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Fiscal Discipline and the Cost of Public Debt Service: Some Estimates for OECD Countries

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Abstract

Is there any systematic explanation of variations in the cost of debt servicing over time and across countries? This paper examines the influence of fiscal variables on borrowing costs in a panel of OECD countries, showing that these variables have a significant role. In particular, an improvement of the primary fiscal balance is associated with a significant reduction in debt-servicing costs, amplifying the effects of primary adjustment on the fiscal position. A significant country-specific component remains, however; several explanations for this component are discussed, including debt management and market infrastructure.

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SUMMARY

This paper examines the empirical relationship between fiscal variables and borrowing costs in a panel of OECD countries from the 1970s through 1991. The results are consistent with the view that the cost of debt servicing depends on the variables that determine the debt dynamics: primary fiscal balances, outstanding debt, inflation, and growth. As is plausible, the results are stronger when the sample is confined to high-debt countries, for which unsustainable debt dynamics are more likely to be perceived as affecting inflation prospects and perceived credit risk. In particular, the outstanding debt has a larger effect on borrowing costs for high-debt countries.

A key result concerns the relationship between the primary balance and the cost of debt servicing. For a variety of specifications, a 1 percentage point improvement in the primary balance is associated with a reduction of about 10 basis points in the average cost of debt servicing, with the effect of amplifying a fiscal adjustment adjustment effort.

Over the period examined, a substantial portion of the variation in borrowing costs could be attributed to "fundamentals". At the same time, there remains a significant unexplained element, particularly as reflected in large and significant country-specific effects. These residual variations may be attributable to a variety of factors, including aspects of debt management, the financial system, and taxation.

I. INTRODUCTION

1. Public debt expanded rapidly in several industrial countries during the 1980s (Figure 1) reflecting a combination of weak primary fiscal balances and self-sustaining debt dynamics. High public debt has been of concern for several reasons (Giavazzi and Spaventa, 1988). The expense of servicing a high public debt, which in some countries accounts for a large share of government spending and increased substantially over the 1970s and '80s (Figure 2), may contribute to chronic fiscal imbalances, and must ultimately be financed through distortionary taxation.[2] A high public debt may also constrain the monetary authorities' ability to pursue price stability: at the most straightforward level, an unsustainable debt may put pressure on the central bank to monetize some debt to alleviate the burden—a risk that the 60 percent Maastricht debt limit is intended to reduce.[3] The interest cost of servicing the public debt is key both to its sustainability and to the burden it places on the public finances and the real economy; this paper will examine the determinants of this cost.

2. If the debt dynamics become unsustainable, some policy change will eventually be needed, and this can take the form of fiscal consolidation, inflation (and attendant currency depreciation) or default; in most industrialized countries, inflation and depreciation are the most likely alternatives, with default an outside possibility (Giovannini and Piga, 1992). The average interest cost of public debt depends on the markets' assessment of its sustainability and the probability that, should adjustment be needed, it will occur through fiscal consolidation rather than one of the other two methods—an assessment that depends in turn on current fiscal variables. The interest cost may also depend importantly on other considerations, including debt management policies, market infrastructure, taxation, financial liberalization. The interest cost of servicing public debt is, of course, in turn an important determinant of the fiscal balance; for instance, in a country with public debt of 100 percent of GDP, a one-percentage-point increase in the average interest rate on public debt is equivalent to a one-percent-of-GDP primary fiscal slippage.

3. The paper presents, rather than formal tests of hypotheses, some international descriptive evidence for a panel of OECD countries on the relationship betwen the cost of debt and public finances. The sample period runs from the 1970s through 1991. A reason for omitting most of the 1990s from the sample is that borrowing costs for many European countries are likely to have been dominated by other elements involving the exchange rate regime: the ERM crisis and its aftermath during 1992-93 and more recently the brightening prospect for EMU; however, it would be useful in further work to examine whether the influence of macroeconomic and fiscal variables is borne out during the later period.

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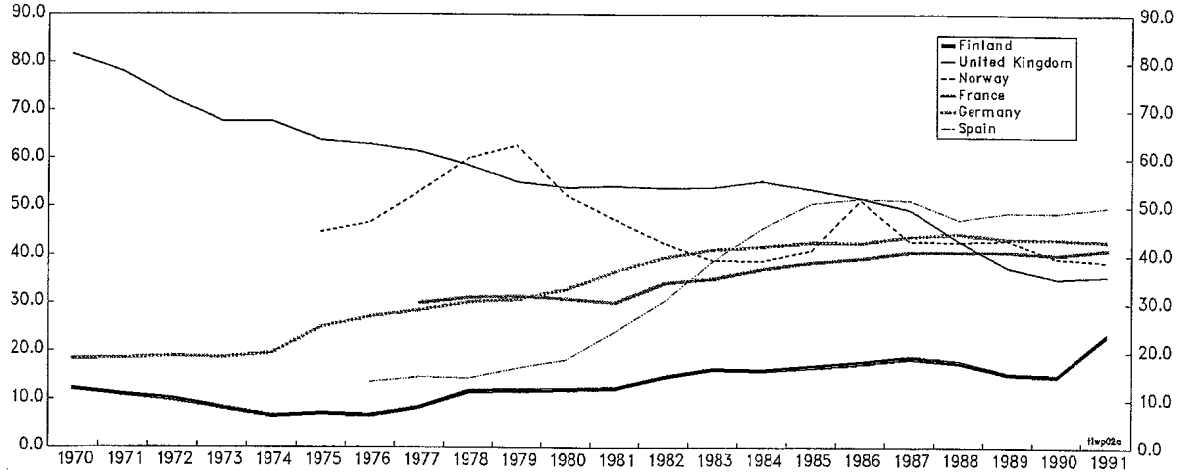
[2]For a discussion of the possible real effects of public debt, see Lane (1997).

