

Tax Smoothing and Credibility: Evidence and Policy Implications

Survey of Theoretical Literature

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Presentation Outline

- Tax Smoothing with conventional debt instruments: evidence and policy implications.
- Relevance of Tax Smoothing approach for policy
- Role of debt instruments for the credibility of the anti-inflationary policy

Tax Smoothing

- Main insight: minimize risk of having to change tax rates
- Debt instruments can be used to insure against shocks to:
 - a) tax bases and thus revenues
 - b) public spending
 - c) interest rates and thus interest payments
- What is the risk that debt managers care about?
- What does tax-smoothing suggest as the relevant risk?
- Which debt instruments are supported by the empirical evidence?

Policy Approach to Risk Minimization

- Avoid exposure to exchange rate variations
- Avoid refinancing risk: a) interest-rate risk
b) risk of funding crisis
- The first concern suggests a domestic currency denomination of public debt.
- The second concern suggests long-term debt and a balanced maturity structure.

Currency Denomination

- Bohn (1990a), Goldfajn (1995), de-Fontaney et al. (1995)

Is preference for domestic currency consistent with TS?

- Exchange rate volatility *per se* favors domestic currency
- Depreciation is often associated with bad shocks to the budget which strengthens the case for domestic currency.

With fixed exchange rates:

- Currency crises are often the result of excessive spending
- Currency crises lead to substantial output falls

Evidence is Against Foreign Currency Debt

- Goldfajn (1995), Missale (1997,1999)

Maturity Structure

Is preference for long-term debt and balanced maturity structure consistent with Tax Smoothing?

- Need to distinguish real from nominal interest rates.
- Need to consider correlation with public spending and economic activity.

VOLATILITY UNRELATED TO BUDGET VARIABLES

- Real rate volatility calls for long maturity debt.
(If real rates rise there is a cost to the extent that new debt must be issued.)
 - Volatility due to expected inflation calls for indexed debt.
(Conventional debt implies unnecessary gains and losses)
- Barro (1995,1997)

Maturity Structure

INTEREST RATES CORRELATED WITH ECONOMIC ACTIVITY

- Positive correlation favors short-term, variable-rate debt
Ex: productivity growth – Gale (1990)
- Negative correlation favors fixed-rate long-term debt
Ex: monetary policy reacting to inflationary pressure

FUNDING CRISES

- can be triggered or worsened by short-term debt and unbalanced maturity Giavazzi-Pagano (1990), Alesina et al. (1990), Obstfeld (1994), Sachs et al. (1998)

Maturity Structure

Evidence Supports Long-term Conventional Debt but Optimal Share is Small: 20%

correlation between interest rates and output innovations is negative but weak.

- Bohn (1990b), Hawkesby-Wright (1997), Missale (1999)
- But evidence is biased in favor of short-term debt, since the analysis does not capture the effect of interest rate volatility if unrelated to other variables -- Missale (1999)

Nominal Vs Inflation-Indexed

- Bohn (1988,1990b) Calvo-Guidotti (1990),
Barro (1995,1997)

IT DEPENDS ON THE TYPE OF SHOCKS:

- Supply shocks and spending shocks favor nominal debt.
- Demand and monetary shocks favor indexed debt.

NOMINAL DEBT CAN BE INFLATED AWAY IN
EMERGENCIES LIKE WARS

- Fischer (1983), Lucas-Stokey (1983)

INDEXED DEBT IS A HEDGE AGAINST
NOMINALISTIC FEATURES OF TAX SYSTEM

Nominal Vs Indexed

Evidence is Mixed; It Depends on the Country and on the Period

- Bohn (1990b): only nominal is optimal for the US
- Goldfajn (1995), Missale (1997,1999): it depends on countries.
- There seems to be scope for price indexation in many countries.

Is Evidence Useful for Policy?

