms of trade growth rates; and a measure of banking crises.

3 Checherita and Rother (2010) use a similar set of control variables as Kumar and Woo (2010) and use both 2SLS and GMM estimation techniques.

include private liabilities in the analysis and find evidence that also excessive corporate and household debt has a negative effect on growth.

The robustness of available estimates and the direction of causality remain strongly questioned and debated. In their survey of empirical studies for advanced countries Panizza and Presbitero (2013) for example conclude that *'while many papers have found a negative correlation between debt and growth … there is no paper that can make a strong case for a causal relationship going from debt to economic growth'*.

In this paper we investigate the developments of government debt, as a share of GDP, and real per capita income growth in Italy over 1861-2007[4]. Italy is an interesting case study since it has experienced high levels of debt for a significant part of its history even excluding the years from the beginning of World War I to the end of World War II. The period as a whole is characterized by a strong negative correlation between the two variables, but there are also instances where such correlation appears to break down, such as over 1995-2007, when both debt and per capita GDP growth are falling. We investigate this issue by estimating a standard production function and through a descriptive analysis of fiscal policy in two key periods (the years around the end of the nineteenth and twentieth century) which, although similar in many respects, display different patterns of the debt-growth link. We exclude from the analysis the years from the start of the first World War to after the first parliamentary elections (1914-1949) and cut the sample to 2007 to avoid that extreme events, such as the wars and the recent crisis, drive the results.

Results lend support to the hypothesis of a negative relation between debt and growth in the periods examined when controlling for the developments of productive factors. Debt composition, the timing of fiscal consolidation and the size and composition of the budget are additional factors that mediate the effects of debt on economic performance.

The rest of the paper is organized as follows. Section 2 provides a concise description of debt and economic developments in Italy since 1861 and highlights the different patterns of growth over the years around the two turns of century included in the sample (1880-1914 and 1985-2007), in the face of similar debt developments. Section 3 describes the model used for the analysis of the relationship between debt and growth and presents the empirical investigation. Section 4 briefly discusses the behaviour of debt and growth over 1880-1914 and 1985-2007 in light of the estimation results and of the insights offered by a descriptive analysis of fiscal policy over the two periods. The final section summarizes the main conclusions.

2. Debt and Growth in Italy: a Concise Description and a Puzzle

As mentioned above, a significant part of Italy's history is marked by relatively high levels of public debt. This is true also excluding the period between the two world wars (fig. 1).[5]

[4] 1861 is the year of Italian unification and establishment of the Kingdom of Italy.

[5] For an overview of public debt developments and composition over the last 150 years see Francese and Pace (2008) and Balassone, Francese and Pace (2013).

Overall four phases of debt accumulation can be distinguished: one over the first 30 years after the unification of the Kingdom of Italy; two linked with the World Wars; and one running from the beginning of the 1970s until the mid-1990s.

During the period from unification to Word War I Italy's public debt to GDP ratio reached its peak in 1894, at almost 126 per cent. Between 1880 and 1894 the debt ratio posted an increase of 33 percentage points. Thereafter it declined to reach just below 74 percent in 1913, more than 50 percentage points lower than the peak.

After World War II public debt peaked at above 121 per cent of GDP in 1994. Between 1985 and 1994 the debt ratio increased by about 40 percentage points. Thereafter it declined to reach just above 103 per cent in 2007, almost 20 percentage points lower than the peak. Since the start of the financial crisis the debt to GDP ratio has been significantly increasing again.

The period as a whole is characterized by a strong negative correlation between public debt (as a ratio to GDP) and real per capita income growth. Excluding the years between the start of World War I and the first parliamentary elections after the end of World War II (1915-1948), the correlation coefficient is -0.61. It is lower before 1915 (-0.15) than after 1949 (-0.72).

Growth developments display some differences over the various debt accumulation/decumulation periods. In particular two distant periods in time, 1880-1914 and 1985-2007, share some features that are of particular interest to the analysis in this paper: (a) they include two local peaks of the debt to GDP ratio in our sample (1894 and 1994; fig. 2); (b) they coincide with expansionary cycles in world GDP and trade. Both periods are characterised by relatively fast growth in the rest of the world. For Western Europe and the USA the average rate of growth was 2.7 per cent both over 1880-1914 and 1985-2007. In both cases the path of external growth was not much different before and after the local peak in Italy's debt to GDP ratio: the average rate of growth of Western Europe and the USA did not change much between 1880-1894 (2.6 per cent) and 1895-1914 (2.7), nor between 1985-1994 (2.6 per cent) and 1995-2007 (2.7). However there is a relevant difference of interest to our analysis: while during both 1880-1894 and 1985-1994 (the periods of debt accumulation) the GDP growth rate is falling, growth picks up once debt starts declining in 1895-1914 but it does not in 1995-2007. In particular real per capita GDP growth averaged at 0.8 percent over 1880-1894 and at 1.5 over 1895-1913 (table 2); while it was on average 2.2 percent over 1985-1994 and 1.2 in 1995-2007.[6]

While the first pattern appears in line with the proposition that higher and increasing debt is associated with subdued growth, the latter is not. The analysis in the following section aims at providing some guidance in interpreting this evidence.

[6] Similar indications are found if one considers trend GDP growth (obtained using an Hodrick-Prescott filter).

3. The Model and the empirical analysis

3.1 The reference framework

The model used for the empirical analysis in this paper is based on a production function framework which allows joint consideration of both an exogenous and an endogenous component in GDP growth[7]. We start by considering the following production function:

$$(1) \qquad Y_t = Ae^{f(t,X_{it})}K_t^{\alpha}L_t^{1-\alpha}$$

where A is a constant, Y output, K capital and L labour. Output growth depends on an exogenous component captured by the time trend t and a number of economic factors X_{it} (i= *1, …, J*). We assume that $f(t, X_{it})$ can be written as a linear relationship with coefficients γ and δ and that *J=1* for simplicity:

$$(2) \qquad f(t, X_t) = \gamma t + \delta X_t$$

Rewriting (1) in per capita terms (small letters indicate per capita values) and taking logs we get:

$$(3) \qquad \ln y_t = \ln A + \gamma t + \delta X_t + \alpha \ln k_t$$

or in first differences:

$$(4) \qquad \Delta \ln y_t = \gamma + \delta \Delta X_t + \alpha \Delta \ln k_t$$

In the long run, when per capita capital stock converges to its long run equilibrium value (k_t*, so that $\Delta \ln k_t^* \to 0$), output growth converges to:

$$(5) \qquad \Delta \ln y_t^* = \gamma + \delta \Delta X_t$$

The simple framework described here highlights two things worth noting. First since actual observations are not equilibrium ones, choice of the steady state specification (5) is not appropriate. In other words, omitting the key variable of the production function – i.e. per capita capital – from the specification will give unreliable estimates of the growth-effects of *X*. This calls for the use of the non-steady state specification (3) in the empirical analysis.

