1 · INTRODUCTION

Fiscal policy is once again at the center of the economic policy debate all over the world. Professional economists and economic policy-makers try to make sense of a bewildering variety of data generated by often badly managed national, regional and global economic laboratories.

Among the open issues that (should) trouble the sleep of those responsible for the design of monetary, fiscal and financial policy are the following:

How can we reconcile the 'twin deficits' of the United States, i.e. the more or less simultaneous emergence of deficits in the current account of the balance of payments and in the Federal budget, with the recent development in Britain of a large current account deficit in the balance of payments at the same time as the public sector budget was moving into surplus?

Are public sector budget deficits monetized sooner or later, i.e. do they eventually spell inflation? Is a correction of the fiscal deficit a necessary condition for a sustained reduction in the rate of inflation?

Is it true, as argued by (among others) Milton Friedman and Robert Barro, that (to a first approximation) the only relevant aspects of the budget are the volume and composition of public spending on real goods and services and that the choice of financing method (taxation, domestic credit expansion or borrowing) is irrelevant? Does financial crowding-out of private saving, capital formation and/or the current account surplus by public sector debt remain a concern?

What remains of the Keynesian arguments for countercyclical budget deficits? Going beyond the above-mentioned first approximation, is the neo-classical tax-smoothing argument (that, since non-distortionary taxes do not exist, planned or expected distortionary tax rates should be smoothed to minimize the efficiency losses inevitably involved in financing the government's spending program) the only remaining rationale for countercyclical budget deficits?

How do we assess the solvency of a government? How do we evaluate the consistency of the government's spending and revenue-raising plans with its outstanding debt obligations and its inflation objectives?

How does the pursuit of internal or external stabilization objectives through fiscal means affect the government's structural (or allocative) and distributional objectives?

These and similar issues have been a central concern in my research since I was a graduate student at Yale in the early 1970s. A representative sample of my work on fiscal and financial policy is brought together in this volume. The 13 essays that follow this Introduction develop four major themes and are organized into five parts.

The first theme, which pervades the essays in each of the five parts, is that the stabilization role of fiscal policy cannot be analyzed separately from its allocative and distributional roles. Variations in any given fiscal instrument (public spending category, tax rate, etc.) will affect the balance between aggregate output and absorption or demand, will alter the key relative prices (static and intertemporal) and rationing constraints faced by private agents, and will alter the distribution of resources.

The second theme, which is the central topic of Part II ('Issues of Measurement') and crops up repeatedly in each of the other parts, focuses on the measurement of public sector activity over time. Giving priority to issues of measurement and accountancy does not merely reflect the fact that, fundamentally, economists are bookkeepers with ambitions (or pretensions). Without measurement there can be no science. Also, the way we measure things, organize data and try to map them into their theoretical counterparts will color our understanding of the processes we are monitoring.

The snapshot, single-period view of the government's corner of the flow-of-funds accounts known as the public sector deficit is now generally recognized to possess very little informational content about anything of interest to an economist, such as impact of fiscal policy on demand, crowding-out pressure, etc. Part II considers how (and to what extent) a longer-run perspective on the government's finances can be summarized in a single comprehensive government balance sheet or its flow counterpart, something which, by abuse of language, we might call a 'permanent deficit'.

The third theme concerns 'crowding out', the displacement of private economic activity by public economic activity. When we investigate this multi-dimensional concept, it soon becomes apparent that both the direct and the indirect or general equilibrium effects of public sector actions on private economic behavior can be reinforcing or complementary ('crowding in') rather than offsetting or substituting ('crowding out'). Part III ('Crowding Out') contains a wide-ranging theoretical analysis of this issue and

presents some tentative empirical evidence on the importance of financial crowding out.

Financial crowding out concerns the consequences of financing public sector deficits by borrowing. The fourth theme, emphasized in Part IV, but also present in Parts I, II and V, deals with the implications of choosing the alternative financing mode, domestic credit expansion or, in closed economic systems, monetary financing.

The government budget constraint (or budget identity) shows that any excess of expenditure over current revenues has to be met by asset sales, borrowing or domestic credit expansion. In conjunction with the government's (intertemporal) solvency constraint limiting the extent to which additional net debt can be incurred, this means that domestic credit expansion is endogenously or residually determined once the government fixes its expenditure and taxation plans, and assuming it will not default on its debt. What does this fiscal view of the ultimate determinants of monetary growth and thus of the rate of inflation tell us about policies to achieve a lasting reduction in the rate of inflation?

All four themes (the need to consider jointly the stabilization, allocative and distributional consequences of fiscal and financial policy; measurement issues; crowding out; and the fiscal origins of inflation) are introduced in a non-technical manner in Part I ('Setting the Scene'). In the final Part V ('Fiscal and Financial Policy in Developing Countries') we see how the tools and concepts developed under these four theme headings can be applied under the extreme conditions generated in the laboratory of developing countries facing severe internal and external disequilibrium.

We now turn to a more detailed review of the essays included in this volume.

1.1 SETTING THE SCENE

The two papers of Part I (Buiter, 1984b; 1985) are broad-ranging, non-technical papers aimed at a wider public. The first of these (Chapter 2) was my inaugural lecture at the London School of Economics (LSE) in 1983 (minus a section on public sector solvency and the consistency of fiscal, financial and monetary plans, dealt with at length in Chapters 3 and 4 in this volume). As I never got around to preparing the inaugural lecture for publication in *Economica* (the normal practice at the LSE), I am pleased to have this opportunity to reissue this rather uninhibited paper here.

The paper deplores the still prevalent split between approaches stressing the stabilization role of fiscal and financial policy and approaches stressing its allocative and distributional aspects.

The incentive- and distributional effects of non-lump-sum taxes, transfers

and subsidies and the incentive- and distributional effects of exhaustive public spending (complementarity or substitutability between public and private consumption and investment, conventional public goods issues, etc.) tend to be studied in universes where stabilization issues are ruled out a priori. (Stabilization here refers to policies designed to affect — and, one hopes, to minimize — gaps between actual levels of output and employment and their socially efficient levels, and to policies aimed at influencing the rate of inflation.) Competitive Walrasian economies, especially when endowed with complete contingent markets, do not permit consideration of the kinds of market failure that generate a potential use for stabilization policy. For example, except for policies aimed at influencing misperceptions-induced departures from the full information equilibrium, there can be no stabilization policy in New Classical models. In such economies, the consideration of financing problems, i.e. the issues involved in choosing the mix over time of various kinds of taxation, borrowing and monetary financing, for a given program of public spending on goods and services, reduces to a standard neoclassical exercise in optimal taxation. With the usual convexity assumptions, the general neoclassical policy prescription ('When in doubt, smooth it out') emerges predictably for conventional distortionary tax rates, especially when objective functionals are time-additive, when there is ample contemporaneous separability and when certainty equivalence rules (see, for example, Barro, 1979; and Kydland and Prescott, 1980). Similar results obtain for the inflation tax rate (see, for example, Phelps, 1973; Mankiw, 1987; and Barro, 1987).