PROBLEMS

- The effect of interest-rate volatility is not captured if unrelated to other variables
- Results are sensitive to the variables in the information set
- Estimation tends to miss rare but important events
- Results change depending on the period considered:
 - i) structural breaks, changes of regime
 - ii) different shocks in different periods
- **FUTURE SHOCKS ARE UNPREDICTABLE**
past correlations are difficult to be exploited

Is Tax Smoothing Useful?

HOPE

- Structural analysis of relations between financing needs and inflation, interest rates, etc.

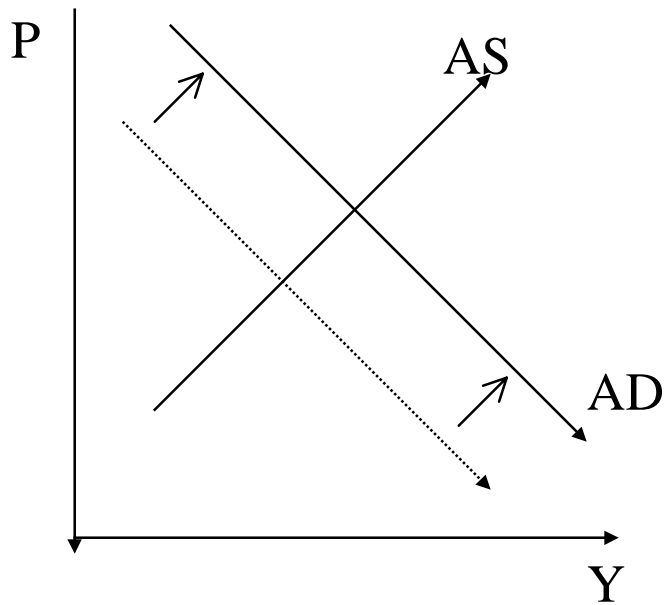
Ex: more persistent supply shocks than demand shocks favor nominal debt -- Hawkesby-Wright (1997)

- Monetary regime has implications for type of correlation

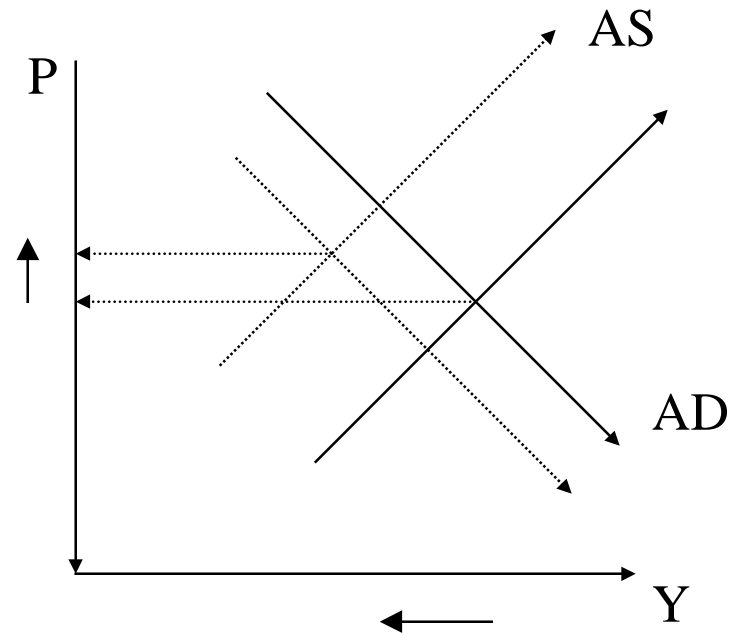
Ex: Inflation Targeting (Taylor's Rule) favors nominal debt:

- demand shocks are fully offset
- supply shocks are partially accommodated

Inflation Targeting



Demand Shock
Fully offset



Supply Shock
partly accommodated

Policy Credibility

Choice of taxes and maturity structure affects interest rates.
Lucas-Stokey(1983) Persson al(1987) Calvo-Guidotti(1992)

- Choice of debt instruments and maturity affects inflation expectations.
 - Bach-Musgrave (1941), Calvo (1988), Bohn (1988, 1991), Calvo-Guidotti (1990), Missale-Blanchard (1994), etc.
- Inflation-indexed, foreign-currency and variable-rate debt rule out inflationary temptations and can lead to lower expected inflation and thus lower inflation:
 - they enhance the credibility of anti-inflationary policy.