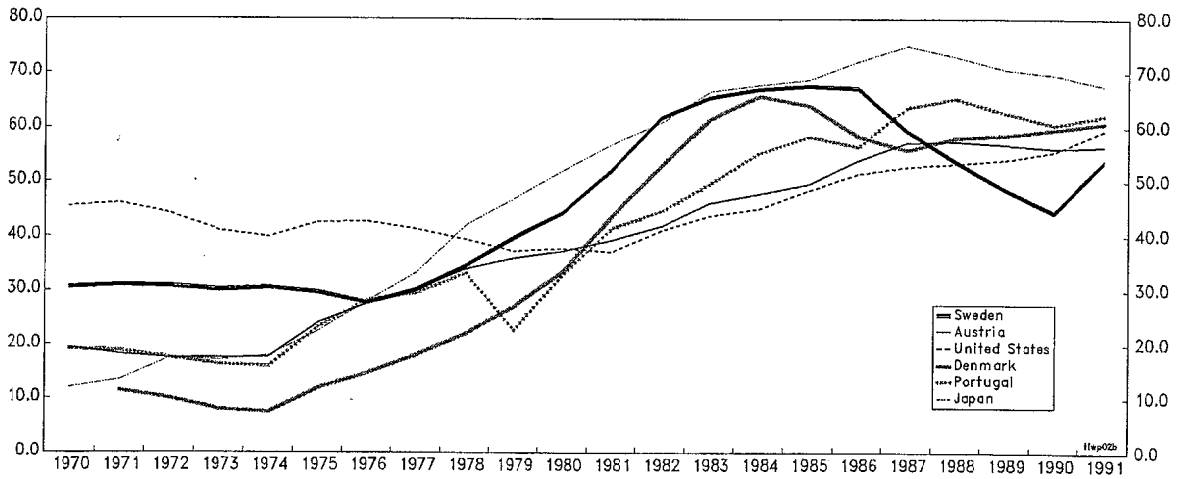
[3]In an extreme case of "unpleasant monetarist arithmetic" (Sargent and Wallace, 1981) monetary policy is fully determined by the debt dynamics.

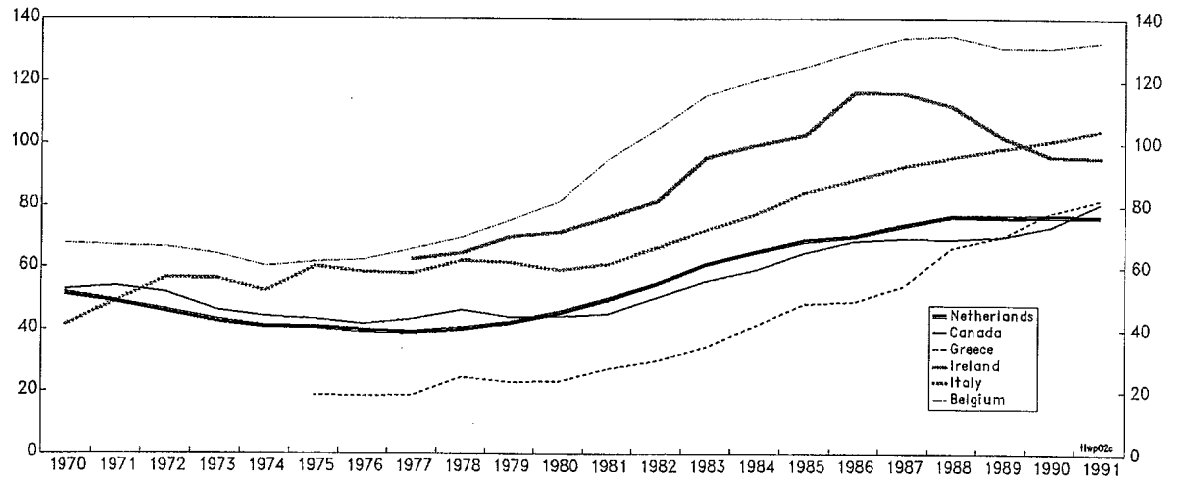
FIGURE 1
SELECTED COUNTRIES

GENERAL GOVERNMENT DEBT

(In percent of GDP)





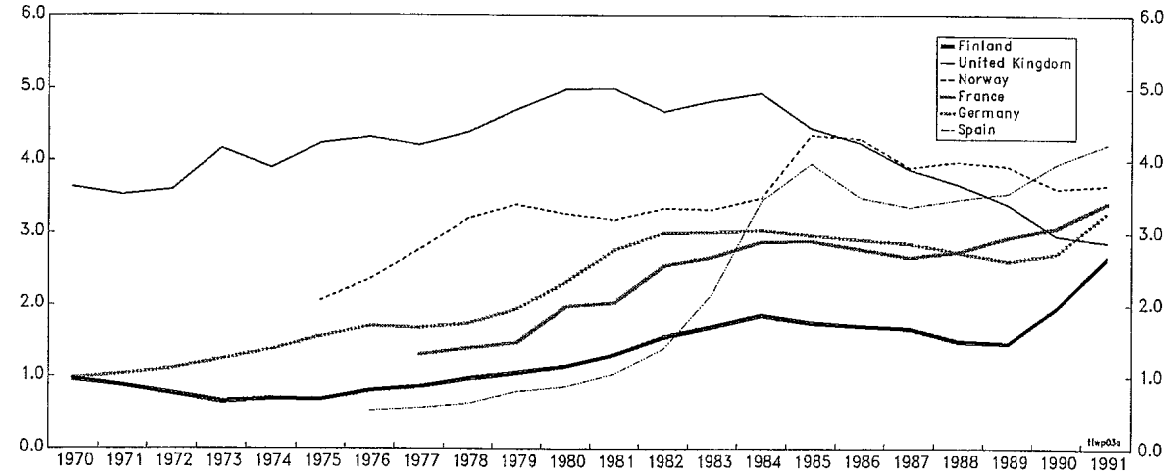


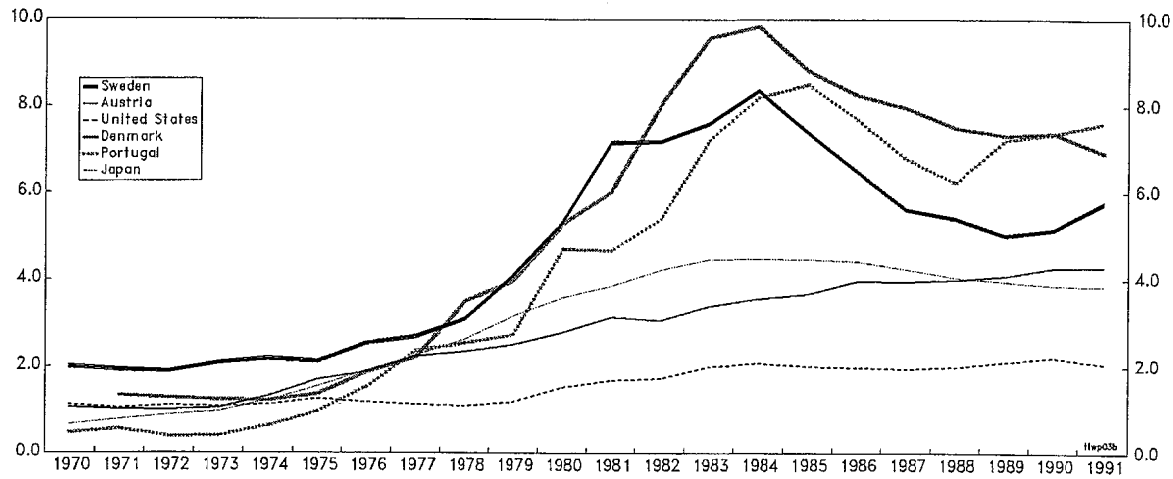
Source: OECD, Economic Outlook.