The key Keynesian insight that market economies can get stuck in persistent non-Walrasian equilibria characterized by widespread underutilization and waste of human and non-human resources has not yet made its mark on those studies in public finance that look seriously at the structure of taxes, duties, tariffs, transfer payments, benefits, subsidies and public sector charges or at the composition and nature of exhaustive public spending programs.

Approaches that take seriously the possibility of significant and persistent failures of the invisible hand and emphasize the influence of fiscal, financial and monetary policy on aggregate demand (and through that on the levels of output and employment) have suffered from two weaknesses. The first is the rather coarse characterization of the spending and tax instruments and of the way in which they affect private sector behavior. Even in a demand-constrained equilibrium, it is likely to make a difference whether a given reduction in current tax revenues is achieved through a cut in personal income tax rates, corporate profit tax rates, capital gains tax rates, tariffs, etc. By the same token, the composition of an increase in public spending may be as important as its magnitude for the determination of its short-run and long-run effects.

Second, the economic mechanisms generating and supporting the non-

Walrasian equilibria are often spelled out poorly or not at all. Note, however, that the failure to generate the equilibrium as the outcome of a dynamic process unfolding in real time (and not in auctioneer's time) is shared by the Walrasian competitive equilibrium; no amount of repetition of the phrase 'all trades perceived to be mutually advantageous are exhausted' can substitute for an explicit analysis of how we get there from here.

Progress has been made, however, on the 'microfoundations' of Keynesian macroeconomics. It is well-known that efficiency-wage phenomena in the labor market (see, for example, Akerlof and Yellen, 1986) can generate persistent equilibria with socially inefficient unemployment of labor. When combined with imperfect competition in product markets (see, for example, Akerlof and Yellen, 1985a; 1985b; 1988; Buiter, 1988b) and with any plausible mechanism for generating *nominal* price or wage stickiness (e.g. menu costs or other real costs of nominal price adjustments, as surveyed in Rotemberg, 1987) such models provide, in principle, the microfoundations of demand management and of stabilization policy. Another promising approach to the microfoundations of Keynesian economics and to stabilization policy is through explicitly game-theoretic models (such as Cooper and John, 1988; or Shleifer and Vishny, 1988) stressing strategic complementarity, spillovers and externalities as the mechanism for generating Keynesian demand externalities or through the related models of search with externalities explored by Diamond (1982; 1988). Blanchard and Kiyotaki (1987) also belongs to this family. None of these new approaches to non-Walrasian economics has as yet come close enough to the institutional reality of modern market economies to permit a recognizable positive or normative analysis of public spending, taxation, borrowing and monetary financing. The very limited intertemporal structure of the current crop of new-Keynesian models is a further obstacle to a serious analysis of budgetary issues, many of which are inherently intertemporal. This will no doubt change in the future as this promising branch of enquiry develops further, but as of now we are stuck between the Scylla of the study of relevant spending and tax structures in uninteresting models and the Charybdis of the study of rudimentary tax and public expenditure options in more interesting models.

Virtually every change in exhaustive public spending programs, tax structures, benefit coverage, entitlement and enforcement will redistribute resources between (groups of) individuals, households, regions, social classes, etc. The often highly aggregative models of modern public finance may miss much that is important to human welfare.

The simple sequential general equilibrium models, such as the neoclassical growth models with an overlapping generations (OLG) structure on the household side, that are now often used for policy-oriented analyses of public finance issues, can lull the profession into a comfortable neglect of

important distributional issues. The most extreme example of this approach, the so-called representative agent models popularized especially by Lucas (see, for example, Lucas, 1978; Lucas and Stokey, 1983; 1987), lose even the very limited ability of simple OLG models to address intergenerational redistribution and focus on pre-Friday Robinson Crusoe economies in which distributional issues cannot arise.

While in this relative neglect of distributional issues the fashionable wing of the economics profession reflects, as ever, the spirit of the times, it is both short-sighted and unnecessary. The computational capacity to analyze dynamic models with non-trivial heterogeneity among households, workers, etc., does exist (see, for example, Auerbach and Kotlikoff, 1987). While many of the applied computational general equilibrium models remain awkwardly static (even when they purport to analyze intertemporal issues involving public sector deficits, external borrowing and domestic capital formation), there are now a number of examples (such as Feltenstein, 1986) showing that this, too, may be a potentially fruitful approach to the analysis of public finance issues with non-trivial distributional aspects.

Chapter 3 considers the three main worries associated with public sector debt and deficits. These are the link between public sector debt, deficits and inflation; the issue of public debt, deficits and solvency; and public debt, deficits and financial 'crowding out'.

Sargent and Wallace (1981) is the starting point of the analysis of the monetary implications of public sector debt and deficits. In a closed economy with an exogenously given primary (non-interest) government deficit, there is assumed to be an upper bound on the public debt–GDP ratio. When this ceiling is reached, further borrowing by the government is constrained to be no more than the product of this debt–GDP ceiling and the growth rate of nominal GDP (in the case of nominally denominated public debt) or the product of the debt–GDP ceiling and the growth rate of real GDP (in the case of index-linked public debt). For simplicity, consider the case where the real interest rate and the growth rate of real GDP are exogenous. Money financing (i.e. the increase in the stock of non-interest-bearing high-powered money or base money) is endogenously or residually determined by the path of the primary deficit, the debt–GDP ceiling, the real interest rate and the growth rate of real GDP. Even if inflation is proximately a strictly monetary phenomenon (most dramatically in the case where the base money–GDP velocity of circulation is constant and real GDP is exogenous), monetary growth is a fiscal phenomenon. If the interest rate exceeds the growth rate of GDP, current reductions in money growth which are not the reflection of reductions in the primary deficit imply increased borrowing and an increase in the debt–GDP ratio. Any given debt–GDP ceiling will be reached earlier (or, in the case analyzed by Sargent and Wallace, the debt–GDP ratio at any given future date, T say, will be higher) than it would have been without the current reduction in

monetary financing. If the debt–GDP ratio at T is maintained forever after, then higher monetary growth after T is the consequence of lower monetary growth before T, in the absence of any fundamental fiscal correction (i.e. absent any reduction in the primary deficit).

