MONETARY BASE CONTROL

PART 1

31 July 1986

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Effects of Fiscal and Monetary Policy Changes
Document

B1 [redacted] Mr Walsh.

From: **J ODLING-SMEE**
31st July 1986

SIR TERENCE BURNS

Mr Peretz should see

cc Mr Cassell
Mr Evans
Mr Peretz – on leave. A.W. 11/8
Mr Sedgwick
Mr S Davies
Mr Grice
Mr Melliss
Mr Mowl
Mr Riley
Mr Allum
Mr Brooks
Mr Bredenkamp
Mr Owen
Mr Spencer
Mr Westaway
Mr Whittaker

M. Grice

EFFECTS OF FISCAL AND MONETARY POLICY CHANGES

Every year we update our analysis and quantitative estimates of the economic effects of changes in fiscal and monetary policy. Most of the work is done between October and January, and it contributes to the quantitative policy advice that we give before the Budget. This year we have continued to refine the analysis since the Budget. The attached paper by Hugh Bredenkamp is the result.

2. I shall not attempt to summarise the paper or even the most important results. There is a very clear summary in paragraphs 58-67, but there is much of interest throughout the paper all of which merits careful reading. Instead I shall offer a few comments on the changes in our philosophy, the model, and the particular simulations.

3. In terms of **philosophy**, we have moved further this year towards an analysis of different assumptions about policy, expectations formation or other aspects of private sector behaviour affect our views of the quantitative effects of policy changes. We have moved away from trying to produce a definitive

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set of numbers for use in all circumstances. Since we are often asked questions about policy changes which imply a situation slightly different from the ones that may have received most attention in the regular analysis, it is helpful to have looked at a broader range of situations as in the present paper.

4. There have, of course, been a number of changes in the Treasury **model** since last year. But there are two types of change that receive much attention in the paper and are quantitatively very important: a different treatment of expectations formation, and the exploration of the consequences of different parameters representing the degree of substitutability between money and gilts, the international mobility of capitaly and the impact of unemployment and income tax changes on earnings.

5. I shall not say more about the specific parameter changes. But the change in expectations formation - the assumption that agents in financial markets form expectations in a consistent forward-looking way rather than according to some ad hoc announcement effects - is of major importance. The paper compares the results of assuming consistent expectations with results from assuming backward-looking expectations and announcement effects. The jump in the exchange rate is considerably greater than when announcement effects are assumed - in fact no jump is assumed under last year's methodology to follow announcements of fiscal policy changes with fixed money supply. This has significant implications for the overall effects of policy changes on output and inflation.

6. One consequence of the assumption of consistent expectations is that we have to be much more explicit about the assessment that financial markets make of the policy change under investigation. In particular, we have to make an assumption about whether they think that unsustainable policies will be reversed, and, if so, in what way. While the numbers that emerge from this sort of exercise may not be wholly reliable, the discipline of thinking about the issues is very valuable.

7. Turning to the **simulations** themselves, the paper presents the usual changes in fiscal policy, expressed as a particular change in the PSBR/GDP ratio brought about in different ways, and in monetary policy, expressed as a change in the rate of monetary growth, again brought about in different ways. Interest focuses on the effects of the different instruments, and of the different assumptions that are made about the "other" policy (ie about monetary policy in the case of the fiscal shock, and about fiscal policy in the case of the monetary shock). A comprehensive analysis of the effects of changing all possible fiscal instruments is presented in the previously circulated ready-reckoner document, and we are planning a small piece of work on the effects of changing the main monetary instruments (interest rates and funding).

8. An innovation this year is to present simulations showing the effects of a change in the overall stance of monetary and fiscal policy, expressed as a sustained increase of one percentage point in the rate of growth of money GDP. This is brought about by various combinations of fiscal and monetary expansion. We also show the effects of changing the fiscal/monetary mix with an unchanged path of money GDP. These changes in the overall stance and in the mix correspond to the way that we often break down policy issues, for example in your Chevening paper at the beginning of the year. I expect that we shall find them useful over the next few months.

9. We have broken a certain amount of new ground in this exercise this year, and Hugh Bredenkamp's paper raises a number of interesting questions about the quantitative analysis of macro-economic policy changes. You might like to hold a meeting in September to discuss it.

JL 01

J ODLING-SMEE

EFFECTS OF FISCAL AND MONETARY POLICY CHANGES

This note presents estimates, derived using the Treasury model, of the quantitative effects on the economy of fiscal and monetary policy changes. The aim is to show how these effects differ when different policy instruments are used to achieve given targets, and to illustrate the critical importance of assumptions, both about the wider policy framework and about how markets react to announced policy changes. Given that many of the assumptions we have to make are necessarily arbitrary, it is useful to assess how sensitive the simulation results are over a range of more or less plausible premises.

2. A more fundamental reason why simulation results of this sort need to be interpreted with care, particularly when comparing the effects of different policy instruments, is that the Treasury model is primarily designed for use in short-term forecasting rather than long term policy analysis. Output and employment are determined essentially by demand for goods and labour respectively, with little emphasis on the sorts of supply-side factors which might be expected to dominate in the longer run. There is no allowance, for example, for the effects of higher public sector investment on the size or quality of the total capital stock, and hence on productive potential. And although tax cuts are assumed to have some beneficial effect on the long-run output - inflation split, by moderating wage demands, no allowance is made for less tangible "incentive" effects. These points suggest that it would be wrong to assume that the ranking of fiscal instruments according to their effects on output in the short run (1-4 years) necessarily carries over into the longer term.

Policy Assumptions

3. All the fiscal simulations reported here are run with both accommodating and non-accommodating monetary policy. The former is characterised by constant real short-term interest rates (that is, nominal rates are varied in line with consumer price inflation) while the latter involves fixing either money GDP or a weighted average of £M3 and MO (equal weights on each).

4. The coverage of cash limits operating in the first year of any simulation has been extended to include local authorities' procurement and rates as well as central government cash-limited expenditure. In subsequent years, cash limits only apply when monetary policy is non-accommodating. In this case, 50 per cent of any divergence in prices from base is offset on cash-limited volumes, while local authorities' borrowing is constrained to grow in line with their investment. In all circumstances, rates are assumed to be the residual source of finance for LAs beyond the first year.