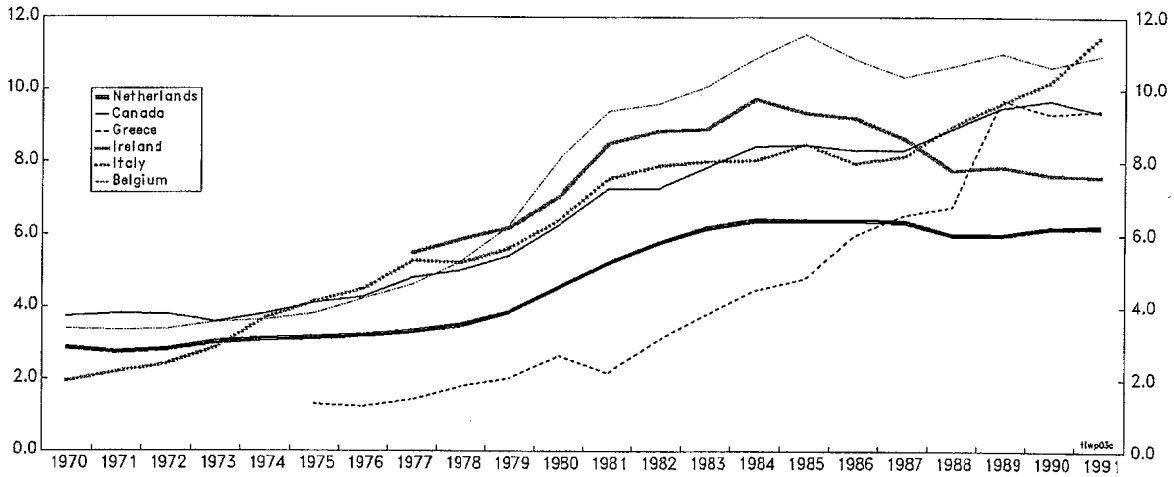
FIGURE 2
SELECTED COUNTRIES

GENERAL GOVERNMENT DEBT SERVICE

(In percent of GDP)







Source: OECD, Economic Outlook.

4. One of the most interesting empirical regularities emerging from the data is that a stronger primary balance is associated with a lower cost of debt servicing. This is consistent with the view that fiscal adjustment can bring subsidiary benefits by improving the markets' assessment of the country's fiscal outlook, lowering the cost of debt servicing thus amplifying the effect on the fiscal position.[4]

5. This paper will present a descriptive empirical analysis of the determinants of the costs of debt servicing. Section II discusses the basic debt dynamics on which the empirical analysis is based. Section III presents empirical results for a panel of OECD countries. These results show that fiscal variables—primary fiscal balances and outstanding debt—have a significant effect on borrowing costs, particularly among high-debt countries. In particular, the results indicate that a one-percentage-point primary fiscal adjustment is associated with a 10-basis-point reduction in interest rates, further contributing to improving the fiscal position. A significant country-specific component remains, however; Section IV discusses some of the factors—related to debt management, the financial system, and taxation—that may account for some of the country-specific differences. Section V presents some conclusions.

II. DEBT DYNAMICS AND BORROWING COSTS

6. The debt dynamics are summarized in the government budget constraint, which can be expressed as the following simple accounting relationship:

$$B_t = B_{t-1}(1 + i_t) - (T_t - G_t) - S_t \qquad (1)$$

where B_t is the debt outstanding at the end of period t, i_t the average interest rate, T_t total revenue, G_t noninterest expenditure (so that $T_t - G_t$ is the primary balance) and S_t monetary financing. This implies the following dynamics for the debt-to-GDP ratio b_t (abstracting from monetary financing):

$$b_t - b_{t-1} = b_{t-1}(i_t - (g_t + \pi_t)) - f_t \qquad (2)$$

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[4]Papers by Alesina, Prati, and Tabellini (1990) and Cottarelli and Mecagni (1990) have examined the influence of fiscal variables on borrowing costs for Italy; another paper by Alesina, De Broek, Prati, and Tabellini (1992) examined a panel of OECD countries focusing on the credit risk component.

where f_t is the primary balance as a share of GDP, g_t the growth rate of real GDP, and π_t the inflation rate (so that $g_t + \pi_t$ is the growth rate of nominal GDP).[5]

7. The average interest cost of servicing the public debt i_t, a key ingredient in the debt dynamics, varies substantially over time and across countries; particularly for higher-debt countries, debt servicing costs followed an upward trend during the 1970s, and then drifted gradually downward during the 1980s (Figure 3). This cost may be analyzed at a disaggregated level in terms of the yield spread on particular assets. This paper takes an alternative approach, presenting an empirical analysis of the determinants of the average cost of public debt servicing. The justification for this aggregative approach, examining a weighted average cost of debt, is a variant of the Modigliani-Miller theorem: changes in the composition of debt or in its conditions of payment that reduce the riskiness of some categories of debt and thus their expected yield would, other things being equal, increase that of other categories, leaving the overall costs of debt servicing unchanged.[6] One drawback of our analysis is the use of an accounting definition of the cost of debt servicing as opposed to an appropriate economic definition; the extent to which accounting measures of the cost of debt differ from economic measures reflects the poverty of government accounting systems, which this paper cannot address. It was also not possible, with the data at our disposal, to obtain estimates of the cost of debt that better approximate the true economic cost, since this would have required the full breakdown of the stock of government securities across all asset types. An additional issue regards the use of average rather than marginal measures of the cost of debt service; the latter would have required the choice of representative individual securities, which could have been made comparable across countries by, for example, obtaining their yield spreads relative to swap rates of identical maturities.

8. Another important determinant of the debt dynamics that appears in equation (2) is the primary fiscal balance.[7] In general, large primary deficits are part of the story behind the accumulation of public debts (Figure 4)—although even once primary adjustment has taken place these imbalances can take on a life of their own due to large outstanding debts and high interest rate spreads.