In a comment on Sargent and Wallace's paper (Buiter, 1984a) I pointed out that the correct deficit for measuring the 'eventual monetization' implied by the fiscal stance could differ quite dramatically from the conventionally measured Public Sector Financial Deficit (PSFD) and a fortiori from such mysterious and mystifying measures of public sector financial transactions as the Public Sector Borrowing Requirement (PSBR) in the United Kingdom. Consider, for example, the case where the current debt–GDP ratio is to be stabilized. Rather than recording current interest payments, the deficit measure relevant for eventual monetization would take the market value (measured or imputed) of all public sector non-monetary liabilities (net of non-monetary assets) and multiply them by the (long) real interest rate net of the growth rate of real GDP. Only the consumption component of exhaustive public spending should be recorded, but a correction should be made for any shortfall of the government's cash rate of return on its capital assets relative to the government's opportunity cost of borrowing. If the current value of the (consumption) primary deficit is a poor indicator of its future value, a 'permanent' (consumption) primary deficit measure should be constructed. If the act of stabilizing the debt–GDP ratio were to change future expected inflation rates, the market value of outstanding stocks of long-dated nominal debt can, of course, change dramatically (as emphasized by Minford, 1985). Similar valuation changes can occur if expected future real rates are affected. These issues were addressed also in Buiter (1982) and in Buiter (1983), the latter included in this volume as Chapter 4.

Sargent and Wallace also pointed out that many familiar money demand functions (including the linear and the log-linear ones) imply the existence of a long-run 'seigniorage Laffer curve'. The same steady-state amount of real revenue can be appropriated by printing money either with a low or with a high proportional growth rate of the nominal money stock (and therefore ultimately with either a low or a high rate of inflation). Restricting ourselves to 'unimodal' long-run seigniorage Laffer curves with a unique seigniorage revenue maximizing rate of inflation, Sargent and Wallace's conclusion that a reduction in monetary growth now implies a higher rate of monetary growth in the future need not hold on the 'slippery slope' of the Laffer curve, when inflation is above the revenue-maximizing level. These issues are considered further in Buiter (1987a; 1988d; 1988e), included in this volume as Chapters 12–14.

It is important to note that the seigniorage or inflation tax revenue of the Sargent–Wallace model is the *anticipated* inflation tax revenue only. Governments capable of surprising holders of long-dated nominal debt

with a burst of unanticipated inflation, or a fortiori with a price-*level* jump (say through a devaluation or, in a New Classical Wonderland where goods prices behave like forward-looking financial asset prices, through a competitive market-clearing general price-level jump) can impose an (unanticipated) inflation levy. Finally, both anticipated and unanticipated inflation are likely to affect the primary deficit; the Tanzi (1978) effect of (hyper)inflation on public sector outlays and revenues may, in countries with very high inflation, outweigh the familiar effect of 'bracket creep' on progressive income tax revenues when the general price level rises.

One important aspect of the fiscal–monetary nexus which the essays in this volume do not consider is the strategic or game-theoretic interaction between the fiscal and the monetary authority. The Sargent–Wallace scenario, after the debt–GDP ceiling has been reached, can be thought of as representing the situation of a dominant fiscal authority forcing an accommodating monetary authority to monetize whatever residual financing requirements it has. This may represent institutional reality in France and, perhaps to a slightly lesser extent, in the United Kingdom where the monetary authorities are *de jure* and/or *de facto* subordinate to the Treasury. The central banks in many developing or semi-industrial countries also tend to be agencies for the fiscal authorities without independent authority.

The scope for independent action of the Federal Reserve Board of the United States is somewhat greater than that of the Bank of England, and the former's influence and indeed leadership in fiscal and financial matters in general are also no doubt enhanced by the fact that budgetary authority in the United States is fragmented between the executive and legislative branches of government. The contrast in this regard with the United Kingdom's unitary state and the absence of any effective separation of powers is striking indeed.

At the extreme end of the spectrum of monetary independence in the industrial world is the West German Bundesbank. A reversal of the Sargent–Wallace ideal-type, with the central bank in a leadership role, setting the amount of seigniorage it is willing to extract and leaving the fiscal authority with the passive role of adjusting its primary deficit to the central bank's monetary target may well be appropriate for a positive analysis of this case.

When the government cannot run Ponzi games, i.e. cannot forever finance the entire interest bill on its outstanding debt simply by borrowing more, we can derive in straightforward fashion the public sector solvency constraint or present value budget constraint. This says simply that the present discounted value of future primary surpluses plus the present discounted value of future new issues of high-powered money should be (at least) as large as the value of the outstanding public debt. The 'no Ponzi game' restriction seems reasonable when (on average) the interest rate is expected to exceed the growth rate in the future.

The government's solvency constraint can be used as a systematic, forward-looking accounting device for evaluating the consistency of the authorities' fiscal, financial and monetary plans. When a discrepancy is shown to exist, various 'permanent deficit' measures can be constructed to indicate the magnitude of the long-run adjustments that will have to be made to spending plans, revenue projections or future planned recourse to seigniorage, in order to achieve feasible plans.

If neither spending, nor revenue, nor monetizations plans can be revised to fill the hole in the government's solvency constraint, a partial or complete default on the government's outstanding debt is indicated.

The brief review of financial crowding out in Chapter 3 anticipates later work (Buiter, 1977; 1988c; 1989; Buiter and Tobin, 1979; Tobin and Buiter, 1976; 1980), which together constitutes Part III of this volume.

It is well known that in otherwise conventional Keynesian models with demand-determined output and sluggish price adjustment, forward-looking financial markets can help create conditions under which the unanticipated announcement of a *future* fiscal expansion causes a recession between the announcement date and the implementation date: the anticipation of higher future short interest rates raises the current long rate of interest, causes the exchange rate to appreciate and may also depress Tobin's q. (see, for example, Blanchard, 1981). The only minor innovation as regards financial crowding-out in the paper is in Appendix 3B which analyzes a simple aggregate demand–aggregate supply model with an augmented Phillips curve and a government budget identity. Even the unexpected announcement of an immediately implemented increase in exhaustive public spending can be contractionary in this model if the government's financing rule is sufficiently biased towards debt.

Finally, the paper repeats the well-known but nevertheless systematically ignored warning of Blinder and Solow (1974) that there are no 'model-free' measures of fiscal stance. Neither the government deficit, not its change, nor the inflation-, growth-, investment- and cyclically-corrected, demand-weighted deficit is a measure of the expansionary thrust (short-, medium- or long-run) of fiscal policy in any model of the economy that I am aware of. Similarly, none of the (doctored or undoctored) deficit measures are reliable indicators of the magnitude or even the sign of the effects of fiscal policy on interest rates, capital formation or the current account of the balance of payments (see also Kotlikoff, 1988).

1.2 ISSUES OF MEASUREMENT

Part II consists of two papers, the first of which (Chapter 4) was written while I was a visiting scholar with the Fiscal Affairs Department of the International Monetary Fund during the summer of 1982. I have always been struck by the willingness of this institution (and its big sister across

the street) to encourage and support heterodox research by consultants and advisers, even when the policy implications of this work did not appear to fit in comfortably with current operational practice and/or institutional conventional wisdom.