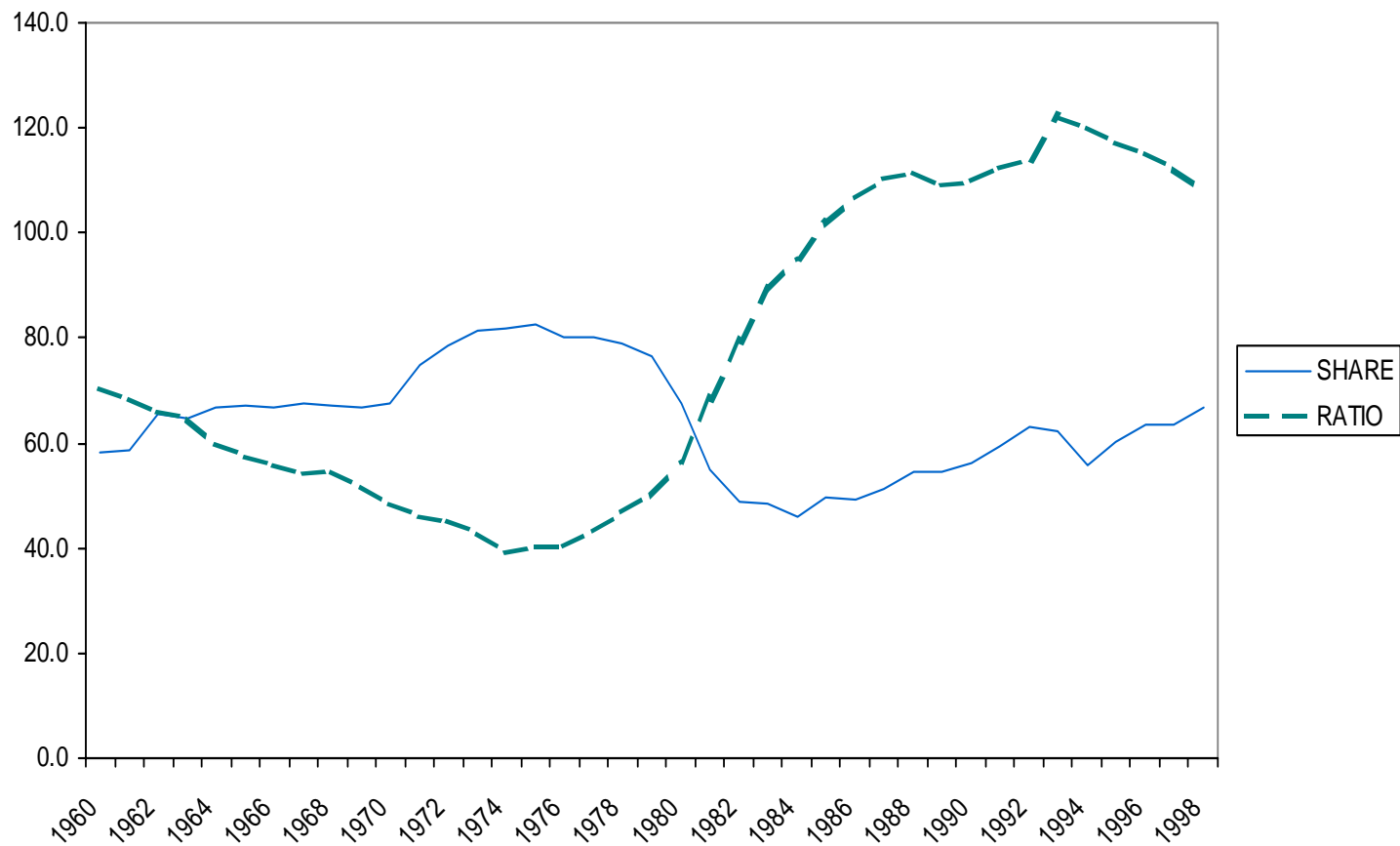
Why is Indexed Debt Not Issued?