5. As in recent Treasury forecasts, we have assumed that the PSBR is fully financed by sales of debt to the non-bank private sector and overseas. Unlike the forecasters, we have imposed this constraint quarter-by-quarter, rather than over the financial year as a whole. The consequences of the zero-overfunding assumption are discussed briefly in the next section.

The Model

6. The version of the model used in this exercise is derived from that used in the December forecast. The main changes since last year's EEPM model are:

i. the incorporation of further work on factor price effects in employment, investment and stockbuilding equations;

ii. a new portfolio allocation system for determining personal sector liquid assets;

iii. a new equation for exports of manufactures, which has a role for exporters' margins as well as relative costs.

The overall effect of these changes has been some further, albeit slight, increase in the sensitivity of total output to changes in interest rates. Trade elasticities, with respect to changes in competitiveness, are broadly unchanged.

7. There are three main areas where we have made adjustments to existing model relationships:

i. the term structure. Zero overfunding has been imposed by varying sales of gilts to the non-bank private sector. Since it is the £M3 equation which, in the model, allocates private sector gross wealth between money and gilts, the funding target can be achieved by manipulating the rate of return on gilts relative to money. In conjunction with a model for expectations, this determines the behaviour of the term structure (long rates relative to short rates) in the simulation. We consider a range of possible values for the degree of substitutability between gilts and money, implying different responses of long term interest rates to any given change in funding requirements.

ii. the exchange rate. According to the model, the current level of the exchange rate depends on expected future exchange rates, the differential between UK and foreign interest rates and the "basic balance" (the current account plus autonomous capital flows). The presence of this last term implies that capital is less than perfectly mobile between countries, which is almost certainly the case, but the appropriate weight to put on the basic balance in the determination of the exchange rate is highly uncertain. The model used here puts a much lower weight on the basic balance (ie assumes a higher degree of capital mobility) than last

year's EEPM model, and we also show how the results are affected when (a) low capital mobility and (b) perfect capital mobility is assumed. The importance of this assumption arises in the context of exchange rate expectations and is discussed later.

iii. private sector earnings. This equation is important in determining the extent to which different fiscal instruments affect real output rather than inflation. In this, as in last year's, EEPM model, the effects of price inflation and taxes embodied in the standard earnings equation were attenuated (ie the speed of response reduced) but the long-run properties were left unchanged. However, we have increasingly felt that the current equation also gives too much weight, in both the short and long term, to factors affecting labour supply (the retention ratio and retail prices) and not enough to demand-side influences (labour taxes, producer prices). Consequently, although most of the results given here assume the standard 50:50 weights on demand and supply factors, we show in a later section how the effects differ if the weight on the demand side is raised to $^2/_3$. We also consider alternative measures of pressure-of-demand in the labour market - represented in the existing earnings equation simply by the level of output. The obvious alternative, more directly related to conditions in the labour market, is the rate of unemployment, and we show what implications this has for simulation results.

Expectations

8. The role of expectational variables in the Treasury model as it stands is limited to the exchange rate, long term interest rates and manufacturing employment:

i. as explained earlier, the expected future exchange rate is an important determinant of the actual (current) rate, which is in turn a major influence on output and inflation in the model. The higher the assumed degree of international capital mobility, the stronger is the link between current and expected future exchange rates.

ii. the path of current long rates will also be heavily influenced by expectations of future interest rates. Though long rates are less important than exchange rates in their effects on the economy, they are more so now than in previous versions of the model since they now directly affect the cost of capital relative to labour.

iii. the manufacturing employment equation contains terms in one and two-step ahead expectations of manufacturing output. This equation is much less important for overall model properties than interest rates and exchange rates, and it is not discussed further in this note.

9. The formation of expectations of future interest rates and exchange rates will be based on agents' perceptions about the interaction of government policy with the rest of the economy. We assume in these simulations that agents know precisely what government policy is now and in the future, and that the path for the economy which they predict under these circumstances is identical to the one generated by the model.

10. This assumption, of rational expectations with perfect foresight, is a more precise formulation of the method of "announcement effects" used in previous EEPM rounds. When policy shocks here are "announced", expectations are immediately revised and long-term interest rates and exchange rates jump to levels consistent with the new path for the economy. This type of behaviour was proxied in last year's EEPM simulations by bringing forward some proportion of the long-run change in equilibrium interest rates or exchange rates. A comparison of results using the "announcement effects" methodology with consistent expectations is given in a later section. Although we regard consistent expectations as an improvement on "announcement effects", it is not necessarily the best representation of how expectations would actually be formed. In particular, there are good reasons for believing that the private sector, even if it shares the same model as the authorities, will be uncertain as to the duration of an announced policy change, or the extent to which it will be accompanied by further changes in fiscal or monetary policy in the future. This issue is not considered further in this paper, but we hope eventually to investigate the effects of assuming that, for example, the private sector "learns" what the new policy configuration is gradually rather than (as here) instantaneously.

11. The size and direction of jumps in long rates or the exchange rate will depend on (a) what is assumed to determine the long-run level of these variables (b) the extent to which interest rates and exchange rates are affected by expectations about the future as opposed to other, "backward-looking", factors and (c) the duration of the policy change.

12. We assume that agents will anticipate a long run equilibrium for the economy in which:

i. the basic balance is unchanged by shifts in policy variables;

ii. nominal (and therefore, implicitly, real) interest rates are constant.

The first of these "terminal conditions" effectively determines the long run level of the exchange rate (actual and expected) while the second, in conjunction with the arbitrage condition, determines long term interest rates (constant interest rates imply zero capital gains on gilts, therefore long and short term interest rates are equalised).

13. The extent to which simulation results are influenced by the precise choice of the terminal conditions depends crucially on how important expectations are, relative to other "backward-looking" factors, in determining actual interest rates and exchange rates. As explained earlier, in the case of the exchange rate, the higher the degree of capital mobility (ie the lower the weight on current and past values of the basic balance) the greater the influence of expectations and so the more important the choice of terminal condition. We have not experimented widely with different terminal conditions for this paper, though one result, using a different condition for the exchange rate, is reported.