Second, because many time-series are likely to be nonstationary in their levels, specifications in first differences may yield unreliable and inefficient estimates since valuable information on the levels would be lost[8].

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[7] For exogenous and endogenous growth models see respectively Solow (1957), Mankiw et al. (1992) and Romer (1986, 1990), Lucas (1988), Grossman and Helpman (1991) and Barro (1991). For a production function framework as the one used year see Rao (2010).

[8] See for example Bottazzi and Peri 2004, Kamps 2005, Bronzini and Piselli 2006; Rao 2010.

Assuming that variables in (3) are I(1) in levels, I(0) in their first differences, and that there exists a cointegrating vector, we can combine (3) and (4) to write a model in error correction form augmented by distributed lags[9]:

$$\Delta \ln y_t = -\lambda\left(\ln y_{t-1} - \ln A - \gamma t - \delta X_{t-1} - \alpha \ln k_{t-1}\right) + \gamma + \delta \Delta X_t + \alpha \Delta \ln k_t + \sum_{i=1}^{n} \beta_{yi} \Delta \ln y_{t-i} + \sum_{i=1}^{m} \beta_{ki} \Delta \ln k_{t-i} + \sum_{i=1}^{p} \beta_{Xi} \Delta X_{t-i} \quad (6)$$

and obtain the following estimating equation:

$$\Delta \ln y_t = \beta_0 + \beta_1 t + \beta_2 \ln y_{t-1} + \beta_3 X_{t-1} + \beta_4 \ln k_{t-1} + \beta_5 \Delta X_t + \beta_6 \Delta \ln k_t + \sum_{i=1}^{n} \beta_{yi} \Delta \ln y_{t-i} + \sum_{i=1}^{m} \beta_{ki} \Delta \ln k_{t-i} + \sum_{i=1}^{p} \beta_{Xi} \Delta X_{t-i} + \varepsilon_t \quad (7)$$

where ε_t is a white noise error term.

From estimates of the coefficients in (7) it is possible to recover the parameters of equation (6):

$$\begin{aligned} \beta_0 &= \lambda \ln A + \gamma \\ \beta_1 &= \lambda\gamma \\ \beta_2 &= -\lambda < 0 \\ \beta_3 &= \lambda\delta \quad \text{same sign as } \beta_5 \\ \beta_4 &= \lambda\alpha > 0 \\ \beta_5 &= \delta \\ \beta_6 &= \alpha > 0 \end{aligned} \quad (8)$$

Note that there are no a priori sign expectations concerning the coefficients of the ARDL terms ($\beta_{yi}, \beta_{ki}, \beta_{Xi}$), the constant ($\beta_0$) and the time trend coefficient (β_1). On the contrary, the coefficients of the level and first difference of X (β_3 and β_5) are required to have the same sign. Finally, the coefficient of per capita income must be negative ($\beta_2 = -\lambda < 0$) as required for convergence of the equation and the coefficients of per capita capital and of its growth rate must be positive (since $\alpha > 0$, then $\beta_4 = \lambda\alpha > 0$ and $\beta_6 = \alpha > 0$).

Given (8) the following restrictions on the estimated coefficients apply:

$$-\frac{\beta_3}{\beta_2} = \beta_5; \quad -\frac{\beta_4}{\beta_2} = \beta_6 \quad \text{and} \quad \beta_2 < 0; \quad \beta_4, \beta_6 > 0 \quad (10)$$

[9] See Rao, 2007 and 2010.

3.2 The data

In our baseline version of equation (7), X is the nominal debt to nominal (trend) GDP ratio.[10] Data for the macroeconomic variables are drawn form recent reconstructions of long time series for the Italian economy. In particular GDP (nominal and real) is drawn from Baffigi (2011), labour force and capital stock are taken from Broadberry, Giordano and Zollino (2011) and General Government debt from Francese and Pace (2008) and updated for the most recent years based on latest releases by Banca d'Italia.[11] These data, except for the debt series, were produced and released in the framework of a research project promoted by the Bank of Italy on the occasion of the 150th Anniversary of Italy's National Unification (Toniolo, 2013). Further details on data sources are provided in the Appendix.

As mentioned the sample used in the empirical analysis excludes the years 1914-1949 and those following 2007.

3.3 The results

In our empirical specification $\ln y_t$ is log real GDP per worker (full time equivalent units), $\ln k_t$ is log real capital per worker and X_t is log debt to trend GDP ($\ln d_t$). Descriptive statistics for the variables of interest over the whole period and specific sub-periods are reported in table 1.

Checks on the order of integration of the three variables suggest that the hypothesis that all three variables have a unit root, that their first differences are I(0) and that there exists a cointegrating vector cannot be rejected.[12]

Estimation[13] results (table 3) suggest that the coefficients all have the expected sign[14] and coefficient restrictions implied by the reference model are not rejected[15]. Our results are in

[10] Trend GDP is computed using a Hodrick-Prescott filter on the real GDP time series and setting the smoothing parameter equal to 30. To account for end point bias, the series is augmented including official estimates for GDP for the years 2011-2012. Nominal trend GDP is obtained from real trend GDP using the implicit deflator from real and nominal GDP series in Baffigi (2011).

[11] Francese and Pace (2008) offer a discussion of the methodology used to reconstruct the time series and its breakdowns. Data for Italian nominal debt for the general government sector are regularly updated and can be downloaded from Banca d'Italia's website. Methodological notes on the time series are available at http://www.bancaditalia.it/statistiche/quadro_norma_metodo/metodoc/sb7308/en_suppl_73_08.pdf.

[12] In particular based on results from both the augmented DF test and the modified DF test on the level variables we cannot reject the hypothesis that all three variables have a unit root. The same tests support the hypothesis that their first differences are I(0). Finally, the Johansen cointegration test supports the existence of a single cointegrating vector among the three variables.