9. Inflation enters implicitly into equation (3) in two ways: through the nominal interest rate via the usual Fisher effect, and through the growth rate of nominal GDP: thus, inflation worsens the debt dynamics by necessitating higher nominal interest rates to provide investors a given real return, and improves it by raising the nominal growth rate.

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[5]Equation (2) is derived by dividing (1) through by nominal GDP and taking an approximation.

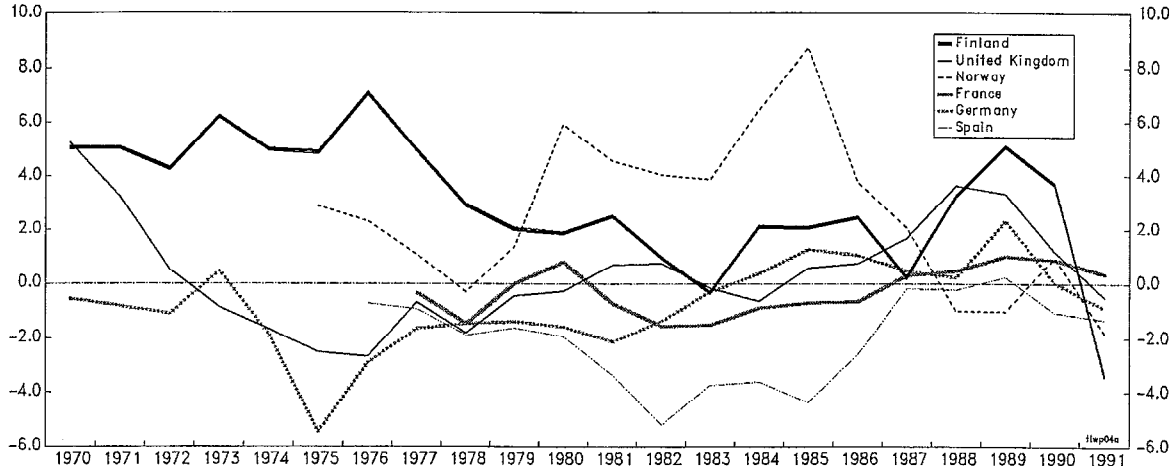
[6]This would be the case, for example, if the relative shares of senior and junior debt is altered, for a given probability distribution of revenues available to service debt.

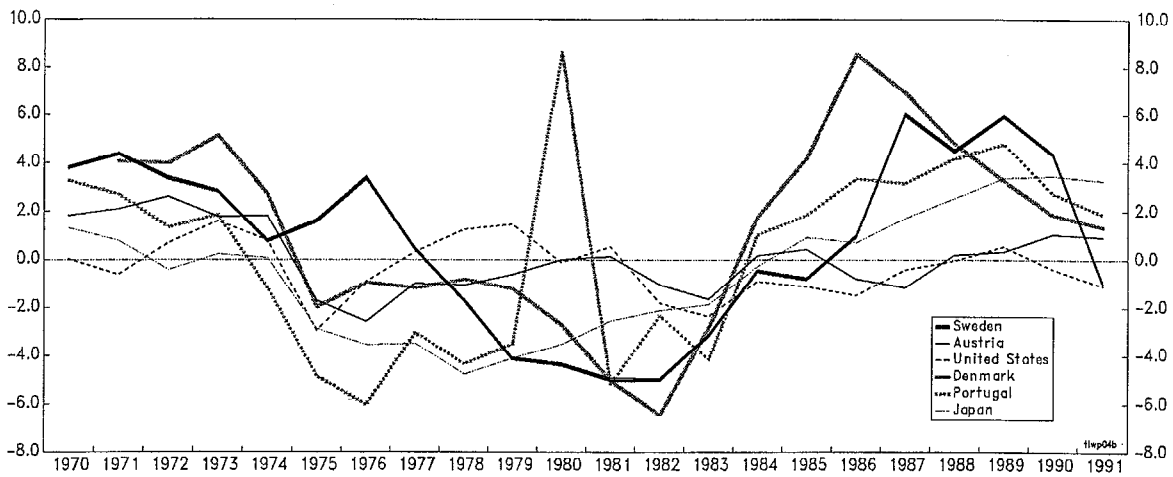
[7]A growing literature explains the behavior of primary fiscal balances, in turn, in terms of political economy considerations. See for instance Alesina and Perrotti (1995).

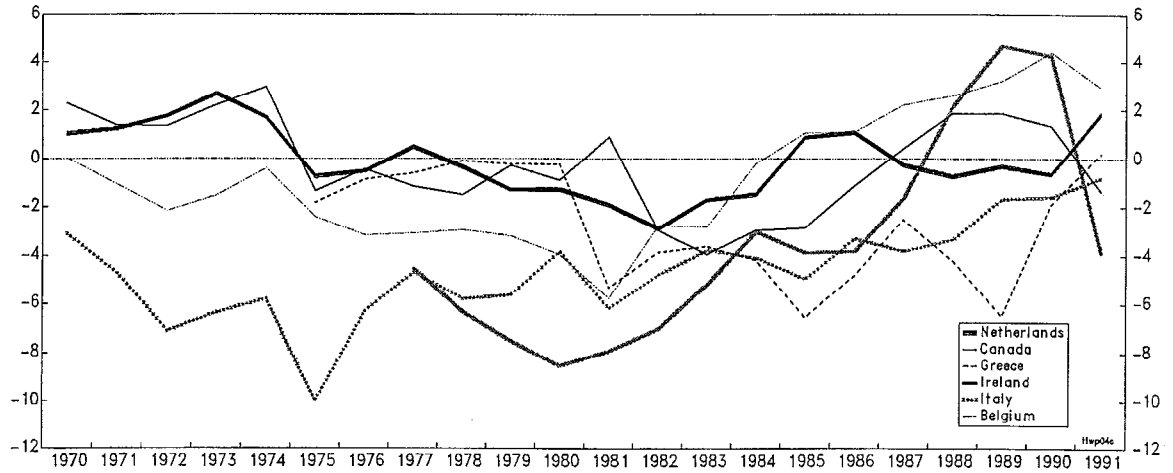
FIGURE 3
SELECTED COUNTRIES

GENERAL GOVERNMENT PRIMARY BALANCE

(In percent of GDP)