- It cannot be inflated away in emergencies; it precludes insurance against supply shocks
- Central Bankers fear that it reduces vigilance toward inflation; it weakens the constituency against inflation.
 - Uhlig (1997), Pecchi-Piga (1999)
- It is costly to introduce because:
 - i) markets do not like indexation, lags, etc.
 - ii) problems in pricing and hedging indexed bonds.

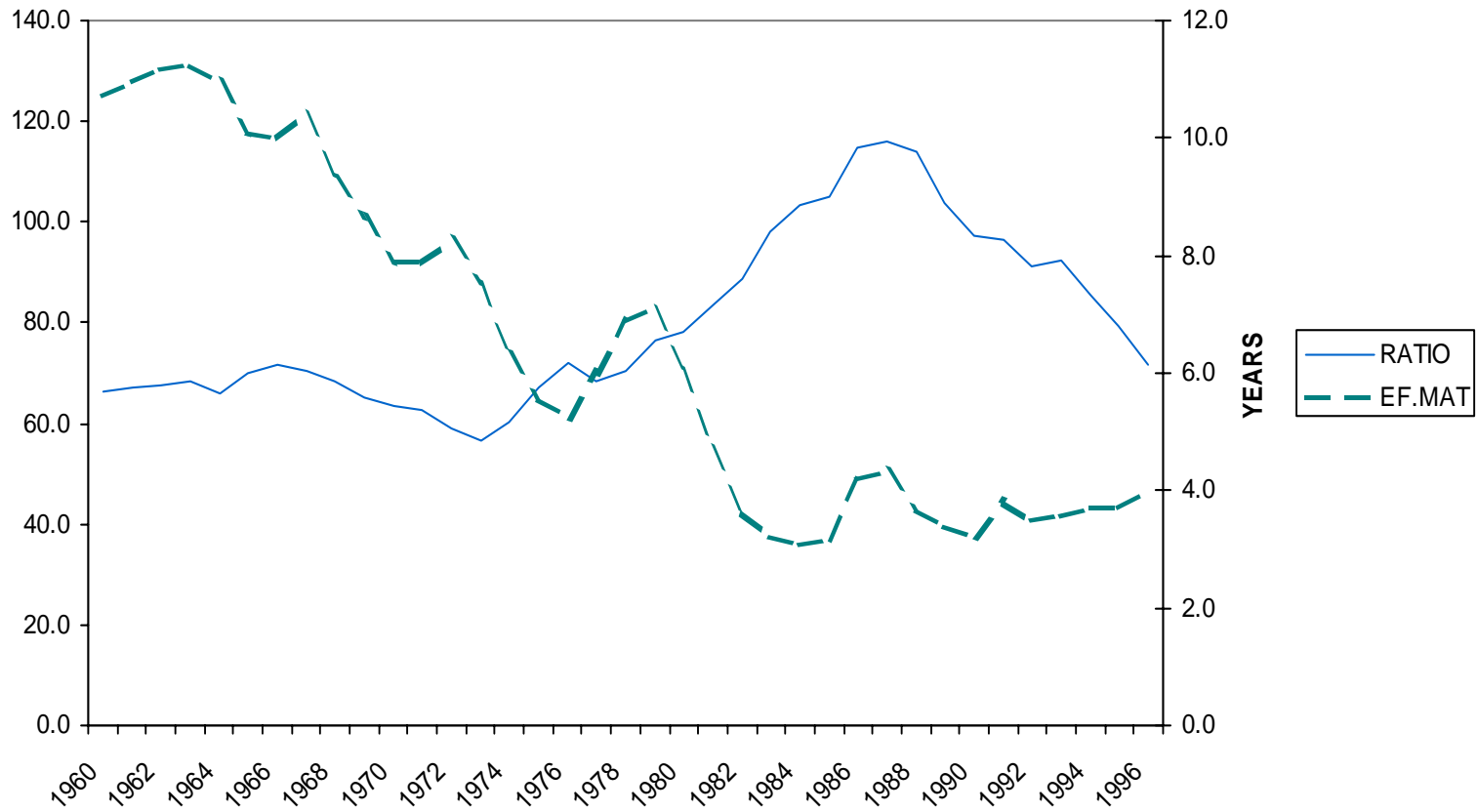
Evidence of Credibility Effects

- In the EMS foreign currency and short-term debt appear to increase the probability to maintain the fixed parity - Falcetti-Missale (1999)