[13] We first estimated the model by OLS without ARDL terms and robust standard errors. Parameters' signs are as expected, all coefficients are statistically significant and the restrictions on coefficients suggested by the model are not rejected (table 4, col. 1). We then estimate (7) with ARDL(4) terms with OLS and robust standard errors (table 3, col. 2) and gradually drop all coefficients that are not significant at the 5% confidence level. In this way we select a specification (table 3, col. 3) where there are ARDL(1) terms for all variables and an ARDL(3) term for income per worker. The sign of the coefficients is maintained throughout the specification selection process; also their magnitude is reasonably stable. The significance of the error correction term in our model supports the hypothesis of long-run Granger causality between the variables we consider and short-run causality is supported by the significance of lagged differentiated variables. The indications of these tests however suffer from well known limitations (Hendry, 1995; see also the discussion in Bronzini and Piselli, 2006).

line with the hypothesis of a negative relation between lagged public debt and growth.[16] Also the estimation of a vector error correction model suggests a negative link between debt and growth; the same exercise confirms the positive effect of capital on growth.

Since the correlation between debt and growth appears different between the pre-1915 and the post-1949 periods, we test for differences between the two by introducing both intercept and slope dummies. Results support the hypothesis of a structural break and we re-estimate the equation separately over the two sub-periods (table 3, cols. 6 and 7). The differences mainly affects estimates for the constant and the trend coefficient. Also, over 1950-2007 the coefficient of the lagged level of debt looses significance, while the negative effect of the change in debt is confirmed. The absolute magnitude of the other coefficients is generally larger over 1861-1913 than over 1950-2007.

As done in other studies (e.g. Kumar and Woo, 2010 and Checherita and Rother, 2010) we also ran a number of alternative regressions to see how the introduction of additional explanatory factors may alter the results. We included among regressors the rate of growth in the rest of Europe and in the USA (to capture the effect of the world business cycle on domestic growth), the degree of openness (ratio of imports plus exports to trend GDP), a proxy for human capital formation (percentage of students in population aged 5-14), government size (expenditure-to-GDP ratio), the old-age dependency ratio (percentage of population aged 65 or more), foreign public debt (as a share of GDP), the ratio of bank deposits to GDP (as a measure of financial development), the interest rate differential between Italian bonds and those of other countries (UK, USA and Germany for different historical periods), and the real exchange rate of the national currency. The introduction of these variables does not significantly affect estimates for the other coefficients in the model; what is interesting to notice is that foreign debt[17] turns out to add some explanatory power to

[14] Diagnostic tests on the residuals from the regression are all favourable. Concerning normality, a plot of residual suggests broad consistency of the actual distribution with the corresponding normal hypothesis and formal tests do not reject the hypothesis of normality. Concerning autocorrelation, the correlogram does not suggest any particular problem, and formal tests are also favourable. We use robust standard errors in the regressions reported in table 3. A Breusch-Pagan test rejects the hypothesis of homoskedastic disturbances. However, the significance of the coefficients does not change using non robust standard errors. We also ran a portmanteau test for white noise residuals with favourable results.

[15] Moreover, the estimation of the equation by imposing such restrictions returns similar results (table 3, col. 4) as the unconstrained estimation.

[16] For example the order of magnitude of the negative effect of lagged debt on growth in our sample is about the same as the one reported by Kumar and Woo (2010): a 10 percentage point increase in the initial debt-to-GDP ratio is associated with a slowdown in annual real per capita GDP growth of around 0.2 percentage points. As a check against a possible endogeneity bias, we run 2SLS estimation of the selected specification where we instrument lagged income and capital per worker and the lagged debt-to-GDP ratio with their lagged values (table 3, col. 5): in this case the sign of estimated coefficients is unaltered and the change in their magnitude remains modest; only the constant term and the trend coefficient lose statistical significance. When instrumenting the debt ratio by debt per capita or per worker, we obtain similar results. However the coefficient of the change in debt looses statistical significance.

[17] Foreign debt is defined as debt issued abroad (either government bonds issued on foreign financial markets or loans from non domestic banks). This choice reflects the lack of historical data for debt held by non residents. It should also be considered that over 1950-1990 there were formal restrictions to the acquisition by non residents (residents) of debt issued domestically (abroad). For a more precise description of foreign debt and the adopted definition, see Francese and Pace (2008).

the model, and its effect is only significant before 1914, when Italy's development was at an early stage.[18]

Finally we ran a regression of investment (public and private) both as a share of GDP and in per capita terms against the stock of capital, the debt ratio and its rate of growth and found a significant negative relationship between investment and debt (both level and growth). A negative impact of debt on capital growth results also from the impulse response function from the vector error correction model mentioned above. These results suggest that a channel through which debt affects growth may be reduced investment.[19]

4. Debt and Growth in Different Sub-periods

We closed Section 2 noting that growth picked-up when the debt ratio was reduced over 1895-1913 but it did not over 1995-2007. The empirical results described in the previous section can help solving the puzzle; in particular a partial explanation is offered by the analysis of growth determinants included in our specification.

First, the decline in the debt ratio over the years 1895-1913 was large and fast, with the ratio falling by more than it had increased over 1880-1894. The reduction in debt that started at the end of the twentieth century was much smaller and slower (the average value of the debt ratio is higher in 1995-2007 than in 1985-1994; table 2). Second, the estimation takes into account the role played by capital accumulation and foreign debt (the latter relevant before World War I), while raw correlations do not. After decreasing in 1880-1894, the rate of capital accumulation increased over 1895-1913; on the contrary, it was decreasing throughout 1985-2007 (table 2). The differential in the growth stimulus from capital accumulation, other things equal, was therefore significant. Moreover almost half of the large debt reduction over 1895-1913 is due to foreign debt, which played no role in the reduction of the debt ratio over 1995-2007.[20]

The simple model described in Section 2 therefore offers some guidance in the understanding of the differences in the developments observed in debt/growth link over the years around the turns of the last two centuries. As all simplifications, however, it suffers some limitations (also for technical reasons). In particular, because of collinearity it is not suitable to also take into account the role played by the fiscal policy stance, as measured by the level and composition of the budget balance (and the size of the government sector). Budget developments and the impulse offered by fiscal policy differ significantly between 1880-1914 and 1985-2007. Therefore in the remaining part of this section a narrative discussion of fiscal developments complements the analysis presented in the previous part of the paper.

[18] On the link between foreign debt and growth in developing countries, see, for instance, Krugman (1988) and Sachs (1989).

[19] This indication is in line with Kumar and Woo (2010) and Checherita and Rother (2010).