14. Finally, since the length of time over which a policy is sustained determines the location of the new long-run equilibrium path for the economy, it will also affect expectations about future levels of interest rates and exchange rates. Given the discussion in the preceding paragraphs, it follows that the more "forward-looking" these variables are, the more important is the assumption about duration of policy shifts. The issue arises becauses some policy combinations (notably fiscal shocks with non-accommodating monetary policy) may be theoretically unsustainable in the long run. It could be argued, therefore, that agents would anticipate some future realignment of policy, sufficient to return the economy to a sustainable equilibrium path, and would form their expectations accordingly.

15. The assumption as to precisely how policy is realigned is clearly arbitrary. Markets could anticipate that the fiscal shock is fully revsed (in the sense that the PSBR/GDP ratio returns to base levels), or that monetary policy becomes fully accommodating, or that some combination of fiscal policy reversal and monetary expansion is pursued. We have assumed as our "main case" that, in the long run, fiscal and monetary policy will be expected to remain in "balance", so that the long run debt-income ratio is broadly stable. This implies that:

i. when real interest rates are held fixed, there is no realignment (since this is a sustainable policy)

ii. when the weighted monetary aggregate is being targetted, markets expect that, after five years, $^2/_3$ of the fiscal shock will be reversed and $^1/_3$ accommodated by faster monetary growth

iii. when money GDP is being held fixed, markets expect complete reversal of the fiscal shock after five years, so that the given path for money GDP is achieved with the same mix of monetary and fiscal policy as in the base. Some alternative assumptions, in the case of fixed money ,are considered in a later section.

Specification of Policy Changes

16. As in last year's EEPM simulations, fiscal shocks have been specified here as a 1 per cent point increase (ex post) in the ratio of the PSBR to GDP achieved by varying a specific tax or expenditure instrument. Monetary policy assumptions were explained in paragraph 3.

17. In all simulations involving a change in the VAT rate, a prior adjustment is made to the "target" path of the monetary aggregates, money GDP or real interest rates, in order to take account of the direct effect of the VAT rate on the price level and so avoid implausible discontinuities in nominal short rates.

18. Monetary policy shocks considered involve a one point increase in the growth rate of the weighted monetary aggregate, achieved by varying either the PSBR (using personal income tax), short-term interest rates, or a combination of both. In the case where the PSBR ratio is initially fixed, markets are assumed to expect that fiscal policy will, after five years, become "accommodating" (ie the PSBR ratio will rise by 0.5).

19. We also consider the results of assuming a one point increase in the rate of growth of money GDP, using;

i. "balanced" fiscal and monetary expansion (see Table D)

ii. fiscal expansion for five years, followed by "balanced" expansion

iii. monetary expansion for five years, followed by "balanced" expansion

TABLE A

SIMULATION RESULTS FOR FISCAL SHOCKS

Sustained increase of 1 percent point in PSBR/GDP ratio
Achieved by varying a specified fiscal instrument

FISCAL INSTRUMENT	PERSONAL INCOME TAX		CENTRAL GOVT INVESTMENT EXP		VAT RATE		EMPLOYERS' NICs RATE	
MONETARY POLICY ASSUMPTION	FIXED* MAGGWT	FIXED REAL RATES	FIXED* MAGGWT	FIXED REAL RATES	FIXED* MAGGWT	FIXED REAL RATES	FIXED* MAGGWT	FIXED REAL RATES
% change from base in:								
REAL GDP								
Year 1	+.3	+.6	+1.5	+1.7	+.5	+.9	+.7	+.9
Year 2	+.2	+.9	+1.4	+2.1	+.7	+.8	+.8	+1.7
Year 3	+.4	+1.2	+1.0	+2.4	+1.1	+2.6	+.9	+2.0
Year 4	+.4	+1.2	+.1	+1.5	+1.0	+2.6	+.6	+1.6
MONEY GDP								
Year 1	+.5	+1.0	+1.3	+1.8	-.9	-.2	-.2	+.2
Year 2	+.8	+2.8	+2.4	+5.2	-.9	+1.9	+.1	+2.3
Year 3	+1.5	+5.3	+3.9	+9.9	-.1	+4.7	+1.1	+5.0
Year 4	+2.3	+7.8	+5.1	+14.3	+.8	+8.0	+2.4	+8.2
EMPLOYMENT								
Year 1	+.2	+.3	+.7	+.7	+.3	+.3	+.4	+.4
Year 2	+.5	+.9	+1.5	+1.9	+.8	+1.5	+1.1	+1.7
Year 3	+.9	+1.6	+1.7	+2.7	+1.5	+2.8	+1.7	+2.7
Year 4	+1.2	+1.9	+1.1	+2.4	+1.9	+3.4	+1.8	+2.9
RPI INFLATION								
Year 1	+.3	+1.0	+.5	+1.7	-1.6	-.6	-.9	0
Year 2	+.5	+1.9	+1.6	+3.7	-.1	+1.6	+.4	+1.8
Year 3	+.6	+2.2	+2.1	+4.5	+.5	+2.0	+1.2	+2.6
Year 4	+1.2	+2.7	+2.1	+5.2	+1.6	+3.5	+1.8	+3.7
NOMINAL EXCHANGE RATE								
Year 1	-.2	-4.9	-2.4	-8.5	-.1	-7.1	-.6	-5.4
Year 2	-0.9	-6.0	-2.6	-10.2	-.8	-8.5	-.4	-5.9
Year 3	-1.5	-7.8	-3.4	-13.0	-1.2	-10.6	-1.1	-7.6
Year 4	-2.5	-10.1	-4.2	-16.7	-2.2	-13.5	-2.0	-10.
S-T INTEREST RATES								
Year 1	+.7	+.8	+.2	+1.4	+.6	+1.0	-.5	0
Year 2	+1.0	+1.6	+1.8	+3.1	+.9	+1.8	+.9	+1.4
Year 3	+1.2	+2.0	+2.5	+4.2	+1.3	+2.6	+1.4	+2.3
Year 4	+2.1	+2.5	+3.1	+4.9	+2.7	+3.4	+2.4	+3.2
L-T INTEREST RATES								
Year 1	+2.5	+1.8	+2.7	+1.9	+3.0	+2.2	+2.5	+1.8
Year 2	+2.8	+1.8	+2.9	+1.6	+3.3	+2.0	+2.8	+1.8
Year 3	+3.0	+1.7	+3.0	+1.2	+3.4	+1.8	+3.0	+1.7
Year 4	+2.9	+1.6	+2.8	+.8	+3.1	+1.4	+2.9	+1.5

NB: MAGGWT (= 50% £M3 + 50% MO) and real short rates are both controlled by varying nominal sh rates

* indicates fiscal shock is $^2/_3$ reversed, $^1/_3$ accommodated after 5 years.