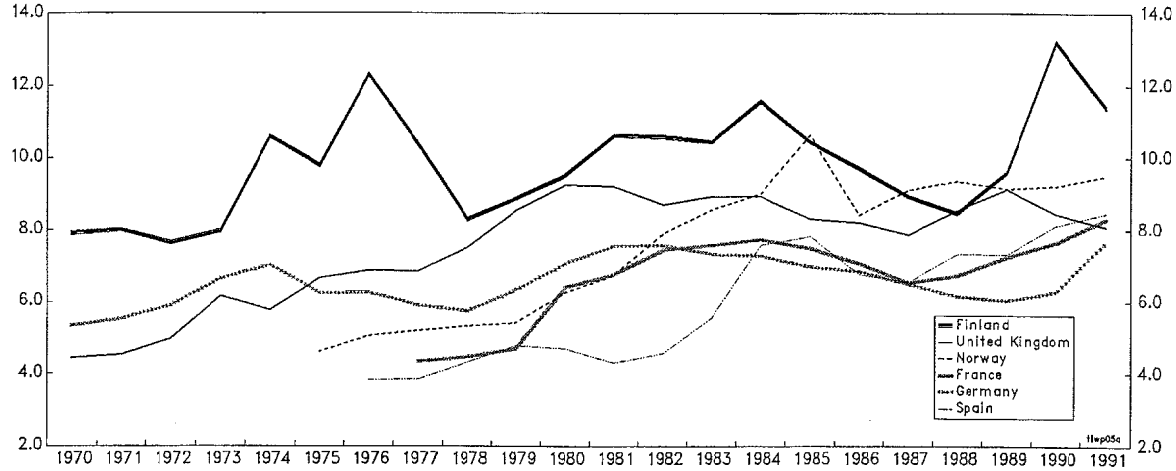


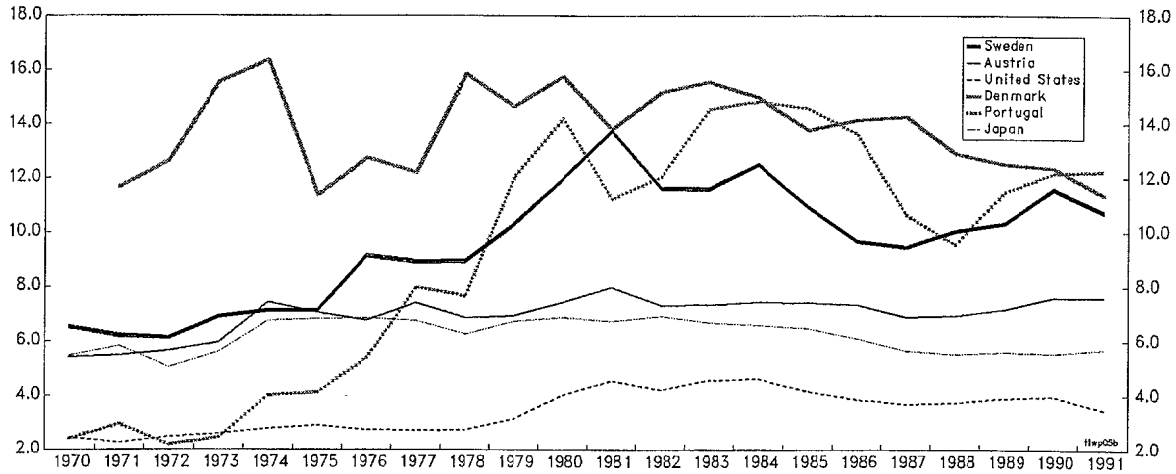
Source: OECD, Economic Outlook.

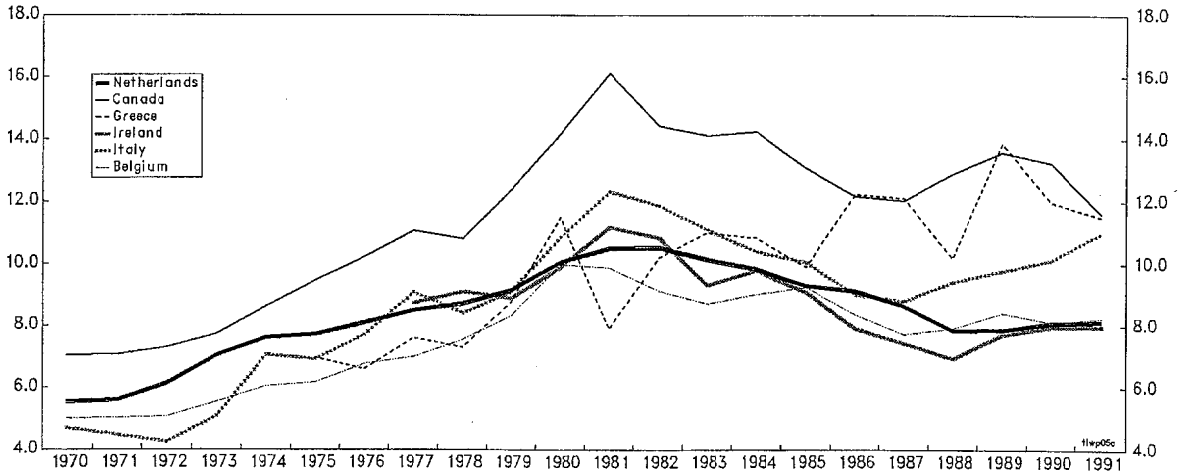
FIGURE 4
SELECTED COUNTRIES

GENERAL GOVERNMENT IMPLICIT INTEREST COST

(In percent)







Source: OECD, Economic Outlook.

10. If the debt dynamics are unsustainable, in the sense that the debt ratio resulting from equation (2) is continually rising, the needed adjustment may come through fiscal adjustment, inflation (and attendant currency depreciation), or default. The financial consequences of sustainability (or the prospect thereof) depends on which of these alternatives or combination thereof market participants consider most likely. Thus the variables that affect the debt dynamics may affect the average costs of servicing debt to the extent that it may incorporate some element of premium for inflation and devaluation risk and pure credit risk. In addition, other factors, some of which are country-specific, may affect market participants' perceptions of the probability that unsustainable debt dynamics will be corrected through fiscal adjustment rather than through inflation or default. Other variables, such as taxation and the liquidity of financial markets, may also affect the pricing of debt for given a fiscal situation.

11. Accordingly, the average interest cost of the debt may be hypothesized to depend on the variables affecting the debt dynamics, as follows:

$$i_{it} = a_{0i} + a_1 f_{it} + a_2 \pi_{it} + a_3 b_{it} + a_4 g_{it} \qquad (3)$$

where the a_j's are coefficients (including a country-specific dummy a_{0i}); i indexes countries and t time. The predictions are that $a_2, a_3 > 0$ while $a_1, a_4 < 0$. Empirical estimates of equation (3) will be presented in the next section.