- In OECD countries short debt is issued before stabilization attempts when long-term rates are "too high" because the program lacks credibility -- Missale et al. (1997).
- In highly indebted OECD countries until the late 1980s we observe a negative relation between maturity and the debt-to-GDP ratio -- Missale-Blanchard (1994), De-Broeck (1997), Missale (1999).
- However, debt maturity lengthens in the 1990s.

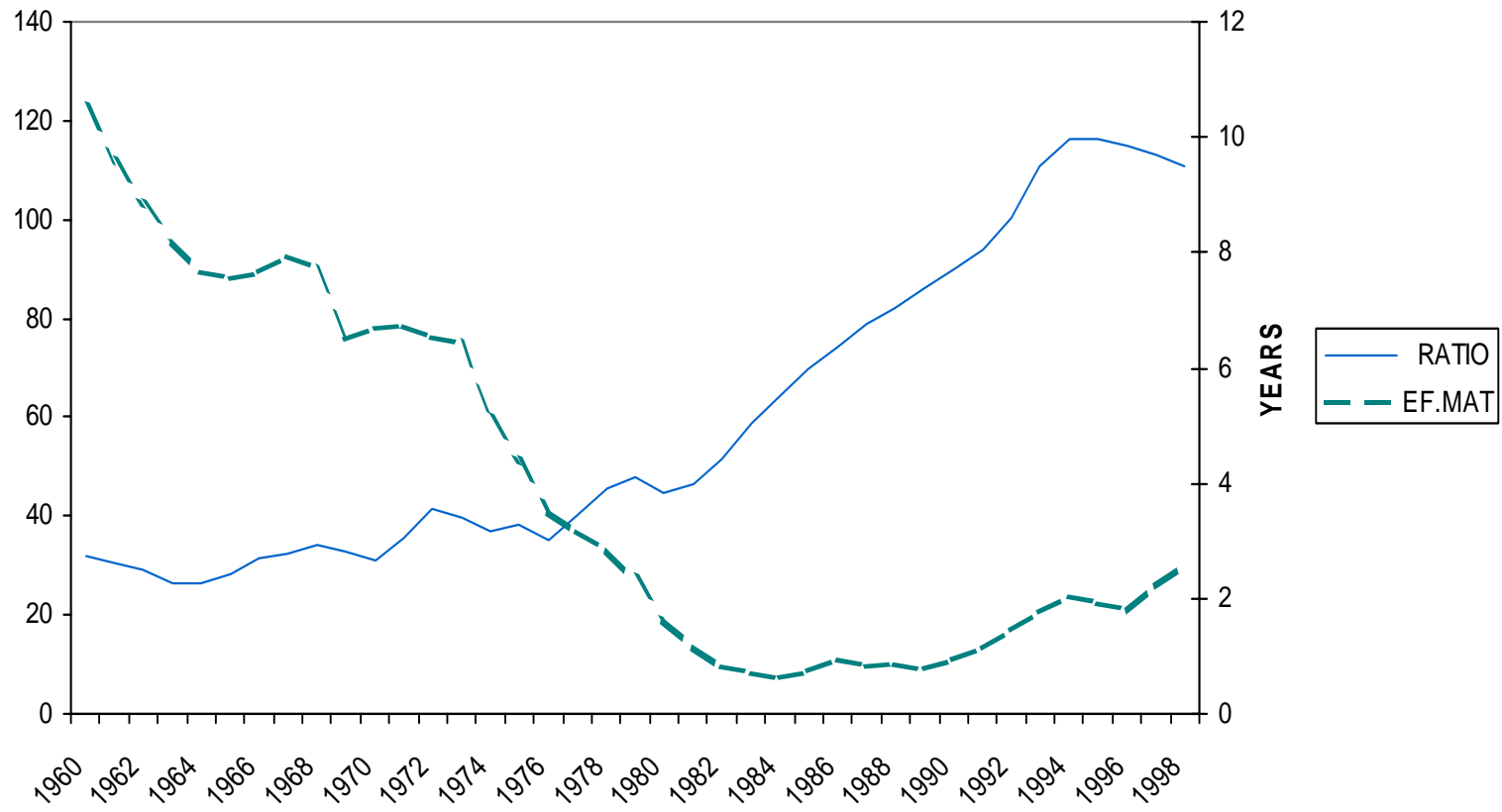
BELGIUM: DEBT RATIO AND FIXED-RATE LONG-TERM DEBT