TABLE B

SIMULATION RESULTS FOR MONETARY SHOCKS

one point increase in growth rate of MAGGWT

Shock	Lower short rates; fixed PSBR	Lower short rates + 0.5 increase in PSBR ratio*	PSBR* higher (Fixed real short rates)
REAL GDP			
Year 1	+.4	+.6	+.9
Year 2	+.8	+.9	+1.1
Year 3	+.7	+.9	+1.2
Year 4	+.5	+.7	+.7
MONEY GDP			
Year 1	+.6	+.8	+1.4
Year 2	+2.0	+2.3	+3.0
Year 3	+3.2	+3.8	+4.7
Year 4	+4.3	+5.2	+5.8
MAGGWT			
Year 1	+.6	+.6	+.6
Year 2	+1.6	+1.6	+1.6
Year 3	+2.6	+2.6	+2.6
Year 4	+3.6	+3.6	+3.6
RPI INFLATION			
Year 1	+.5	+.6	+1.0
Year 2	+1.2	+1.4	+1.8
Year 3	+1.4	+1.6	+1.6
Year 4	+1.1	+1.6	+1.6
EXCHANGE RATE			
Year 1	-4.4	-4.3	-4.6
Year 2	-4.2	-4.4	-5.4
Year 3	-4.9	-5.3	-6.2
Year 4	-6.0	-6.6	-7.0
S-T INTEREST RATES			
Year 1	-.4	-.1	+.8
Year 2	+.3	+.7	+1.4
Year 3	+.7	+1.2	+1.5
Year 4	+.4	+1.2	+1.5
L-T INTEREST RATES			
Year 1	-.6	+.5	+1.4
Year 2	-.7	+.5	+.1
Year 3	-.8	+.5	-1.1
Year 4	-.7	+.5	-2.0

* achieved by varying personal income tax

TABLE C

SIMULATION RESULTS FOR CHANGES IN THE FISCAL - MONETARY MIX

Easing of fiscal policy, tightening of monetary policy. First four columns calibrated on PSBR ratio (1 point higher), fifth column on interest rates (1 point higher). Growth in money GDP held at base levels.

	PERSONAL INCOME TAX	CENTRAL GOVERNMENT INVESTMENT	VAT RATE	EMPLOYERS' NICs RATE	INTEREST RATES
% change from base in:					
REAL GDP					
Year 1	0	+.5	0	+.9	-.1
Year 2	0	+.1	+.4	+1.2	-.1
Year 3	+.2	-.2	+.7	+1.1	-.1
Year 4	+.2	-.7	+.5	+.3	-.1
INVESTMENT*					
Year 1	-.2	+.8	-.2	-.1	-.1
Year 2	-.3	+.6	-.4	-.6	-.3
Year 3	-.6	+.1	-.8	-.9	-.4
Year 4	-.8	-.1	-1.0	-1.3	-.4
EMPLOYMENT					
Year 1	+.1	+.4	+.1	+.4	0
Year 2	+.2	+.4	+.4	+1.3	+.1
Year 3	+.6	+.4	+1.1	+1.9	+.2
Year 4	+.9	+.1	+1.4	+1.7	+.3
RPI INFLATION					
Year 1	+.2	+.4	-1.1	-1.3	+.2
Year 2	-.5	-.3	-1.2	-.5	+.2
Year 3	-.1	+.6	-.3	+.5	+.1
Year 4	+.4	+.9	+.8	+1.3	+.1
NOMINAL EXCHANGE RATE					
Year 1	+1.8	+2.7	+2.3	+.1	+.7
Year 2	+1.2	+1.8	+1.8	+1.9	+.4
Year 3	+1.6	+1.6	+2.5	+3.2	+.4
Year 4	+1.5	+.8	+2.5	+3.6	+.4
S-T INTEREST RATES or PSBR RATIO					PSBR
Year 1	+1.4	+2.2	+1.6	-1.6	+.5
Year 2	-.1	+.6	-.5	-.7	+.8
Year 3	+.7	+1.9	+.8	+1.0	+.6
Year 4	+1.6	+2.9	+2.3	+2.6	+.5

NB: In the case of VAT, the "target path" of money GDP is shifted downwards to accommodate the direct effect of VAT on the price level.

* Total fixed investment plus the real current account balance, as per cent of GDP

TABLE D

FASTER GROWTH IN MONEY GDP

Sustained increase of 1 per cent point in rate of growth of money GDP, using different settings of fiscal and monetary policy

	BALANCED EXPANSION			
	Fixed real short rates; fiscal policy accommodating	**0.5 increase in PSBR ratio; monetary policy accommodating**	**FISCAL EXPANSION***	**MONETARY EXPANSION****
REAL GDP				
Year 1	+.3	+.5	+.3	+.4
Year 2	+.5	+.6	+.4	+.6
Year 3	+.6	+.7	+.4	+.6
Year 4	+.5	+.5	+.2	+.6
RPI INFLATION				
Year 1	+.5	+.4	+.3	+.2
Year 2	+.9	+.9	+.9	+1.0
Year 3	+1.0	+1.1	+1.1	+1.0
Year 4	+1.1	+1.1	+1.3	+1.0
EMPLOYMENT				
Year 1	+.1	+.2	+.2	+.1
Year 2	+.5	+.6	+.5	+.4
Year 3	+.8	+.9	+.9	+.6
Year 4	+.9	+1.0	+1.1	+.6
EXCHANGE RATE				
Year 1	-2.4	-2.6	-1.2	-3.1
Year 2	-2.9	-2.8	-1.8	-3.2
Year 3	-3.6	-3.4	-2.8	-4.0
Year 4	-4.4	-4.2	-3.8	-4.9
PSBR RATIO or MAGGWT	PSBR	MAGGWT	PSBR	MAGGWT
Year 1	+.5	+.5	+.7	+.9
Year 2	+.6	+1.2	+1.1	+1.3
Year 3	+.4	+1.7	+1.0	+2.1
Year 4	+.4	+2.2	+.6	+2.9
S-T INTEREST RATES				
Year 1	+.4	-.1	+.5	-.7
Year 2	+.8	+.4	+1.5	+.3
Year 3	+.9	+.8	+1.7	+.4
Year 4	+1.0	+1.0	+2.2	+.3
L-T INTEREST RATES				
Year 1	+.6	+.9	+2.2	-.7
Year 2	+.6	+1.0	+2.5	-.8
Year 3	+.5	+1.1	+2.6	-1.0
Year 4	+.4	+1.1	+2.4	-1.0