[20] In the most recent years with the start of the monetary union, our definition of foreign debt as debt issued abroad is less satisfactory. However, holdings of Italian government securities by foreign investors, if anything, increased over the period considered.

Homogeneous data for deficit, revenue and expenditure for the 150 years since Italian unification are not available; however a discussion of fiscal policy can be based on State budget data[21] for the years before World War I and the general government accounts compiled by the national statistical institute since the 1960s. The main aspects that will be pointed out are related to the composition of the budget and the size and timing of fiscal consolidation, in particular over the periods of debt reduction at the turn of the past two centuries.

4.1 The government budget over 1861-1913

The size of government before World War I was small by today's standard: State expenditure amounted to 11.4 percent of GDP on average during 1862-1913 and revenue to 10.2 percent (the corresponding figures for general government were 16.8 and 13.5).[22] There was no strong upward trend in expenditure over the whole period.[23] The revenue ratio grew gradually from 5.2 percent in 1862 to peak at 12.4 in 1894; it averaged at 11.0 percent thereafter (fig. 3). The State budget posted large imbalances only in the early years after the unification (the average deficit over 1862-66 amounted to 5.0 percent of GDP). As to the timing, fiscal consolidation started much earlier than the debt-ratio reached its peak.

A close to balance budgetary position was reached in 1874 (0.5 percent of GDP). After the mid-1860s spending was kept below the peak level recorded in the early years of the new State mainly due to reduced military spending, which accounted for about two thirds of the total reduction between the expenditure peak in 1866 and 1874. Revenue increases also contributed to rebalancing the budget: between 1862 and 1874 the tax ratio at the State level rose from 5.2 to 8.7 percent, reaching close to 11 percent by the end of the decade (also in connection with favourable macroeconomic conditions, with both prices and trade growing).

The close to balance position was maintained until 1884 (the average deficit over this period amounted to 0.4 per cent of GDP).[24] A surge in expenditure reopened the imbalance in the second half of the 1880s, when the average deficit was 2.6 per cent of GDP, with a peak at 4.1 in 1888. Under the government of the Left the composition of spending changed. According to Plebano (1900), most expenditure in the early years of the Kingdom of Italy

[21] Data on the State budget are from Pedone (1967) and Ragioneria Generale dello Stato (2011), GDP is from Baffigi (2011).

[22] However, the expenditure-to-GDP ratio was higher in Italy than in other European countries at that time: the average general government expenditure ratio over 1872-1912 was 17.0 per cent in Italy (using GDP data from Baffigi, 2011), 14.5 in Germany, 13.8 in France and 10.6 in Great Britain (Brosio and Marchese 1986).

[23] "Expenditure growth was rather limited during 1866-1914 […] set to 100 [the value of expenditure] in 1866, it was equal to 485 in 1918, after over 50 years, notwithstanding the acceleration due to World War I" (Brosio and Marchese 1986, p. 52). The average real growth rate over the period was about 2 percent. Over 1900-13, as a share of GDP, both State and General Government expenditure were broadly on the same level as in the 1860s.

[24] It has been argued that such result was precarious in nature and based on creative accounting (see e.g., Plebano, 1900, and Pedone, 1967). Indeed, the difference between the change in general government debt and the State budget deficit is suspiciously large in 1876, 1881 and 1882 (fig. 5): the former is a measure of the cash deficit while the state budget is based on accruals; moreover the change in debt takes into account debt assumptions which may or may not be accounted for in the State budget. But similar differences between the two indicators were also recorded in earlier years and, overall, the State deficit and the change in debt follow the same declining pattern.

related to military needs, public works and to building the administration of the new State. Brosio and Marchese (1986) add to this list the service of debts inherited from pre-unitary states. Over the 1880s, instead, the most dynamic component of the budget was investment, which reached 3.7 percent of GDP in 1888, 26 per cent of non-military general government spending and 21 percent of total outlays (Brosio and Marchese 1986, p. 53).

The deficit was again about 1 percent of GDP in the first half of the 1890s; the budget was in balance in the second part of that decade, when debt started declining after the peak of 1894; small surpluses were recorded from 1898 to 1908; noticeable deficits emerged again only just before World War I (the average over 1911-1913 was 1.6 percent of GDP). Between 1899 and 1907, during the economy's "take off", total public spending as a share of GDP declined and so did public revenue (both by about 2 percentage points; the reduction in primary outlays amounts to ½ percentage point). Giolitti's policy reduced the share of government in the economy at a time when private investment spending was buoyant. A balanced budget and regressive taxation were accompanied by an increase in savings that was channelled to industry (Brosio and Marchese 1986, p. 54).[25]

Overall the composition of public expenditure over 1862-1913 was relatively "growth-friendly". Public investment averaged at about 2 per cent of GDP over the whole period, with peaks at around 4 percent in the late 1880s (the average for that decade is 3 percent). The share of investment in total expenditure, on average, was close to 13 percent (15 percent of non-military outlays). Over 1866-1894, the sum of budget deficits is two thirds of the sum of investment spending; the latter accounts for about 80 percent of the increase in debt over the same period.

4.2 The Government budget over 1960-2007

The size and composition of the budget were radically different over 1960-2007 than 1861-1913. Revenues and expenditure averaged at around 40 percent of GDP and investment amounted on average to 6 percent of total expenditure. The average deficit was more than twice investment spending.

The size of government increased steadily after World War II. General Government primary expenditure amounted to 27 percent of GDP 1960 and temporarily peaked at almost 44 percent in 1993 (fig. 4). Over two thirds of the increase came from social spending (pensions and health). Over three decades the provision of public services was widened in scope and extended to the whole population. The pension system gradually matured and expenses grew as benefits were claimed by cohorts with larger entitlements (see Franco, 1993). The increase in total expenditure was amplified by rising interest payments. Revenue followed with a lag: they remained below 30 percent of GDP until the mid-1970s and only reached the same level as primary expenditure in the early 1990s. Large and growing imbalances were recorded from the mid-1960s until the early 1990s. The deficit over 1960-64 averaged at just below 1 percent of GDP. It grew to almost 3 percent on average in the second part of the

[25] Brosio and Marchese (1986) provide a classification of Italy's revenues over 1861-1913 according to the degree of regressivity. They find that regressive taxation accounted for about 50 per cent of total revenue on average in the period considered.

decade and then kept rising, posting average values of 7.6 percent in the 1970s, and 10.8 in the 1980s and early 1990s.