III. EMPIRICAL ANALYSIS

12. This section presents empirical results for a panel of 19 OECD countries using annual data for 1970 to 1991. All data are from the OECD Economic Outlook database. Available country-year data points are listed in the Appendix.

13. The primary measure of a country's average interest cost of public debt i_{it} the ratio of general government gross interest expenditure to the stock of debt outstanding at the end of previous year (although alternative measures will be examined to assess the results' robustness). All of the panel-data regressions presented in this paper are fixed-effect models, including a full set of country-specific dummies. A complete set of time dummies (one for each year) or a time trend is also included in some regressions for pragmatic reasons.

14. Table 1 presents estimates of equation (3) for the whole sample. Regression [1] is estimated with ordinary least squares (OLS). Since the residuals from this regression show evidence of group-wise heteroskedasticity, all subsequent regressions use feasible generalized least squares (GLS) allowing the error terms of different countries to have different variances;

Table 1. Estimates for Alternative Specifications

(Full Sample, 1969–91)

Explanatory Variables	(1) OLS	(2) GLS	(3) GLS	(4) GLS
Primary	-0.0724	-0.1414	-0.0605	-0.1393
	(0.0385)	(0.0292)	(0.0264)	(0.0274)
Inflation	0.1204	0.0877	0.1288	0.1561
	(0.0318)	(0.0277)	(0.0236)	(0.0242)
Debt	0.0482	0.0379	-0.0119	-0.0091
	(0.0064)	(0.0047)	(0.0041)	(0.0053)
Growth	-0.1698	-0.0938	-0.0225	-0.0550
	(0.0439)	(0.0288)	(0.0306)	(0.0305)
Time Trend	--	--	--	0.0021
				(0.0001)
Time Dummies	No	No	Yes	No
Adjusted R^2	0.6952	0.6753	0.8031	0.7653
Observations	370	370	370	370
Countries	19	19	19	19

the parameter estimates are sensitive to this change in estimation method and there is a considerable gain in efficiency. Regression [3] includes a full set of year dummies, and [4] instead includes a time trend.[8]

15. The results confirm the relevance of fiscal variables to borrowing costs. For all four specifications, a government running a primary surplus faces significantly lower interest costs. The magnitude of the coefficients is also large: a one-percentage-point increase in the primary surplus-to-GDP ratio associated with a reduction in the unit cost of debt servicing of roughly 10 basis points. For a government with a large debt, this would provide an important additional reason for fiscal adjustment.

16. Equally robust and significant are the effects of inflation on the cost of debt. As discussed above, current inflation has two opposing effects on the debt: in addition to the usual Fisher effect, higher inflation *ceteris paribus* improves the debt dynamics. The opposition of these two effects may in part explain why the coefficients in all equations are around 0.1, much smaller than predicted by the Fisher effect alone (although in line with many other empirical estimates of the Fisher effect—see e.g. Carmichael and Stebbing, 1983). The errors in variables problems resulting from the use of annual inflation in the equation, when it is expected inflation that is relevant to the Fisher effect, may also partly explain the magnitude of the estimated coefficients.

17. The results for the debt-to-GDP ratio are somwhat puzzling. When only country effects are controlled for (regression [2]), the coefficient is significantly positive as predicted, and the magnitude is plausible: a 1-percentage point increase in debt is associated with a 0.03 percentage point increase in borrowing costs. However, this effect disappears when time effects or a time trend are added: the coefficient turns negative (although only significantly so with the full set of year dummies). This may reflect an important time trend in the debt stock itself; another possible explanation is division bias, since the dependent variable is interest expenditure divided by the stock of debt.[9]

18. The rate of growth of the economy tends, as predicted, to lower the cost of debt, but the effect is not statistically significant in the two specifications that control for time. In addition, the economic magnitude of the effects is rather small. For example, increasing the real growth rate by 1 percentage point reduces the unit cost of debt by about 10 basis points.

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[8]The loss of degrees of freedom resulting from including 22 year dummies obvious weakens many of the results, both here and later in the paper. However, the hypothesis that these dummies could be replaced by the time trend was rejected, $F(21, 325) = 3.67$.

[9]When the long-term interest rate instead of the implicit average interest cost of debt is used as the dependent variable, the results are qualitatively similar, and the significant negative coefficient on debt disappears, but the coefficient is insignificant where a time trend or time dummies are included.

This may reflect the errors-in-variables bias associated with the including annual growth rates when long-run growth rates are relevant to the debt dynamics.

19. Next, the sample period was broken up into two sub-periods, reflecting the differences in the global macroeconomic environment of the 1970s and the 1980s. The results of estimated separate equations using GLS for 1969-1979 and 1980-1991 sub-periods are reported in Table 2. Both Chow and Wald tests reject (at the 0.05 level or lower) the hypothesis that the coefficients were the same in the two sub-periods. Regressions [6] and [9] contain year dummies, while [7] and [10] include a time trend.

20. The results presented in Table 2 suggest that the link between debt and borrowing costs are less clear in the 1970s than in the 1980s. In particular, for the 1970s, the effect of the primary balance on borrowing costs is negative and significant only when no time dummies or trend is included; in contrast, this effect is significant in all three specifications for the 1980s. The coefficients on inflation are significant and large in both sub-decades, but they are much larger in magnitude in the 1970s. This may reflect interaction between debt and inflation in the effects of inflation on debt sustainability—a hypothesis to be explored further below: in the 1970s, when most countries' debt stocks were lower, the Fisher effect was dominant, while in the 1980s when most countries' debts were generally larger the benefits were partly offset by the effect of inflation on debt sustainability. It may also reflect higher and more variable inflation in the 1970s, which may have resulted in larger interest premia for expected inflation and possibly also inflation risk.

21. A hypothesis that emerges from the foregoing discussion is that the influence of fiscal variables on borrowing costs may be different for high-debt than for low-debt countries: specifically, a shock to outstanding debt, the primary balance, or inflation may have a greater effect on the perceived probability of inflation or default in countries with a large outstanding debt than in low-debt countries. It was suggested above that this may partly explain the different estimated coefficients in the high-debt 1980s than in the lower-debt 1970s. This hypothesis can be examined more directly by breaking up the sample into high- and low-debt observations. The high-debt subsample includes those country-year data points in which the gross debt to GDP ratio is above the Maastricht-Treaty threshold of 0.6, and the low-debt subsample all those below this threshold.