The paper considers in considerable detail the construction and interpretation of the comprehensive wealth accounts or solvency constraints of the public, private and external sectors. Focusing on these accounts, rather than on the current flow of funds, compels the policy-maker to take the long view. An important part of stabilization policy consists in the restructuring by the government of its comprehensive balance sheet, consisting of its tangible and intangible assets and liabilities, in such a way that private agents (who might otherwise be constrained in their spending behavior by cash flow constraints, liquidity constraints, lack of collateral or other capital market imperfections) can also take the long view and are enabled to act as if they, too, are constrained only by their permanent income.

Basic differences in the 'opportunity sets' of the private and public sectors mean that the government is the natural borrower or borrower of first resort when the economy is hit by shocks that drive current income below permanent income. Such shocks often increase the incidence and severity of liquidity constraints in the private sector and worsen the quality of the private balance sheets, thus reducing their collateral value. Because of its monopoly of the power to tax, to regulate and to declare some of its liabilities legal tender, governments have access to the capital markets on terms that are superior to those available to most private agents. By borrowing (a device for singling out non-liquidity-constrained private agents) or by printing money during periods when liquidity constraints bite more widely and more deeply than usual and by retiring this debt or the additional money through higher taxes during times when liquidity constraints are less prevalent, the government can improve the intertemporal allocative efficiency of the economy as a whole. This argument for fiscal stabilization would hold even if reductions in demand did not have Keynesian consequences in the form of wasted idle capacity and underutilization of labor. They are, of course, reinforced by Keynesian failures of goods and labor markets. The political economy issues associated with temporary borrowing or monetization (the time-consistency of such fiscal-financial strategies) is an issue that is not addressed in my work. The design of political institutions that will support wise stabilization policy (especially 'reversible-in-present-value-terms' deficit financing) is an important issue, but there is no need to wait for its resolution before we can begin to think systematically about the nature of optimal stabilization policy. The analysis of optimal policy under the assumption of full credibility (or ability to precommit) also makes us more aware of the costs of the inability to precommit and may act as a spur to institutional reform.

The construction of the solvency constraints is, of course, no substitute

for the modeling of economic behavior. The paper emphasizes this repeatedly. It comes up, for example, when it is pointed out that the 'human capital' relevant to the behavior of the private sector is the human capital of those currently alive, while the present discounted value of future taxes on labor income in the public sector's solvency constraint includes the labor income taxes paid by future generations. Only when those currently alive are linked to these future generations through a chain of operative inter-generational gifts or bequests will the future tax streams constraining private and public behavior be the same.

The short Chapter 5 is an excerpt from a much longer paper (Buiter, 1987b), written as a background paper for the preparation of the 1988 *World Development Report* of the World Bank. It is included here to demonstrate the practical uses that can be made of the government's solvency constraint, even with very limited data and unlimited reluctance to make projections about the likely future behavior of public spending, conventional tax revenues and inflation tax revenues. It contains calculations for the main industrial countries of the constant or permanent primary surpluses (as a percentage of GDP) required to stabilize the public debt burden. It also shows that in recent years seigniorage (measured as the ratio of the change in the base money stock to GDP) has been a negligible source of government revenue in all the major industrial countries with the notable exception of Italy.

1.3 CROWDING OUT

Part III, 'Crowding Out', is the longest in the volume. It contains the most careful statements about why and how public debt and deficits matter and emphasizes the distinction between 'financing issues', i.e. the choice between tax financing, money financing and bond financing of a given 'exhaustive' public spending program, and 'public expenditure issues', the analysis of the consequences of variations in the size and composition of the exhaustive public spending program for a *given* financing mode. Didactically, it is probably best to analyze the consequences of variations in public spending in a balanced budget setting, with lump-sum taxes (if they are available) or broadly based distortionary taxes (if lump-sum taxes are not available) varying endogenously to maintain budget balance. A bond-financed increase in public consumption spending would then be viewed as the sum of two distinct kinds of fiscal policy actions: a balanced budget increase in public consumption expenditure and a tax cut financed by borrowing.

After developing a taxonomy of 'crowing out' in Chapter 6 (Buiter, 1977), the 'microfoundations' of debt neutrality and its absence are developed in Chapters 7 and 8 (Buiter, 1988c; 1989). Chapter 7 is the only

essay in this volume to make serious technical demands on the reader. Some early empirical tests of the debt neutrality proposition are reported in Chapter 9 (Buiter and Tobin, 1979) and the economy-wide consequences of alternative fiscal-financial strategies when there is absence of debt neutrality are analyzed in two further joint papers with James Tobin, Chapters 10 and 11 (Tobin and Buiter, 1976; 1980).

The search for sufficient causes for absence of debt neutrality involves the study of individual and aggregate private consumption behavior. Having obtained an aggregate consumption function for which taxes today and taxes (equal in present value) tomorrow are not equivalent, we can embed it in a simple dynamic aggregative general equilibrium model and analyze the consequences of public debt and deficits for the behavior of the economic system as a whole, i.e. for interest rates, saving, capital formation, inflation and, in open economic systems, for the trade balance and real and nominal exchange rates. The two 'microfoundations' essays in Part III (Chapters 7 and 8), while written about a decade after Chapters 10 and 11 (which deal with general equilibrium aspects of crowding out and crowding in), are logically prior to them, as they provide sets of conditions under which (something like) the *ad hoc* aggregate consumption functions of Chapters 10 and 11 can be rationalized. Part III would likewise be incomplete without the simple aggregative general equilibrium models of Chapters 10 and 11 and the means they provide for doing systematic policy analysis.

Chapter 6 grew out of my Ph.D. thesis. It develops a taxonomy of 'crowding out' which I still consider useful. Apart from the *degree* of crowding out or crowding in (crowding out is seldom an all-or-nothing phenomenon) and the *time horizon* under consideration (impact or short-run, intermediate or long-run), the main distinction is between *direct* and *indirect* crowding out. Direct crowding out (or crowding in) refers to effects of public actions (mainly exhaustive spending) that occur because these public actions enter directly as arguments in private utility functions or production possibility sets. Examples are public consumption or invest-ment spending that may be complementary with or a substitute for private consumption or investment spending. Such public actions affect private behavior even at given prices (including interest rates) and without directly affecting the private budget constraints.

Indirect crowding out refers to the consequences of public actions that affect private behavior either by altering private budget constraints or by influencing the prices faced by private agents. The effect on private consumption behavior of the substitution of borrowing for current lump-sum taxes, holding constant the magnitude and composition of the exhaus-tive public spending program, is an example.