In the 20th century fiscal consolidation had only just began when the debt ratio peaked in 1994. From the mid-1980s debt stabilisation became the main target of Italian fiscal policy, but, initially, progress on the primary balance was offset by increasing interest expenditure. Then the deficit went down from 11.4 percent of GDP in 1989 to 9.0 in 1994 (the year in which public debt peaked), to 2.7 in 1997 and 1.7 in 1999. The revenue-to-GDP ratio increased by almost 6 percentage points over 1989-1999. Interest spending declined by 2½ points and capital outlays by slightly more than 1 point. Current primary spending, as a share of GDP, was unchanged. Some of the features of the consolidation effort (such as significant reliance on tax increases and capital spending reductions, in some cases resort to temporary measures and a delayed and lengthy reform processes to halt primary current expenditure trends) may have amplified negative effects on economic performance (see for example Balassone *et al*. 2002, pp. 779-780).

After 1999 the general government deficit averaged at just below 3 per cent of GDP. Total expenditure and revenue were broadly stable (at about 48 and 45 percent of GDP respectively). The further decline in interest outlays, by 1½ percentage points of GDP, was offset by an equal increase in primary current outlays.

The description of budget developments suggests that the fiscal stance has been significantly different at the turns of the two past centuries. While in the nineteenth century the budget should not have exerted a large negative impulse on GDP growth during debt reduction (1895-1913), a significant fiscal contraction marked the start and accompanied the debt reduction after 1994 (fig. 6).

Besides fiscal policy, debt/GDP and economic performance are affected also by other factors which have not been taken into account in the discussion so far. An important one in large debt reductions episodes in the Italian economic history has been inflation. The latter however has had major effects during the World Wars and the immediately subsequent years (which we have excluded from our analysis) and over the seventies (in which debt has been rising), without being a major factor in the sub-periods we have more closely examined[26].

7. Conclusions

The debate on the relationship between public debt and growth has revived in recent years. The analysis in the previous sections, drawing on a model based on a standard production function and using deep time series for Italy, suggests a negative link between lagged government debt and per capita GDP growth, with the foreign component of debt exerting a stronger impact than the domestic one before 1914.

[26] For example if we take as an indication the difference between nominal and real GDP growth (which enters the debt dynamics identity), it has been about 1.8 per cent per year over 1895-1913 and about 2.8 per cent over 1995-2007 (fig. 7). For a description of the main components of changes in debt over the Italian history see Francese and Pace (2008) and for a more detailed break down (related to primary deficit, interest spending, real growth and inflation) see Bartoletto at al. (2012) and (2013) which use long time series for debt and macroeconomic variables in line with those used in this work.

The empirical analysis takes into account factors (such as capital accumulation) that partially explain why the raw negative correlation between debt and growth is not confirmed in some sub-periods of Italian history, in particular over 1995-2007 when debt reduction was not accompanied by a pick up in growth.

Our narrative analysis has also discussed the role of important factors which could not be taken care of in the empirical exercise, such as the fiscal stance and the size and composition of the budget. We noted that in the 19th century, fiscal consolidation started much earlier than the debt-ratio reached its peak. In the 20th century, instead, fiscal consolidation had only just began when the debt ratio peaked in 1994. Thus, while the budget exerted no negative impulse on GDP growth during debt reduction over 1895-1913, a significant fiscal contraction, mostly based on revenue increases and cuts to investment spending, accompanied debt reduction after 1994. Moreover about 80% of debt accumulation until 1894 can be accounted for by public investment, while over 1960-2007 the average deficit was more than twice investment spending.

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Figures and Tables

Fig. 1 – Italy's Public Debt: 1861-2010
(% of GDP)

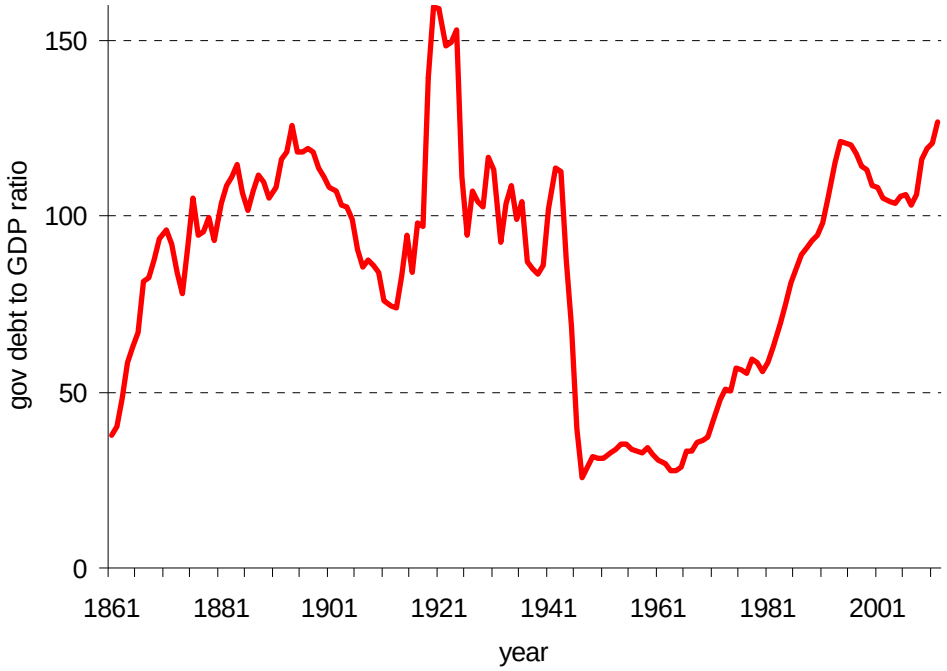

Fig. 2 - Public Debt-to-GDP Ratio Developments at the turn of the past two centuries