IRELAND: DEBT RATIO AND EFFECTIVE MATURITY



ITALY: DEBT RATIO AND EFFECTIVE MATURITY



Institutional Design Vs Debt Management

- When the Central Bank is NOT independent, short-term debt, indexed debt, etc. must be issued to control inflation expectations, also to reduce costs.
- With Central Bank independence debt management is no longer needed for credibility:

It is more efficient to grant independence to the CB.

- Leong (1999), Falcetti-Missale (1999).

References:

- Alesina, A., A. Prati and G. Tabellini (1990)**, "Public Confidence and Debt Management: a Model and a Case Study of Italy," in R. Dornbusch and M. Draghi, eds., *Public Debt Management: Theory and History* (94-124), Cambridge: Cambridge University Press.
- Bach, G.L. and R.A. Musgrave (1941)**, "A Stable Purchasing Power Bond," *American Economic Review*, 31, 823-25.
- Barro, R.J. (1995)**, "Optimal Debt Management," NBER Working Paper No.5327, October.
- Barro, R.J. (1997)**, "Optimal Management of Indexed and Nominal Debt," NBER Working Paper No.6197, September.
- Bohn, H. (1988)**, "Why Do We Have Nominal Government Debt?," *Journal of Monetary Economics*, 21, 127-40.
- Bohn, H. (1990)**, "Tax Smoothing with Financial Instruments," *American Economic Review*, 80(5), 1217-30.
- Bohn, H. (1990b)**, "A Positive Theory of Foreign Currency Debt," *Journal of International Economics*, 29, 273-92.
- Bohn, H. (1991)**, "Time Consistency of Monetary Policy in the Open Economy," *Journal of International Economics*, 30, 249-66.
- Calvo, G.A. (1988)**, "Servicing the Public Debt: the Role of Expectations," *American Economic Review*, 78(4), 647-61.
- Calvo, G.A. and P.E. Guidotti (1990)**, "Indexation and Maturity of Government Bonds: An Exploratory Model," in R. Dornbusch and M. Draghi, eds., *Public Debt Management: Theory and History* (52-93), Cambridge: Cambridge University Press.
- Calvo, G.A. and P.E. Guidotti (1990b)**, "Credibility and Nominal Debt," *IMF Staff Papers* 37, September, 612-35.
- Calvo, G.A. and P.E. Guidotti (1992)**, "Optimal Maturity of Nominal Government Debt: An Infinite-Horizon Model," *International Economic Review*, 33(4), 895-919.
- De-Broeck, M. (1997)**, "The Financial Structure of Government Debt in OECD Countries: An Examination of the Time-Consistency Issue," *Journal of Monetary Economics*, 39, 279-301.
- de Fontenay, P., G.M. Milesi-Ferretti and H. Pill (1995)**, "The Role of Foreign Currency Debt in Public Debt Management," IMF Working Paper no. 95/21, revised version May 1995.
- Falchetti, E. and A. Missale (1999)**, "The Currency Denomination of Public Debt and the Choice of the Monetary Regime," CEP/LSE Discussion Paper No.427, London, June.