* Higher PSBR and fixed MAGGWT for first 5 years; then balanced expansion

** Lower interest rates and fixed PSBR ratio for first 5 years; then balanced expansion

The Main Results

20. The simulation results based on our "central assumptions" are set out in Tables A to C. Table A shows the effects of fiscal changes with accommodating and non-accommodating monetary policy (fixed MAGGWT). Table B shows changes in monetary policy with different fiscal assumptions, and Table C gives the effects of a combination of fiscal expansion and monetary tightening sufficient to maintain a given path for money GDP.

(i) **Fiscal shocks - different instruments**

21. The four fiscal instruments considered here are direct taxes (on personal incomes), public expenditure (central government investment), indirect taxes (VAT) and labour taxes (employers' NICs). It is clear that a given PSBR increase will have different effects on domestic demand when administered through these different instruments. For example, whatever the monetary policy assumption, higher central government investment has a bigger initial effect on output than cuts in taxes - essentially because there are fewer leakages into saving and imports.

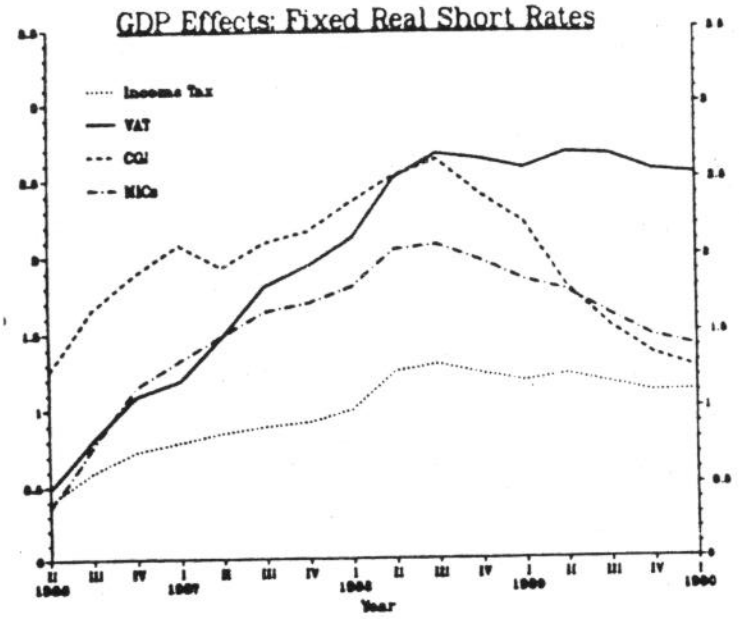
22. The size of these impact effects appears to be, not surprisingly, a major determinant of the way the economy responds over the whole period of the simulation. Generally speaking, the greater the initial impact on domestic demand, the higher inflation will be by year 4, the faster the initial stimulus is "crowded out", the greater the depreciation of the exchange rate and the higher are nominal short-term interest rates. Of the instruments considered here, public investment is the most "inflationary" (ie has the largest impact effect on demand), followed by VAT, employers' NICs and income tax. This ranking of instruments is the same under accommodating and non-accommodating monetary policy (see charts on the following page).

23. The comparative efficiency of indirect taxes as a means of stimulating demand derives from the real wealth effects of a lower price level. Note that these effects appear to be important despite an adjustment to the target paths for money supply and real interest rates which "accommodate" the direct impact of VAT on the price level. (This direct effect of VAT on the price level contributes towards the jagged RPI inflation response shown in the charts below - a lower price level means lower inflation for one year only. The inflation response is particularly volatile in the case of fixed money GDP, but this reflects mainly greater volatility of interest rates).

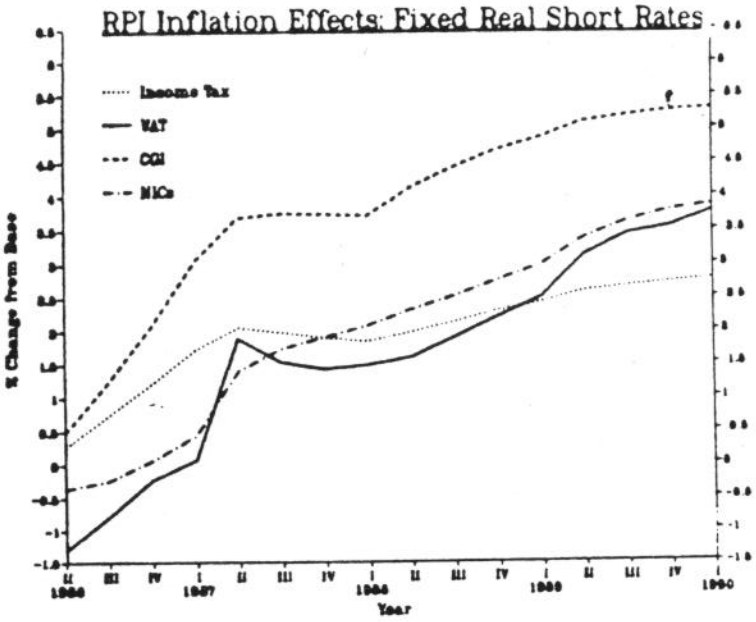
24. Comparing employment effects across different instruments is complicated by differences in the profiles (as opposed to the relative magnitude) of output responses as well as by the fact that personal income tax and employers' NICs directly affect earnings