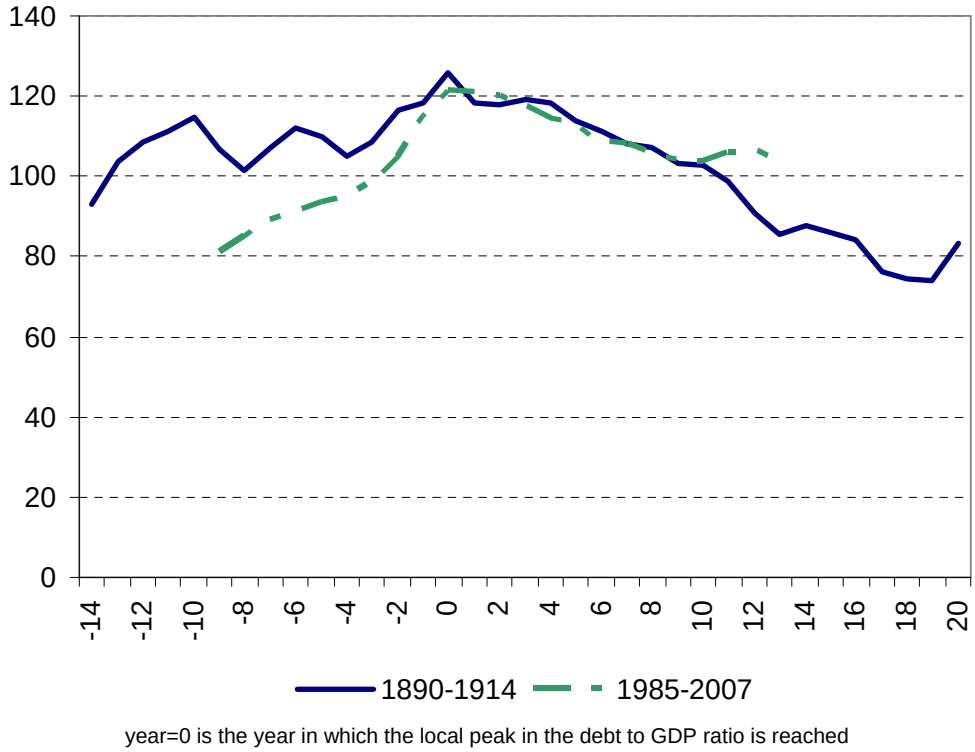

Fig. 3 – State Expenditure and Revenue 1862-1913
(% of GDP)

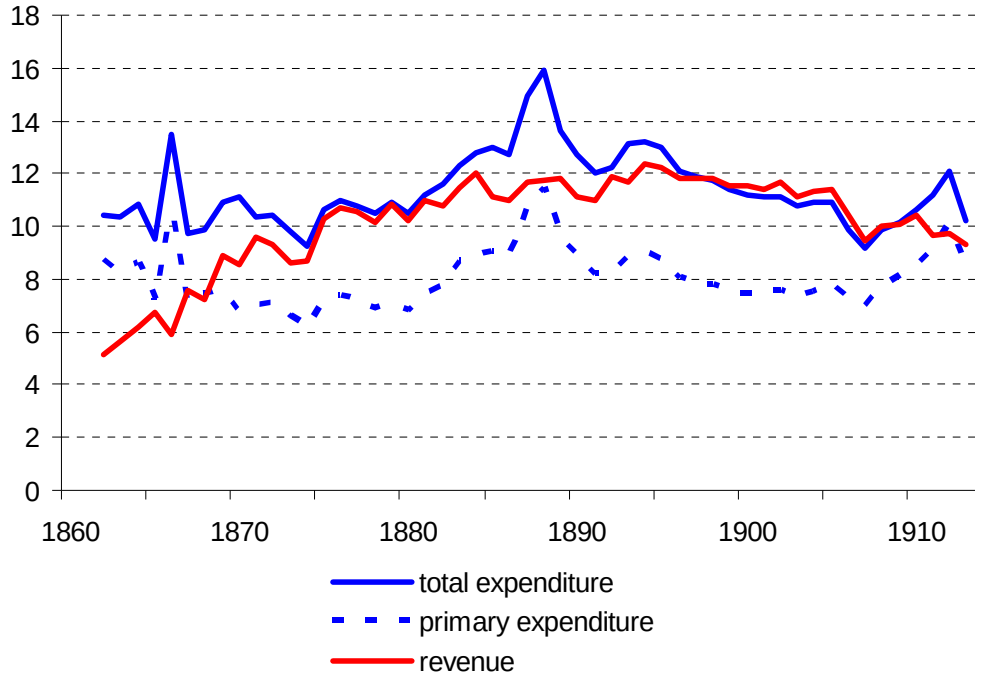

Fig. 4 – General Government Expenditure and Revenue 1960-2007
(% of GDP)

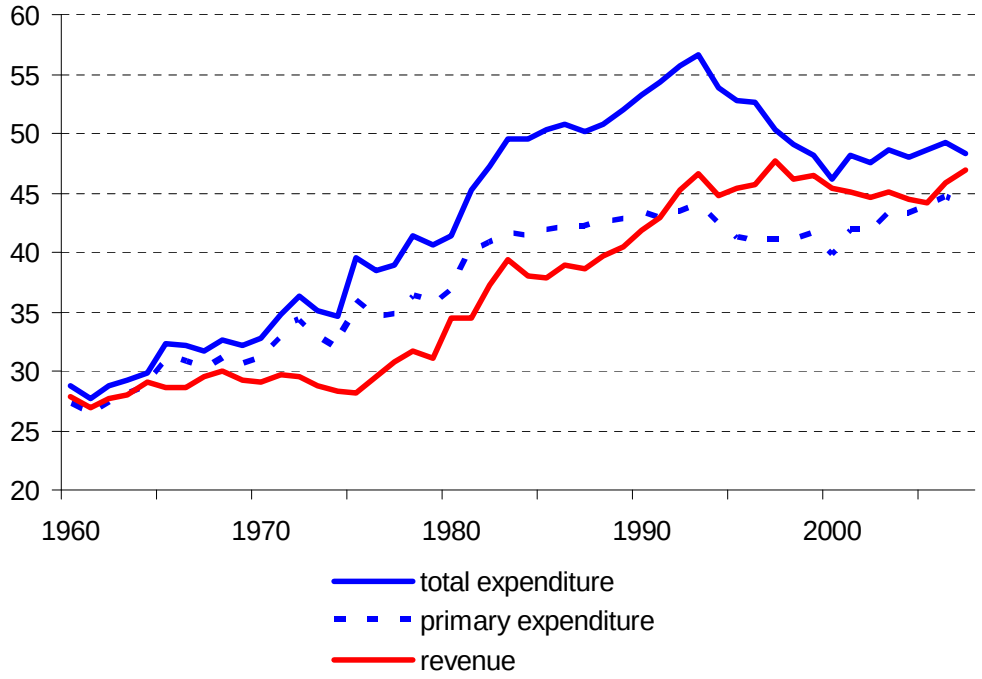

Fig. 5 – State Deficit and Change in Government Debt 1862-1913
(% of GDP)