This issue is explored at length in Chapter 7. Following Barro's (1974) famous restatement of the proposition, first formalized (and rejected as implausible) by Ricardo (1817; 1820), that operative intergenerational gift

and bequest motives would effectively turn an overlapping generations economy with finite-lived households into a single infinite-lived representative household whose consumption behavior would not be affected by intertemporal redistributions of lump-sum taxes, I had made two earlier attempts at a more satisfactory formalization of these ideas (Buiter, 1979b; 1980). While Buiter (1979b) had serious flaws, Buiter (1980), which benefited from the work of Carmichael (1979; 1982) (see also Buiter and Carmichael, 1984), contained a satisfactory analysis of the case of 'one-sided' intergenerational caring (i.e. the case where a person cares directly either about his children or about his parents but not about both). It also contained the proposition that stationary competitive equilibria with an operative child-to-parent gift motive are inefficient (the interest rate is below the growth rate). The reason for this is that parental utility, while valued positively, is discounted by the child. Contrary to the case of the infinite-lived representative consumer, therefore, earlier consumption (by earlier generations) is valued less than later consumption (by the current generation).

The case of 'two-sided' intergenerational caring was still not handled satisfactorily in Buiter (1980). It was the work of Kimball (1987a; 1987b) that provided an elegant solution to this problem. His approach is reproduced, essentially unchanged, in the first part of Chapter 7. His model of consumer behavior is then embedded in a neoclassical growth model in the style of Diamond (1965) and is used to analyze the implications of deficit financing, unfunded social security retirement schemes and variations in exhaustive public spending.

The second half of the paper reviews, reinterprets and extends the Yaari–Blanchard–Weil OLG model. The absence of debt neutrality in the Blanchard (1985) OLG model with uncertain lifetimes was initially attributed to the presence of uncertain lifetimes and (effectively) finite horizons for private consumers. This in contrast to governments, whose effective time horizons (assuming they do not repudiate the debts incurred by themselves or by previous governments) are infinite. Weil (1985; 1987) showed that even when each individual consumer lives for ever, debt neutrality will be absent if there is a positive birth rate and if there is no operative intergenerational gift and bequest motive. In Buiter (1988a) I showed that not only was the assumption of uncertain lifetimes not necessary for debt neutrality in the Yaari–Blanchard–Weil model, it was not sufficient either. In that model a positive birth rate is both necessary and sufficient for absence of debt neutrality. The reason is that in the Yaari–Blanchard–Weil model with its constant (age-independent) instantaneous probability of death, all survivors, regardless of age, have the same life expectancy. With a zero birth rate, postponing lump-sum taxes on labor income therefore does not alter the choice set of any of the agents that are currently alive. If, on the other hand, different survivors have different life

expectancies, then postponing lump-sum taxation on labor income will redistribute resources towards those with shorter time horizons. In most cases, this will boost aggregate consumption. A positive birth rate means, even with common (possibly infinite) horizons for those currently alive, that by postponing taxes part of the tax burden can be shifted to the new-born, thus boosting the consumption of those already alive.

The general insight is that for debt neutrality to break down, changes in the pattern over time of lump-sum taxes should redistribute resources between heterogeneous consumers. Representative agent models therefore preclude the possibility of absence of debt neutrality. Capital market imperfections only provide a mechanism for departures from debt neutrality if they affect different private agents in different ways.

Recently, Bernheim and Bagwell (1988) have shown that if all private agents in the economy are linked, directly or indirectly, by operative gift motives, not only will intergenerational redistributions of lump-sum taxes be neutral, so will all distortionary fiscal actions except for variations in the volume or composition of exhaustive public spending. Given typical marriage patterns (ignored in Kimball's and my own work) such comprehensive interpersonal caring is argued to be quite likely, although the likelihood of interior solutions for voluntary interpersonal giving remains an unknown. Kimball's finding — that in his model without strategic gift and bequest motives, no one would make positive voluntary transfers to related contemporaries (siblings, first cousins, second cousins, etc.) — suggests that corner solutions may be quite likely. Regardless of the issue of the likelihood of interior solutions for voluntary transfers between private units, I confess to being uncertain as to what to make of this analysis. In particular, I worry about what appear to be assumptions about strategic behavior by households that seem incompatible with 'small' households taking prices, government behavior and voluntary gifts by all other households as parametric.

The short Chapter 8 (Buiter, 1989) points out that the breakdown of debt neutrality (in the absence of operative intergenerational gift motives) when there is a positive birth rate assumes (implicitly) that the taxes that are being redistributed over time and between generations are lump-sum taxes on *labor* income. If instead the tax falls on the income from a non-human factor ('land') whose ownership claims are priced efficiently, then, if all land is owned by generations currently alive, changes in the inter-temporal pattern of taxation do not permit current generations to shift the tax burden to future generations nor do they permit short-lived households currently alive to shift part of the tax burden to households with a longer life expectancy. In the absence of slavery, the human capital of future generations is not owned by anyone alive today and postponing lump-sum taxes on labor income will indeed make those currently alive better off.

Chapter 9 was written jointly with James Tobin, who has had such a major influence on my perception of the substance and process of economic discourse. After reviewing the history of economic thought on the subject (an exercise that left me permanently in awe of the formidable analytical skills of Ricardo), we present some econometric consumption function estimates to test our view on the irrelevance of debt neutrality. The econometric testing of propositions derived from intertemporal optimizing models has made rapid strides since 1979 when this paper was written. Both estimation methods based on the intertemporal first-order conditions of a representative optimizing agent (so-called 'Euler equation' methods; see, for example, Hall, 1978; and Hansen and Singleton, 1983) and methods based on closed-form decision rules (for example, Leiderman and Razin, 1988) have been used to test the debt neutrality hypothesis, directly or by implication.

It is fair to say that many (though by no means all) of the recent tests have failed to reject the null hypothesis of debt neutrality. This leaves in a bit of a quandary those who, like myself, believe that public debt and deficits matter for reasons other than a neoclassical desire to smooth the time pattern of distortionary tax rates. Still, even if the debt neutrality proposition were correct, there would be no cost (other than possibly in terms of suboptimal distortionary tax rate smoothing) to the government acting as if debt is not neutral. The converse obviously does not hold. If debt neutrality fails, a government acting on the mistaken belief that debt is neutral could do real damage.

Chapter 10, also written with James Tobin, was the first paper to be published with my name on it (albeit in second position). The first part is a 'sensitivity analysis' of Blinder and Solow (1973), which studied the long-run effects of public spending and tax changes under different financing rules. In a fixed price-level Keynesian model with demand-determined output and taxes an increasing function of output, bond financing of deficits (with public spending exogenous) will tend to generate instability unless a larger volume of public debt lowers the primary (non-interest) deficit by more than it increases the interest burden. This will happen only if debt has a strong positive effect on consumption demand (no debt neutrality) and a weak effect on the demand for money. We consider alternative spending rules that may stabilize the debt process by reducing exhaustive spending when interest payments increase. The last part of the paper analyzes money and debt financing in a full-employment, flexible price level model in which an endogenous capital stock generates variations over time in the level of capacity output.