22. When the sample is broken up this way, the hypothesis of equal coefficients for the two subsamples is rejected by both the Chow and Wald tests at the 0.05 level for all four specifications. The results for the two subsamples are shown in Table 3. These results suggest that the impact of fiscal variables on borrowing costs may be stronger for countries with a large outstanding debt. In the high-debt sub-sample the size of the debt has now always a positive coefficient, although the coefficient is not significantly different from 0 in the specification with time dummies. In the low-debt sub-sample, in contrast, the size of the debt still enters negatively when time dummies are included, and it only significant when only country dummies are included. Thus the basic results of the paper pertaining to the effects of fiscal variables and inflation on debt appear more sharply for the subsample limited to high-debt cases.

Table 2. Sub-Period Estimates (GLS)

Explanatory Variables	1969–79			1980–91		
	(5)	(6)	(7)	(8)	(9)	(10)
Primary	-0.255	0.0001	0.0589	-0.0993	-0.0923	-0.1009
	(0.0505)	(0.0481)	(0.0407)	(0.0263)	(0.0269)	(0.0279)
Inflation	0.1845	0.1782	0.1455	0.0811	0.0659	0.0801
	(0.0296)	(0.0237)	(0.0237)	(0.0290)	(0.0320)	(0.0321)
Debt	0.0078	-0.0235	-0.0129	-0.0063	-0.0097	-0.0077
	(0.0166)	(0.0118)	(0.0131)	(0.0074)	(0.0078)	(0.0079)
Growth	-0.0311	-0.0481	-0.0143	0.0045	-0.0137	0.0005
	(0.0415)	(0.0349)	(0.0279)	(0.0324)	(0.0310)	(0.0329)
Time Trend	--	--	0.0033	--	--	0.0001
			(0.0003)			(0.0003)
Time Dummies	No	Yes	No	No	Yes	No
Adjusted R^2	0.7350	0.8548	0.8605	0.9479	0.8939	0.9400
Observations	149	149	149	221	221	221
Countries	18	18	18	19	19	19

Table 3. Subsample Estimates Based on Outstanding Debt (GLS)

Explanatory Variables	High Debt (11)	High Debt (12)	High Debt (13)	Low Debt (14)	Low Debt (15)	Low Debt (16)
Primary	-0.1991	-0.0351	-0.2565	-0.0340	-0.0220	-0.0375
	(0.0438)	(0.0374)	(0.0447)	(0.0453)	(0.0371)	(0.0342)
Inflation	0.1357	0.0889	0.1245	0.1462	0.1868	0.1900
	(0.0425)	(0.0238)	(0.0399)	(0.0342)	(0.0339)	(0.0285)
Debt	0.0441	0.0031	0.0194	0.0871	-0.0083	0.0056
	(0.0067)	(0.0085)	(0.0091)	(0.0099)	(0.0106)	(0.0106)
Growth	0.0121	0.0682	0.0473	-0.1505	-0.0785	-0.0764
	(0.0533)	(0.0386)	(0.0521)	(0.0447)	(0.0393)	(0.0321)
Time Trend	--	--	0.0014	--	--	0.0024
			(0.0004)			(0.0002)
Time Dummies	No	Yes	No	No	Yes	No
Adjusted R^2	0.9084	0.8837	0.9403	0.7618	0.7773	0.7801
Observations	105	105	105	265	265	265
Countries	12	12	12	17	17	17

23. Another question that can be explored is the extent to which differences between estimates for the 1970s and '80s reflect differences in international financial market conditions. This can be examined by including German long-term interest rates as an additional explanatory variable for all countries. Including this additional variable does not qualitatively affect the results.

24. One potential concern with the approach taken is associated with the possibility that some of the explanatory variables may be endogenous. In particular, a shock to the interest cost of debt servicing may affect the debt (through the cumulation of interest), the primary fiscal balance (through the authorities' reaction function) or the growth rate and/or inflation (via the monetary transmission mechanism). However, debt is defined as the stock at the end of the previous year, which is only correlated with the disturbance term in the previous year; budgets are typically made for the year ahead, so it is unlikely that this year's interest costs would affect the primary balance until at least the next year; and according to most estimates, lags in monetary transmission are such that only lagged interest rates are likely to affect growth and inflation. Thus all the explanatory variables may be correlated with lagged disturbances but probably only minimally with current disturbances. However, serial correlation in the disturbances could then introduce correlation between current disturbances and the explanatory variables. Tests were unable to reject the hypothesis that shocks were serially correlated, suggesting that this may potentially be a problem. This issue was explored further by using the standard Cochrane-Orcutt transformation to yield an equation with serially uncorrelated error terms; the resulting estimates barely differed from those obtained using OLS or GLS.[10] While this result is not conclusive, it suggests that the simultaneity problem, while of concern in principle, may not be serious in this instance.

IV. OTHER REASONS BORROWING COSTS DIFFER

25. The foregoing section has shown that much of the variation in the costs of servicing public debt can be explained in terms of the fundamentals that determine the debt dynamics. This still leaves a significant component to be explained in terms of other idiosyncratic factors; in the regression results, such factors are reflected in the country-specific dummies (which are significant in almost every instance, with a range of over 10 basis points) and may also be reflected in the time-specific dummies and the error term. To some extent, this unexplained variation in borrowing costs reflects the exchange rate regime as well as other unquantified factors that affect the credibility of monetary and fiscal policy, and thus investors' subjective probability that the current debt path will result in inflation or default. However, there are also some other important influences, which will briefly be discussed in this section.

26. Borrowing costs are importantly affected by **financial liberalization.** One aspect is domestic restrictions on financial markets and institutions, including restrictions on prices (such as interest rate ceilings) and on portfolio composition (such as liquidity requirements). A

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[10]Since these results were so similar, they are not reported here.

second aspect pertains to limitations on international capital movements. Either type of restriction can limit the extent to which borrowing costs reflect the market's assessment of credit and inflation risks.[11] Put differently, financial repression may significantly reduce borrowing costs (Giovannini and de Melo, 1993). The liberalization of both domestic financial markets and international capital movements in many industrialized countries in the 1980s may, in part, explain the difference in the determinants of borrowing costs in the two sub-periods.