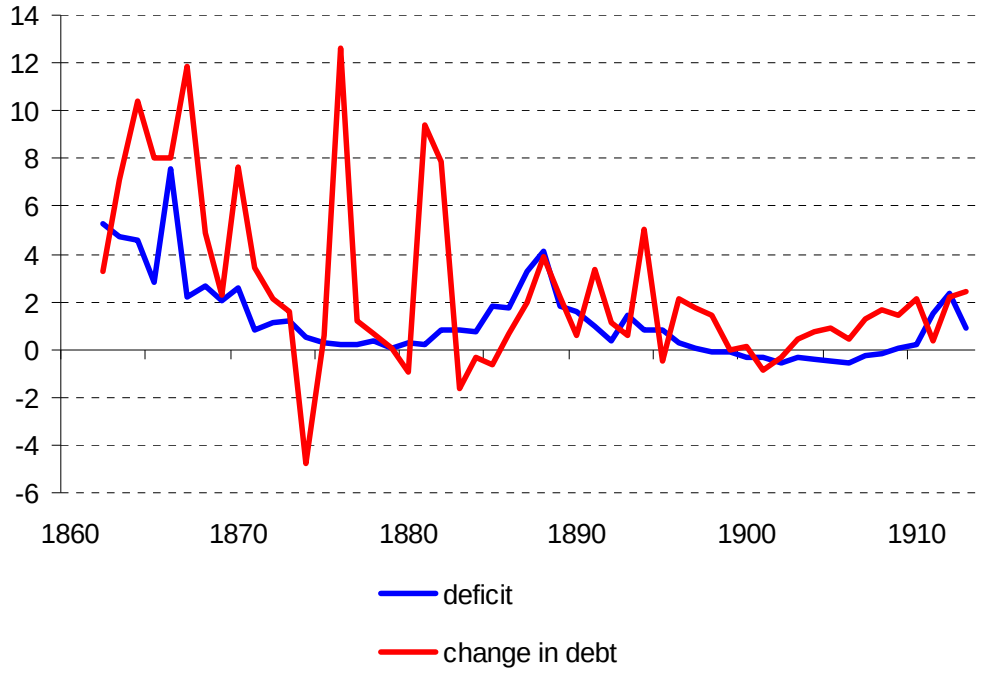

Fig. 6 – Changes in the budget balance and its main components: 1894-1913 vs. 1994-2007
(% of GDP)

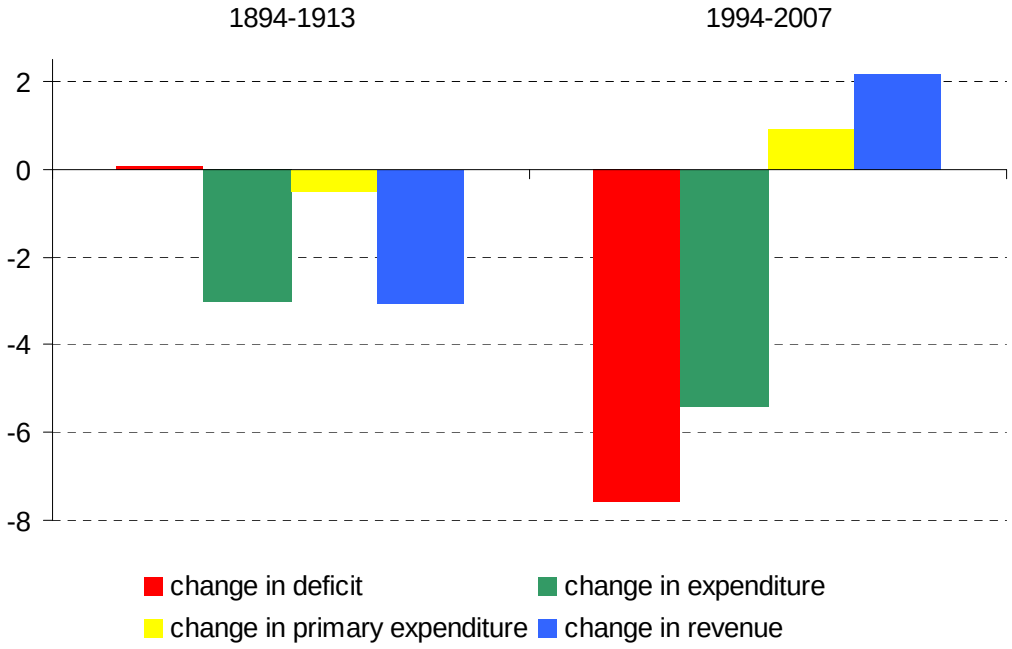

Fig. 7 – Nominal and real GDP growth
(% variation)