Chapter 11, again written with James Tobin, consists of two parts. The first is an extensive, non-technical discussion of crowding out, debt neutrality, monetary neutrality and monetary superneutrality. The second

part develops a class of dynamic stock-flow models that are then used to analyze some fiscal and financial policy issues in closed and open economic systems.

The models are so-called 'end-of-period' equilibrium models (see Foley, 1975; and Buiter, 1979a), rather than 'beginning-of-period' equilibrium models, so the goods market equilibrium condition (*IS*) and the asset market equilibrium conditions (*LM*, etc.) are dimensionally commensurate. While both beginning- and end-of-period models can be used to tell essentially the same story, the latter have the expository and didactic advantage of clearly showing the current period flow-of-funds (government and external deficits) entering into the current period market-clearing conditions.

The private sector behavioral relationships (asset demand functions, investment function, etc.) are not derived from optimizing first (or last) principles but are based on sound *ad hoc* judgement. Expectations are taken to be predetermined in the short run, although in steady state (a neoclassical balanced growth path) expectations are realized. Impact effects of fiscal and financial policy are derived for Keynesian and full-employment versions of the model and long-run comparative static propositions are derived for the full employment version of the model. It is my belief that such models, while currently somewhat out of fashion, have a lot of useful mileage left in them.

1.4 THE FISCAL ROOTS OF INFLATION

The two papers in Part IV, 'The Fiscal Roots of Inflation', take up some unfinished business in Sargent and Wallace's analysis of the eventual monetization of fiscal deficits (Sargent and Wallace, 1981; Sargent, 1982). Once the public debt burden has reached its upper limit, monetary growth is residually determined given the primary public sector deficit, the real interest rate and the real growth rate. In his application of this approach to four historical hyperinflations, Sargent (1982) attributed the hyperinflations to excessive fiscal deficits and argued that a credible reduction in the fiscal deficit was a necessary condition for ending these hyperinflations. While I do not necessarily disagree with this diagnosis, it cannot, unfortunately, be derived from and supported by the formal model of Sargent and Wallace (1981). With rational expectations, this model cannot generate a hyper-inflationary outcome. In Chapter 12, which contains a continuous-time analogue of the discrete-time model of Sargent and Wallace, I first reproduce their finding that their model either has two stationary (constant inflation) equilibria (for low fiscal deficits as a proportion of GDP), or one or none (for large fiscal deficits). Of these two stationary equilibria (in the case of low deficits), the low-inflation equilibrium is on the friendly side of

the long-run seigniorage Laffer curve, while the high-inflation equilibrium is on the unfriendly or slippery slope of the long-run seigniorage Laffer curve. With rational expectations the low inflation equilibrium is locally unstable and the high inflation equilibrium is locally stable. (The price level and thus the inflation rate are taken to be non-predetermined in the Sargent–Wallace model, so the existence of a locally stable stationary equilibrium creates problems of non-uniqueness.) When the deficit gets to be so large that no stationary equilibrium exists, the non-convergent, 'explosive' solutions are in fact 'implosive' ones. We *cannot* get a process of forever rising inflation and falling real money balances. That would put us further and further on the wrong side of the (non-steady-state) seigniorage Laffer curve; the deficit could not be financed at all and no solution would exist.

There appear to be solutions with a forever falling (and increasingly negative) inflation rate and a forever rising stock of real money balances (or seigniorage tax base). As we now are on the efficient side of the seigniorage Laffer curve, the deficit can be financed. Unfortunately, a forever rising stock of real money balances (indeed one which rises without bound) is inconsistent with equilibrium in the Sargent–Wallace model. On the (perhaps doubtful) principle that you cannot start what you will not finish, the 'hyperdeflation' solution is then ruled out. Excessive deficits imply that there exists *no* solution, not a hyperinflationary solution in the Sargent–Wallace model with rational expectations.

Sargent has suggested interpreting a move from the (locally unstable) low inflation equilibrium to the (locally stable) high inflation equilibrium as a hyperinflation. There seems to be little in common between, on the one hand, a transition in the Sargent–Wallace model from one steady rate of inflation to another steady rate of inflation (both supported by the same deficit–GDP ratio) and, on the other hand, the explosive, runaway hyper-inflations of the historical record. The inflation rate corresponding to the high-inflation steady state will, for reasonable money demand functions, also be orders of magnitude below the peak inflation rates experienced during historical hyperinflations.

If the rational expectations assumption is dropped and replaced, say, by adaptive expectations, the low-inflation steady state (in the moderate deficit case with two stationary equilibria) may become locally stable and the high-inflation steady state locally unstable. While this eliminates Sargent's interpretation of a hyperinflation as a transition from a low-inflation steady state to a high-inflation steady state (for a given deficit), the divergent, explosive solution in the case of large deficits when there is no stationary equilibrium now is indeed a hyperinflation. This, of course, is merely Cagan's (1956) original model.

There are bound to be ways of tinkering with the money demand function, the primary government deficit or the price formation process,

that will make hyperinflations consistent with rational expectations. The current crop of straightforward Cagan-style money demand functions augmented with price-level- and inflation-rate-independent primary government deficits does, however, force one to make a choice between hyperinflations and rational expectations.

Chapter 13 also focuses on countries in which further increases in the internal and external debt burden are impossible and monetary financing has become the residual financing mode. While the paper also explores the slippery slope of the seigniorage Laffer curve, its main point can be made most transparently when the government still operates in the range where higher inflation generates larger seigniorage revenue.

Public spending cuts aimed at reducing the primary deficit and thus the rate of inflation may have the opposite effect if the spending cuts take the form of reductions in productive public expenditure. I refer to such spending as public sector investment, although there are categories of current public expenditure that may have similar characteristics (education, maintenance of infrastructure, public administration, tax collection, etc.).

A reduction in public sector capital formation will, *ceteris paribus*, reduce the deficit one-for-one. Set against this *expenditure effect*, there can be a *direct revenue effect*, reflecting the consequences of a lower public sector capital stock on the direct cash returns the government obtains from its ownership of the public sector capital stock. In addition, there are *indirect revenue effects*, which comprise the implications of a lower public sector capital stock for domestic output and thus for production-, income- or sales-related tax revenues. Note that the direct and indirect revenue effects exclude the Keynesian revenue effect which will obtain if output is demand-determined and a reduction in public spending reduces aggregate demand and thus GDP and GDP-related tax revenues.