Economic Effects of Different Fiscal Instruments

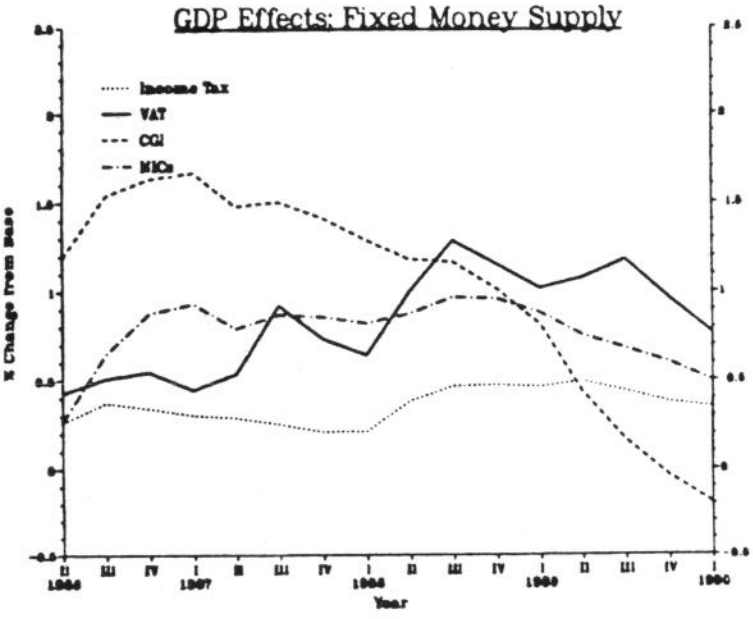
GDP Effects: Fixed Real Short Rates



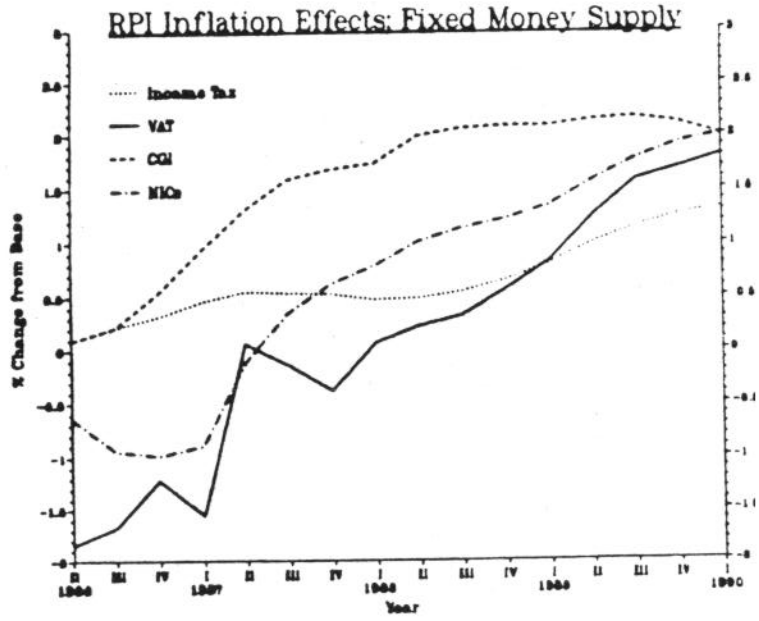
RPI Inflation Effects: Fixed Real Short Rates



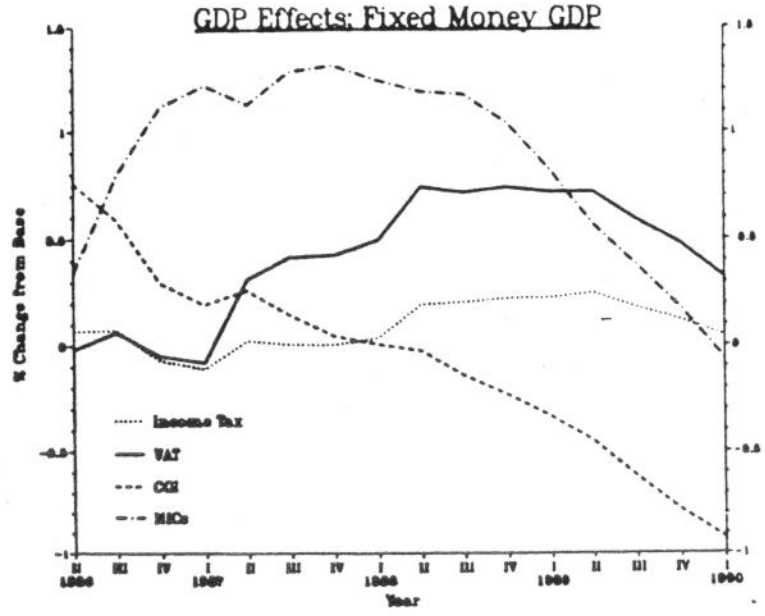
GDP Effects: Fixed Money Supply



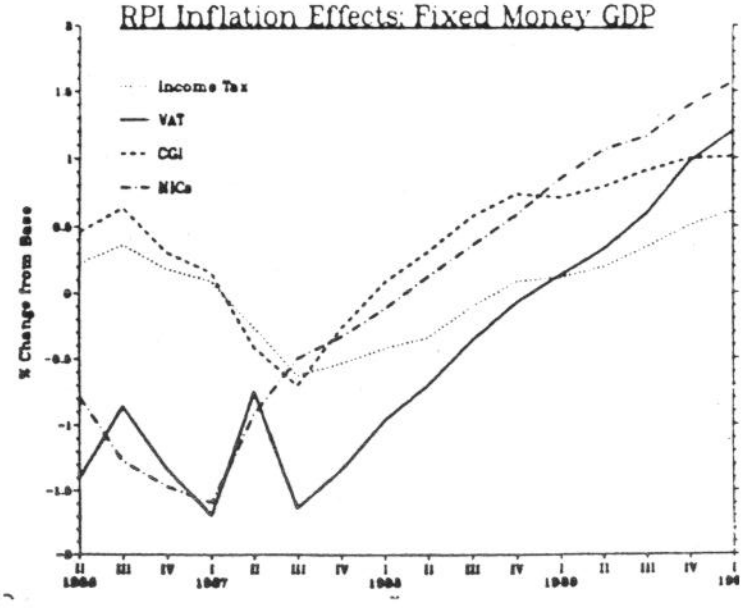
RPI Inflation Effects: Fixed Money Supply