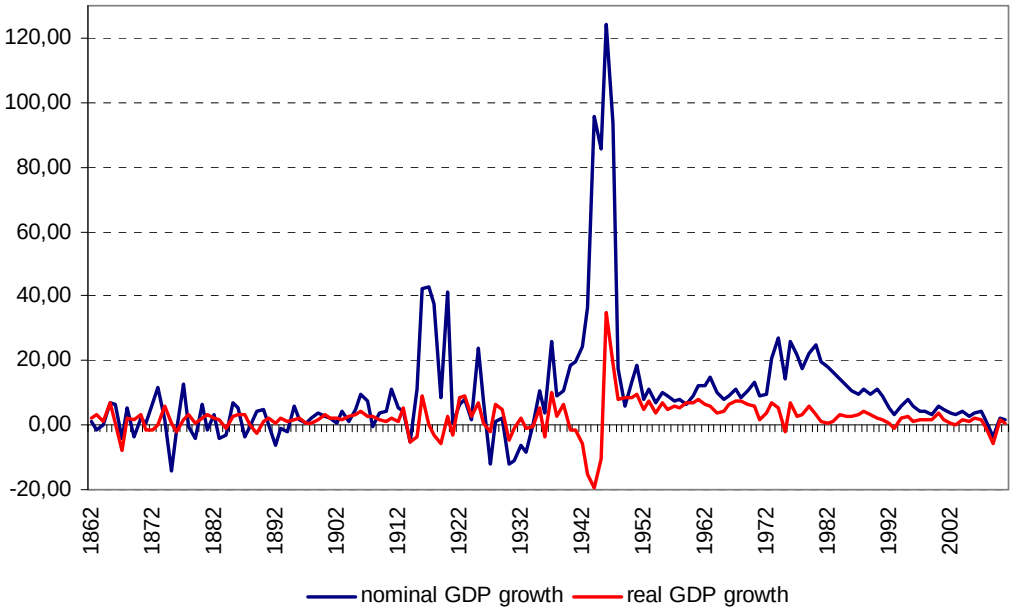

Table 1 - Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
1861-2007					
log real per capita GDP - ln y_t	147	-6.471	0.818	-7.364	-5.009
real per capita GDP growth rate	146	1.931	5.101	-19.539	33.871
log - real per capita capital - ln k_t	147	-5.014	0.769	-5.808	-3.534
government debt to trend GDP ratio - d_t	147	85.490	33.321	24.760	175.234
1861-2007 excl. years from IWW to 1949					
log real per capita GDP - ln y_t	111	-6.334	0.898	-7.364	-5.009
real per capita GDP growth rate	110	2.217	2.667	-8.045	9.116
log - real per capita capital - ln k_t	111	-4.884	0.840	-5.808	-3.534
government debt to trend GDP ratio - d_t	111	80.236	31.114	27.200	125.346
1861-1913					
log real per capita GDP - ln y_t	53	-7.188	0.148	-7.364	-6.894
real per capita GDP growth rate	52	0.932	2.201	-8.045	5.998
log - real per capita capital - ln k_t	53	-5.654	0.096	-5.808	-5.495
government debt to trend GDP ratio - d_t	53	94.609	20.498	38.258	125.346
1950-2007					
log real per capita GDP - ln y_t	58	-5.553	0.486	-6.569	-5.009
real per capita GDP growth rate	58	3.370	2.531	-2.611	9.116
log - real per capita capital - ln k_t	58	-4.180	0.546	-5.190	-3.534
government debt to trend GDP ratio - d_t	58	67.102	33.426	27.200	123.409

Table 2 – Development of selected variables over debt accumulation/reduction episodes

Tab. 2 - Developments of selected variables over debt accumulation/reduction episodes

	1880-1913		1985-2007	
	debt accummulation	debt reduction	debt accummulation	debt reduction
	1880-1894	1895-1913	1985-1994	1995-2007
average per capita GDP growth (%)	0.77	1.49	2.16	1.19
per capita capital growth	decreasing	increasing	decreasing	decreasing
average yearly variation	-0.07	0.10	-0.04	-0.07
average debt ratio	109.44	98.84	97.61	110.52
change in the debt ratio	32.8	-51.9	40.0	-17.6
of which: foreign debt	4.8	-22.9	4.3	-0.1

Table 3 – Estimation results

Variables		basic specification (no ARDL terms) (1)		ARDL(4) (2)		selected specification (3)		nl (with non linear constraints on parameters) (4)		2SLS (5)		selected specification 1861-1913 (6)		selected specification 1950-2007 (7)	
		coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
constant	β_0	-2.242 ***	0.000	-2.136 ***	0.002	-2.356 ***	0.000	-1.763 ***	0.001	-1.514	0.119	-10.536 ***	0.001	0.583	0.598
year	β_1	0.001 ***	0.000	0.001 ***	0.002	0.001 ***	0.000	0.001 ***	0.000	0.001	0.121	0.004 ***	0.000	-0.001	0.335
ln y_{t-1}	β_2	-0.216 ***	0.000	-0.153 ***	0.001	-0.208 ***	0.000	-0.156 ***	0.000	-0.185 ***	0.000	-0.602 ***	0.000	-0.270 ***	0.001
ln d_{t-1}	β_3	-0.027 ***	0.000	-0.015 **	0.035	-0.023 ***	0.001	-0.025 ***	0.000	-0.028 ***	0.001	-0.109 ***	0.000	0.004	0.726
ln k_{t-1}	β_4	0.174 ***	0.000	0.111 ***	0.004	0.164 ***	0.000	0.122 ***	0.000	0.159 ***	0.000	0.296 ***	0.000	0.246 ***	0.001
Δln d_t	β_5	-0.143 ***	0.000	-0.164 ***	0.000	-0.176 ***	0.000	-0.161 §		-0.274 ***	0.010	-0.205 ***	0.000	-0.161 ***	0.000
Δln k_t	β_6	0.676 ***	0.000	0.735 ***	0.000	0.800 ***	0.000	0.782 §		0.848 ***	0.000	0.691 ***	0.000	0.972 ***	0.000
No. Obs.		110		106		107		107		107		49		58	
R-squared		0.628		0.728		0.696		0.685		0.647		0.711		0.818	
Tests															
parameters restrictions															
1) $-(\beta_4/\beta_2)=\beta_6$		-1.370 (0.174)		0.080 (0.937)		0.100 (0.924)		constrained coeffs.		-0.100 (0.922)		1.480 (0.148)		0.360 (0.723)	
2) $-(\beta_3/\beta_2)=\beta_5$		-0.460 (0.646)		-1.250 (0.216)		-1.400 (0.164)		constrained coeffs.		-1.620 (0.106)		-0.510 (0.615)		-3.030 (0.004)	
normality of rediduals															
Skewness/Kurtosis tests						2.440 (0.295)						0.120 (0.942)		5.150 (0.076)	
Shapiro-Wilk W test						-0.111 (0.544)						-1.768 (0.961)		0.727 (0.234)	
Shapiro-Francia W' test						0.572 (0.284)						-1.468 (0.929)		1.250 (0.106)	
Portmanteau for whitenoise						49.405 (0.146)						19.698 (0.602)		30.179 (0.306)	
autocorrelation of residuals															
a) Breusch-Godfrey LM test for autocorrelation															
lags 1						1.388 (0.239)						0.505 (0.477)		2.292 (0.130)	
lags 2						1.400 (0.497)						0.735 (0.693)		3.032 (0.220)	
b) Durbin's alternative test for autocorrelation															
lags 1						1.249 (0.264)						0.386 (0.535)		1.893 (0.169)	
lags 2						1.246 (0.536)						0.548 (0.760)		2.482 (0.289)	
c) LM test for autoregressive conditional heteroskedasticity (ARCH															
lags 1						0.090 (0.764)						0.542 (0.462)		0.354 (0.552)	
lags 2						0.805 (0.669)						0.450 (0.798)		7.615 (0.022)	

*, ** and *** significance at 10, 5 and 1 per cent respectively

§ computed given parameters restrictions