A lower level of productive public sector capital expenditure may therefore end up increasing rather than reducing the public sector deficit and thus increasing rather than reducing the public sector's 'demand for seigniorage revenue'. It may also, by reducing income, reduce the demand for real money balances and with it the private sector's 'supply of seigniorage revenue'. This adverse *money demand effect* creates further scope for an adverse response of inflation to ill-conceived policies aimed at reducing the public sector deficit by cutting public expenditure.

1.5 FISCAL AND FINANCIAL POLICY IN DEVELOPING COUNTRIES

The last part of this volume contains a single longish paper, Chapter 14, which is a synthesis of two working papers written for the World Bank as background papers for the preparation of the 1988 *World Development*

Report (WDR). It clearly reflects the many discussions I have had on these issues with Sweder van Wijnbergen.

In this paper we come full circle, in terms of the concerns expressed in Chapter 2, by considering the whole gamut of stabilization, allocative and distributional aspects of fiscal and financial policy. The application here of the methods and theories developed in the earlier essays to the problems of restoring internal and external balance and of achieving structural adjustment in developing countries, should serve to emphasize the wide applicability of these approaches.

The paper analyzes in a non-technical manner the role of fiscal policy in the restoration of internal and external macroeconomic equilibrium and in achieving structural adjustment, i.e. major changes in the patterns of intersectoral and intertemporal resource allocation.

The external transfer problem and the associated internal fiscal and real resource transfer problems, as well as some of the distributional issues that are likely to arise, are discussed with special emphasis on possible causes of the breakdown of the internal and external transfer processes. Again the concepts of sectoral and national solvency are seen to be useful for the evaluation of the mutual consistency and feasibility of fiscal, financial and monetary plans. The strengths and weaknesses of some operational methods for evaluating the consistency of fiscal plans and inflation objectives (see, for example, Anand and van Wijnbergen, 1987) are also evaluated.

Each of the subjects discussed in this volume is very much 'alive', both as an area of academic and intellectual investigation and as a policy issue. I very much hope that the reader will share the sense of excitement and indeed of fun that I experienced while writing these essays.

1.6 REFERENCES

Akerlof, G. and J. Yellen (1985a) 'A near rational model of the business cycle, with wage and price inertia', *Quarterly Journal of Economics*, August, pp. 823–38.

Akerlof, G. and J. Yellen (1985b) 'Can small deviations from rationality make significant differences to economic equilibria?', *American Economic Review*, 75, September, pp. 708–20.

Akerlof, G. and J. Yellen (1986) *Efficiency Wage Models of the Labor Market*, Cambridge University Press, Cambridge.

Akerlof, G. and J. Yellen (1988) 'How large are the losses from rule of thumb behavior in models of the business cycle?', mimeo, May.

Anand, R. and S. van Wijnbergen (1987) 'Inflation and the financing of government expenditure in Turkey: an introductory analysis', World Bank mimeo, revised, June.

Auerbach, A.J. and L.J. Kotlikoff (1987) *Dynamic Fiscal Policy*, Cambridge University Press, Cambridge.

Barro, Robert J. (1974) 'Are government bonds net wealth?', *Journal of Political Economy*, 82, November–December, pp. 1095–117.

Barro, Robert J. (1979) 'On the determination of the public debt', *Journal of Political Economy*, 87, October, pp. 940–71.

Barro, Robert J. (1987) 'Interest rate smoothing', University of Rochester, NY, mimeo.

Bernheim, B. and K. Bagwell (1988) 'Is everything neutral?', *Journal of Political Economy*, 96, April, pp. 308–38.

Blanchard, Olivier J. (1981) 'Output, the stock market and interest rates', *American Economic Review*, March.

Blanchard, Olivier J. (1985) 'Debt, deficits and finite horizons', *Journal of Political Economy*, 93, April, pp. 223–47.

Blanchard, Olivier J. and N. Kiyotaki (1987) 'Monopolistic competition and the effects of aggregate demand', *American Economic Review*, 77, September, pp. 647–66.

Blinder, A.S. and R.M. Solow (1973) 'Does fiscal policy matter?', *Journal of Public Economics*, 2, pp. 319–37.

Blinder, A.S. and R.M. Solow (1974) *The Economics of Public Finance*, The Brookings Institution, Washington, DC.

Buiter, Willem H. (1977) ' "Crowding out" and the effectiveness of fiscal policy', *Journal of Public Economics*, 7, pp. 309–28 (also Chapter 6, this volume).

Buiter, Willem H. (1979a) *Temporary and Long-run Equilibrium*, Garland Publishing, New York.

Buiter, Willem H. (1979b) 'Government finance in an overlapping generations model with gifts and bequests', in G.M. von Furstenberg (ed.), *Social Security vs. Private Saving*, Ballinger, Cambridge, MA, pp. 395–429.

Buiter, Willem H. (1980) ' "Crowding out" of private capital formation by government borrowing in the presence of intergenerational gifts and bequests', *Greek Economic Review*, 2, August, pp. 111–42.

Buiter, Willem H. (1982) 'Deficits, crowding out and inflation: the simple analytics', Centre for Labour Economics, London School of Economics, Discussion Paper no. 143.

Buiter, Willem H. (1983) 'Measurement of the public sector deficit and its implications for policy evaluation and design', *IMF Staff Papers*, 30, June, pp. 306–49 (also Chapter 4, this volume).

Buiter, Willem H. (1984a) 'Comment on T.J. Sargent and N. Wallace: Some unpleasant monetarist arithmetic' in B. Griffith and G.E. Wood (eds), *Monetarism in the United Kingdom*, Macmillan, London, pp. 42–60.

Buiter, Willem H. (1984b) *Allocative and Stabilization Aspects of Budgetary and Financial Policy*, London School of Economics, London (also Chapter 2, this volume).

Buiter, Willem H. (1985) 'A guide to public sector debt and deficits', *Economic Policy*, 1, November, pp. 14–61, 70–9 (also Chapter 3, this volume).

Buiter, Willem H. (1987a) 'A fiscal theory of hyperdeflations? Some surprising monetarist arithmetic', *Oxford Economic Papers*, 39, March, pp. 111–18 (also Chapter 12, this volume).

Buiter, Willem H. (1987b) 'The current global economic situation, outlook and policy options, with special emphasis on fiscal policy issues', CEPR Discussion Paper, no. 210, November.

Buiter, Willem H. (1988a) 'Death, birth, productivity growth and debt neutrality', *Economic Journal*, 98, June, pp. 279–83.

Buiter, Willem H. (1988b) 'The right combination of demand and supply policies:

the case for a two-handed approach' in H. Giersch (ed.), *Macro- and Micro-Policies for More Growth and Employment*, Kiel Institute of World Economics, Kiel.

Buiter, Willem H. (1988c) 'Debt neutrality, redistribution and consumer heterogeneity' in W.C. Brainard *et al* (eds), *Essays in Honor of James Tobin*, MIT Press, Cambridge, MA (also Chapter 7, this volume).