GDP Effects: Fixed Money GDP



RPI Inflation Effects: Fixed Money GDP



and therefore relative factor prices. On the whole, the faster earnings growth in the more inflationary simulations (eg for changes in public investment) appears be to more or less offset in its effects on relative factor costs by higher interest rates (which raise the cost of capital). Consequently, the ranking of instruments according to their effects on productivity appears to depend primarily on the direct impact on labour costs - so that cuts in NICs and personal income tax generate more employment for each unit of output (ie lower productivity) than cuts in VAT or increases in public investment. As we would expect, given that employers' and employees' taxes have equal weight in the earnings equation, income tax and NICs are broadly indistinguishable in their effects on productivity.

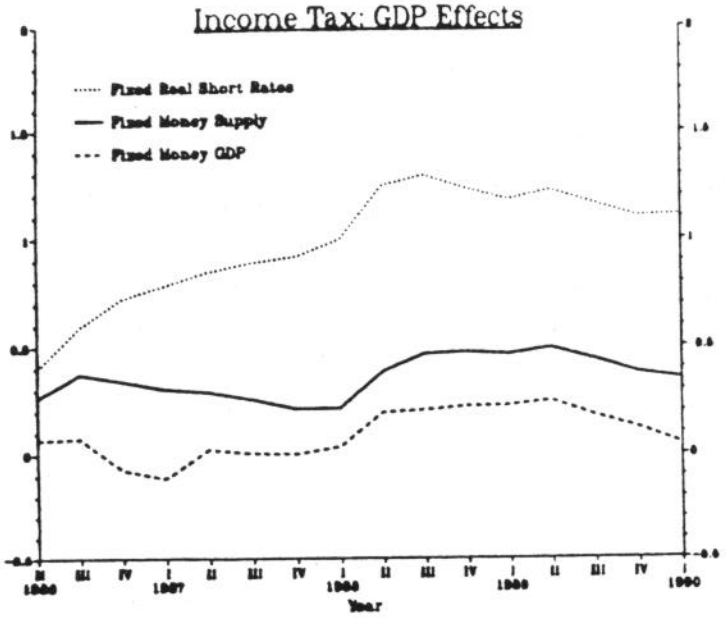
(ii) **Fiscal shocks - different monetary policy assumptions**

25. Charts summarising the effects on simulation results of changing the underlying monetary policy assumption are shown on the following two pages. Perhaps the most important point to emphasise here is that, although both inflation and real output effects are obviously larger when monetary policy is accommodating than when it is not (over the four year period), by year 4 of each simulation there is already evidence that real GDP gains are being "crowded out" even when monetary policy is accommodating. This effect is most marked in the case of higher public investment, where the increase in real output falls from a peak of 2.4 per cent in year 3 to only 1.5 per cent in year 4. With real interest rates fixed, crowding out must occur through the direct effects of higher inflation (and higher long-term interest rates) on real wealth.

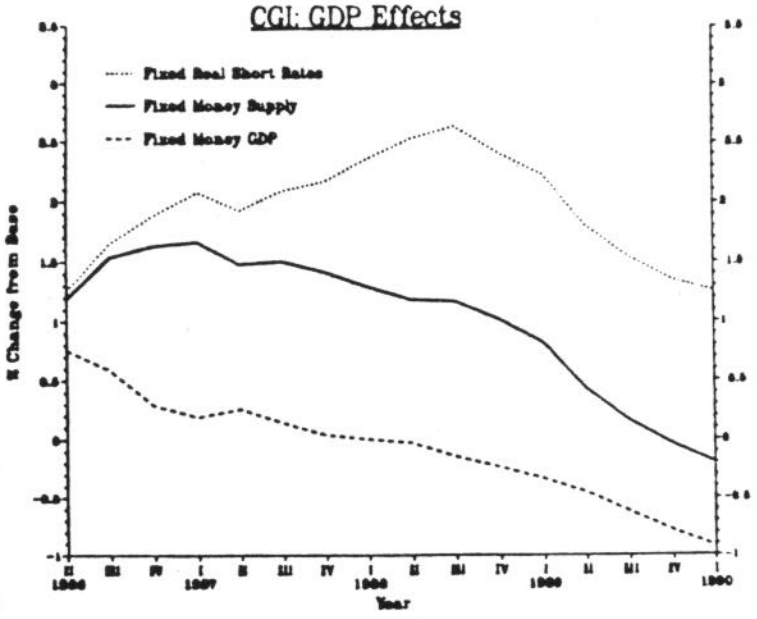
26. The different output and inflation responses under accommodating and non-accommodating monetary policy are reflected in - and, in a sense, attributable to - very different paths for the nominal exchange rate. Whichever instrument is used, a fiscal stimulus to domestic demand produces an incipient deterioration in the basic balance which must be offset in the long run by a fall in the real exchange rate when monetary policy is accommodating. This in turn requires a large downward shift in the nominal exchange rate, since not only is the stimulus to demand greater than with fixed money but also the price level is higher in equilibrium (implying a lower nominal exchange rate for any given real exchange rate). With forward-looking expectations, this leads to an immediate downward jump in the nominal exchange rate of 3-7 per cent (depending on the fiscal instrument). When the weighted monetary aggregate is held fixed, however, little or no change in the equilibrium real exchange rate is required (since the demand effects are crowded out more quickly) and the nominal rate typically drifts down as the price level rises. Except in the case of public investment, the initial downward jump in the exchange rate under fixed money is negligible. And if, instead, money GDP is held fixed - a more restrictive policy than fixed money, since the latter generally involves some increase in income velocity - the nominal exchange rate actually