27. Another set of influences is the **composition of the debt**, including its maturity and currency structure, and other features such as indexation. A substantial body of literature has examined the effects of debt composition on monetary policy credibility, to the extent that it affects the authorities' incentives to engineer surprise inflation (Calvo and Guidotti, 1992) or to yield to speculative pressures (Giavazzi and Pagano, 1989). Another consideration is the vulnerability of the fiscal position to external shocks: for instance, a debt with a larger foreign-currency or inflation-indexed component would be associated with a larger increase in borrowing costs in case of an adverse supply shock. In addition to these considerations, which imply that debt composition has a genuine effect on borrowing costs, there may be cosmetic effects resulting from imperfections of the accounting systems. For instance, in some countries part of returns on zero-coupon bonds is counted as expenditure only when interest is paid (at maturity), so that measured borrowing costs could be lowered by issuing such bonds; similar considerations apply to foreign-currency and inflation-indexed bonds where part of the return on the bonds consists of revaluation of the principal value of the bond, which may not be included in interest expenditure.

28. Another important issue is the quality of **market infrastructure**, including the structure of the secondary market, the efficiency of the payments and settlement system, the availability of means of financing for bond inventories (such as repurchase agreements), facilities for bond lending and short selling, and the existence of a primary dealer system that provides major institutions with the incentive to make a secondary market.[12] A related issue concerns **debt issuance**: borrowing costs can be reduced if debt is issued in such a way as to increase the market's depth and liquidity. This would include policies such as concentrated issues in benchmark maturities that pool market liquidity; encouraging participation in the market through regular debt auctions; and making upcoming issues more predictable by announcing an auction calendar.

29. **Taxation** has an important effect on the government's borrowing costs. Some of this influence is illusory, to the extent that both the government and bond-holders are concerned with the after-tax yield, and differences in taxation have largely offsetting effects on borrowing costs and on tax revenues. However, taxation may also lower net-of-tax borrowing costs if taxation of bond interest successfully discriminates among different holders, or it may raise

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[11]This is discussed further in Lane (1992).

[12]See Goldstein and Folkerts-Landau (1994).

costs if withholding tax results in market segmentation due to its differential impact on different investors.

30. Finally, the country-specific component may reflect a range of **political economy considerations** that affect the probability of inflation or default for a given level of fiscal imbalances. For instance, Caselli (1997) develops a model that features a systematic tendency for coalition governments to be more default-prone than majority governments, and presents empirical evidence suggesting that such considerations tend to be reflected in higher risk premia for coalition governments.

V. CONCLUSION

31. A simple empirical analysis of OECD countries has shown that the costs of servicing public debt depends importantly on the variables that determine the debt dynamics: primary fiscal balances, outstanding debt, inflation, and growth. As is plausible, the results are stronger when the sample is confined to high-debt countries, for which unsustainable debt dynamics are more likely to be perceived as affecting inflation prospects and perceived credit risk. In particular, the outstanding stock of debt has a significantly larger effect on borrowing costs for higher-debt countries.

32. A key result concerns the effect of the primary balance on the cost of debt servicing. For a variety of specifications, a one-percentage-point improvement in the primary balance is associated with a roughly ten-basis-point reduction in average costs of debt servicing. This has the effect of amplifying the effects of fiscal adjustment.

33. The analysis confirms that a substantial part of the variation in borrowing costs and across countries can be attributed to "fundamentals". At the same time, there remains a significant element that is unexplained, particularly as reflected in large and significant country-specific effects—variations that may be explained, in part, by aspects of debt management, the financial system, and taxation. It suggests that improvements in debt management and financial system development may play more than a marginal role in reducing the burden of servicing public debt.

The Data

Annual data on general government debt and primary balances, real GDP, and inflation are from the OECD *Economic Outlook* database.

Data for Austria, Belgium, Canada, Finland, Germany, Italy, Japan, Netherlands, Portugal, the United Kingdom, and the United States are for 1970-91. Data for Australia are for 1987-91; for Denmark, 1971-91; for France, 1977-91; for Greece and Norway, 1975-91; for Ireland, 1977-91; for Spain, 1976-91; and for Sweden, 1974-91.

REFERENCES

Alesina, Alberto, and Roberto Perrotti, 1995. The Political Economy of Budget Deficits. *IMF Staff Papers*, Vol. 42 (March), pp. 1–31.

Alesina, Alberto, Alessandro Prati, and Guido Tabellini, 1990, Public Confidence and Debt Management: A Model and a Case Study for Italy. In R. Dornbusch and M. Draghi (ed.), *Public Debt Management: Theory and History*, Cambridget University Press, Cambridge.

Alesina, Alberto, Mark De Broeck, Alessandro Prati, and Guido Tabellini, 1992, Default Risk on Government Debt in OECD Countries. *Economic Policy: A European Forum* pp. 428–463.

Calvo, Guillermo, and Pablo Guidotti, 1992, Optimal Maturity of Nominal Government Debt: An Infinite-Horizon Model. *International Economic Review* Vol. 33 (November), pp. 895–919.

Carmichael, Jeffrey, and Peter W. Stebbing, 1983, Fisher's Paradox and the Theory of Interest. *American Economic Review* Vol. 73, No. 4 (September), pp. 619–630.

Caselli, Francesco, 1987, On the Distribution of Debt and Taxes. *Journal of Public Economics* (forthcoming).

Cottarelli, Carlo, and Mauro Mecagni, 1990, The Risk Premium on Italian Government Debt, 1976–88. *IMF Staff Papers* Vol. 37, No. 4 (December), pp. 865–880.

Giavazzi, Francesco, and Marco Pagano, 1990, Confidence Crises and Public Debt Management. In Rudiger Dornbusch and Mario Draghi (eds.), *Public Debt Management in Theory and History*, Cambridge: Cambridge University Press.

Giavazzi, Francesco, and Luigi Spaventa, 1988, *High Public Debt: The Italian Experience*. Cambridge University Press: Cambridge.

Giovannini, Alberto, and Martha de Melo, 1993, Government Revenue from Financial Repression. *American Economic Review* Vol. 83 (September), pp. 953–963.

Giovannini, Alberto, and Gustavo Piga, 1992, Understanding the High Interest Rates on Italian Government Securities. Center for Economic Policy Research Discussion Paper Series No. 720 (October).

Goldstein, Morris, David Folkerts-Landau, and others, 1994, *International Capital Markets: Developments, Prospects, and Policy Issues*. (Washington: International Monetary Fund).

Lane, Timothy D., 1992, Market Discipline. *IMF Staff Papers* Vol. 40, pp. 53–88.

Lane, Timothy D., 1997, High Public Debt: Consequences for Investment and Growth. In Paul J.J. Welfens and Holger C. Wolf (ed.), *Banking, International Capital Flows, and Growth in Europe*. Berlin: Springer Verlag, 1997.

Sargent, Thomas J., and Neil Wallace, 1981, Some Unpleasant Monetarist Arithmetic. *Federal Reserve Bank of Minneapolis Quarterly Review* 5, pp. 1–17.