Fischer, S. (1983), "Welfare Aspects of Government Issue of Indexed Bonds," in R. Dornbusch and M.H. Simonsen, eds., *Inflation Debt and Indexation* (223-46). Cambridge MA: MIT Press.

Gale, D. (1990), "The Efficient Design of Public Debt," in R. Dornbusch and M. Draghi, eds., *Public Debt Management: Theory and History* (94-124), Cambridge: Cambridge University Press.

Giavazzi, F. and M. Pagano (1990), "Confidence Crises and Public Debt Management," in R. Dornbusch and M. Draghi, eds., *Public Debt Management: Theory and History* (94-124), Cambridge: Cambridge University Press.

Goldfajn, I. (1995), "On Public Debt Indexation and Denomination," Brandeis University Working Paper, No.345.

Hawkesby, C. and J. Wright (1997), "The Optimal Public Debt Portfolios for Nine OECD Countries: A Tax Smoothing Approach," mimeo, University of Canterbury, New Zealand.

Leong, D. (1999), "Debt Management - Theory and Practice," mimeo, HM Treasury, London.

Lucas, R.E. and N.L. Stokey (1983), "Optimal Fiscal and Monetary Policy in an Economy Without Capital," *Journal of Monetary Economics*, 12, 55-94.

Missale, A. (1997), "Tax Smoothing with Price Indexed Bonds: A Case Study of Italy and the United Kingdom," in M. De Cecco, L. Pecchi and G. Piga, eds., *Managing Public Debt: Index-Linked Bonds in Theory and Practice* (50-92), Cheltenham: Edward Elgar.

Missale, A. (1999), *Public Debt Management*, Oxford: Oxford University Press.

Missale, A. and O.J. Blanchard (1994), "The Debt Burden and Debt Maturity," *American Economic Review*, 84(1), 309-19.

Missale, A., F. Giavazzi and P. Benigno (1997), "Managing the Public Debt in Fiscal Stabilizations: The Evidence," NBER Working Paper No.6311, December.

Obstfeld, M. (1994), "The Logic of Currency Crises," NBER Working Paper No.4640, February.

Pecchi, L. and G. Piga (1997), "The Politics of Indexed-Linked Bonds?," *Economics and Politics*, 11(2), 201-12.

Persson, M., T. Persson and L.E.O. Svensson (1987), "Time Consistency of Fiscal and Monetary Policy," *Econometrica*, 55(6), 1419-32.

Sachs J., Tornell A. and A. Velasco (1996), "The Mexican Peso Crisis: Sudden Death or Death Foretold," *Journal of International Economics*, 41, (3/4) 265-83.

Uhlig, H. (1997), "Long Term Debt and the Political Support for a Monetary Union," CEPR Discussion Paper No.1603, March.

Other Useful References:

- Calvo, G.A. and M. King (1998)**, *The Debt Burden and its Consequences for Monetary Policy*: Proceedings of a Conference held by the International Economic Association held at the Deutsche Bundesbank, Frankfurt. IEA Conference volume No.118, McMillan Press.
- Dale, S., A. Mongiardino and D. Quah (1997)**, "A Modest Proposal for Setting the Public Debt Structure," CEPR/ESRC Workshop on Optimal Fiscal Policy, April.
- De-Cecco, M., L. Pecchi and G. Piga (1997)**, *Managing Public Debt: Index-Linked Bonds in Theory and Practice*, Cheltenham: Edward Elgar.
- Milesi-Ferretti, G.M. (1995)**, "Do Good or Do Well? Public Debt Management in a Two Party Economy," *Economics and Politics*, 7(1), 59-78.
- Missale, A. (1997)**, "Managing the Public Debt: The Optimal Taxation Approach," *Journal of Economic Surveys*, 11(3), 235-65.
- Sundararajan, V., P. Dattels and H.J. Blommestein (1997)**, *Coordinating Public Debt and Monetary Management*, IMF.