Buiter, Willem H. (1988d) 'Can public spending cuts be inflationary?', CEPR Discussion Paper no. 225, April (also Chapter 13, this volume).

Buiter, Willem H. (1988e) 'Some thoughts on the role of fiscal policy in stabilization and structural adjustment in developing countries', Centre for Labour Economics, London School of Economics, Discussion Paper no. 312, June (also Chapter 14, this volume).

Buiter, Willem H. (1989) 'Debt neutrality, Professor Vickrey and Henry George's "Single Tax"', *Economics Letters*, 29, pp. 43–7 (also Chapter 8, this volume).

Buiter, Willem H. and J. Carmichael (1984) 'Government debt: comment', *American Economic Review*, 74, pp. 762–5.

Buiter, Willem H. and James Tobin (1979) 'Debt neutrality: a brief review of doctrine and evidence' in G.M. von Furstenberg (ed.), *Social Security versus Private Saving*, Ballinger, Cambridge, MA, pp. 39–63 (also Chapter 9, this volume).

Cagan, P. (1956) 'The monetary dynamics of hyperinflation' in M. Friedman (ed.), *Studies in the Quantity Theory of Money*, Chicago, University of Chicago Press.

Carmichael, J. (1979) 'The role of government financial policy in economic growth', Ph.D. thesis, Princeton University.

Carmichael, J. (1982) 'On Barro's theorem of debt neutrality: the irrelevance of net wealth', *American Economic Review*, 72, March, pp. 202–13.

Cooper, R. and A. John (1988) 'Coordinating coordination failures in Keynesian models', *Quarterly Journal of Economics*, 103, August, pp. 441–63.

Diamond, Peter (1965) 'National debt in a neo-classical growth model', *American Economic Review*, 55, December, pp. 1126–50.

Diamond, Peter (1982) 'Aggregate demand management in search equilibrium', *Journal of Political Economy*, 90, pp. 881–94.

Diamond, Peter (1988) 'Credit in search equilibrium' in Meir Kohn and Sho-Chieh Tsiang (eds), *Finance Constraints, Expectations and Macroeconomics*, Oxford University Press, Oxford, pp. 36–53.

Feltenstein, Andrew (1986) 'An intertemporal general equilibrium model of financial crowding out: a policy model and some applications to Australia', *Journal of Public Economics*, 31, October, pp. 79–104.

Foley, Duncan (1975) 'On two specifications of asset equilibrium in macroeconomic models', *Journal of Political Economy*, 83, April, pp. 305–24.

Hall, Robert E. (1978) 'Stochastic implications of the life cycle-permanent income hypothesis', *Journal of Political Economy*, 86, December, pp. 971–88.

Hansen, Lars P. and K.J. Singleton (1983) 'Consumption, risk aversion and the temporal behavior of asset returns', *Journal of Political Economy*, 91, April, pp. 1269–86.

Kimball M. (1987a) 'Making sense of two-sided altruism', *Journal of Monetary Economics*, 20, September, pp. 301–26.

Kimball, M. (1987b) 'Making sense of two-sided altruism' in Kimball, 'Essays on intertemporal household choice', Ph.D. thesis, Harvard University, Chapter 2.

Kotlikoff, L.J. (1988) 'The deficit is not a well-defined measure of fiscal policy', *Science*, 241, 12 August, pp. 791–5.

Kydland, Finn and Edward C. Prescott (1980) 'A competitive theory of fluctuations

and the feasibility and desirability of stabilization policy' in Stanley Fischer (ed.), *Rational Expectations and Economic Policy*, Chicago University Press, Chicago, pp. 169–87.

Leiderman, L. and A. Razin (1988) 'Testing Ricardian neutrality with an intertemporal stochastic model', *Journal of Money, Credit and Banking*, 20, February, pp. 1–21.

Lucas, Robert E. (1978) 'Asset prices in an exchange economy', *Econometrica*, 46, pp. 1429–45.

Lucas, Robert E. and Nancy L. Stokey (1983) 'Optimal fiscal and monetary policy in an economy without capital', *Journal of Monetary Economics*, 12, pp. 55–93.

Lucas, Robert E. and Nancy L. Stokey (1987) 'Money and interest in a cash-in-advance economy', *Econometrica*, 55, May, pp. 491–513.

Mankiw, N.G. (1987) 'The optimal collection of seigniorage: theory and evidence', *Journal of Monetary Economics*, 20, September, pp. 327–41.

Minford, Patrick (1985) 'Comment', *Economic Policy*, 1, November, pp. 64–8.

Phelps, E.S. (1973) 'Inflation in the theory of public finance', *Swedish Journal of Economics*, 75, pp. 76–82.

Ricardo, David (1817) *On the Principles of Political Economy and Taxation*, London.

Ricardo, David (1820) 'Funding System' in Piero Sraffa (ed.), *The Works and Correspondence of David Ricardo*, Vol. IV, Cambridge University Press, Cambridge (1951).

Rotemberg, Julio J. (1987) 'The New Keynesian microfoundations' in Stanley Fischer (ed.), *N.B.E.R. Macroeconomics Annual 1987*, MIT Press, Cambridge, MA, pp. 69–104.

Sargent, T.J. (1982) 'The ends of four big inflations' in R.E. Hall (ed.), *Inflation: Causes and Effects*, University of Chicago Press, Chicago, pp. 41–97.

Sargent, T.J. and N. Wallace (1981) 'Some unpleasant monetarist arithmetic', *Federal Reserve Bank of Minneapolis Quarterly Review*, 5, Fall.

Shleifer, A. and R.W. Vishny (1988) 'The efficiency of investment in the presence of aggregate demand spillovers', *Journal of Political Economy*, 96, December, pp. 1221–31.

Tanzi, V. (1978) 'Inflation, real tax revenue and the case for inflationary finance: theory with an application to Argentina', *IMF Staff Papers*, Vol. 25, September.

Tobin, James and Willem H. Buiter (1976) 'Long-run effects of fiscal and monetary policy on aggregate demand' in J. Stein (ed.), *Monetarism*, North Holland, Amsterdam, pp. 273–309 (also Chapter 10, this volume).

Tobin, James and Willem H. Buiter (1980) 'Fiscal and monetary policies, capital formation and economic activity' in G. Von Furstenberg (ed.), *The Government and Capital Formation*, Ballinger, Cambridge, MA, pp. 73–151 (also Chapter 11, this volume).

Weil, P. 'Essays on the valuation of unbacked assets', Ph.D. thesis, Harvard University.

Weil, P. (1987) 'Love thy children: Reflections on the Barro debt neutrality theorem', *Journal of Monetary Economics*, 19, pp. 377–91.