Effects of Fiscal Changes under Different Monetary Policy Assumptions

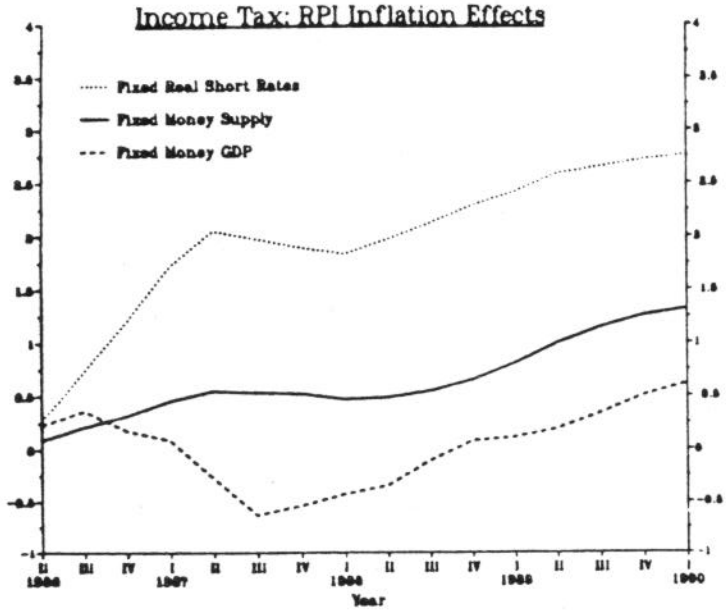
Income Tax: GDP Effects



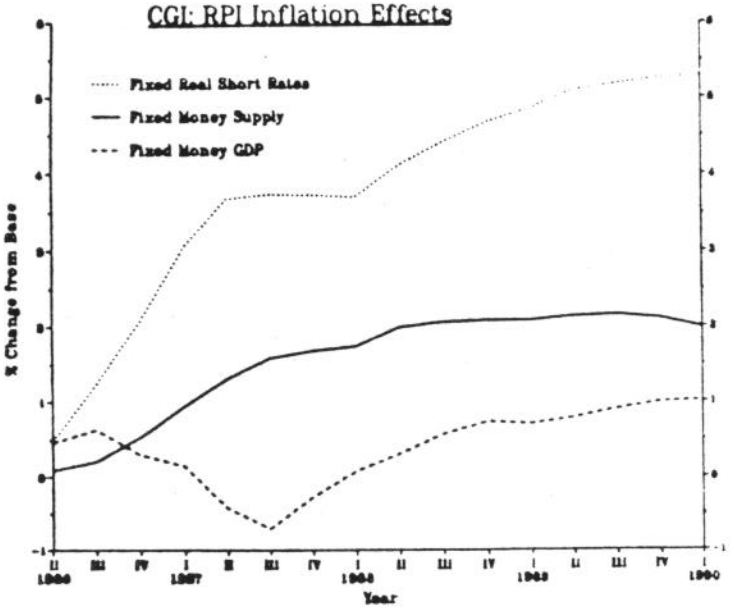
CGI: GDP Effects



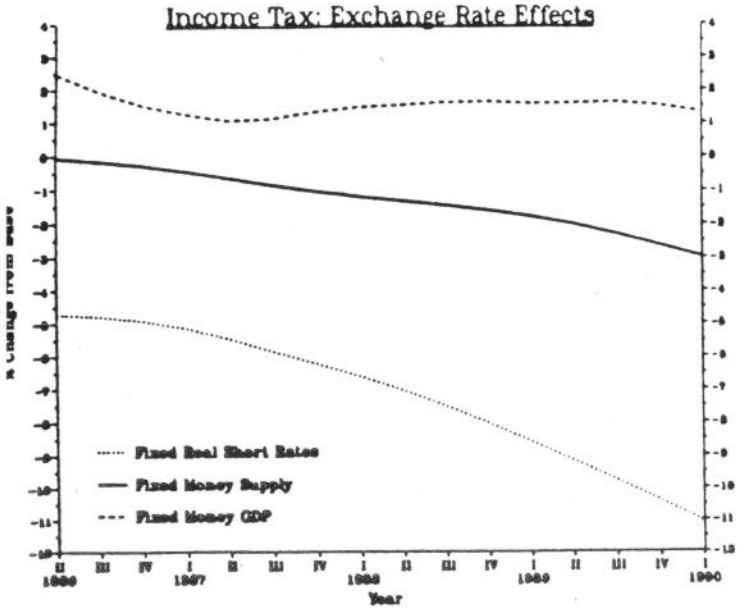
Income Tax: RPI Inflation Effects



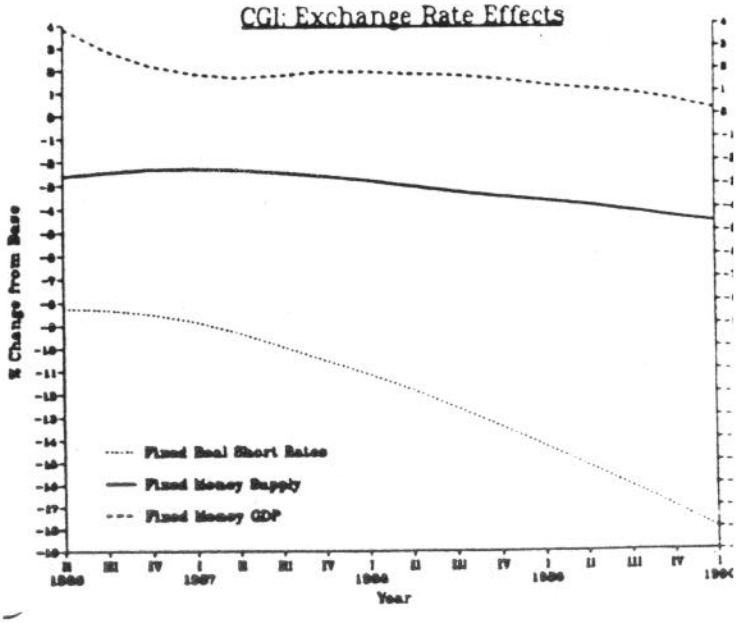
CGI: RPI Inflation Effects



Income Tax: Exchange Rate Effects

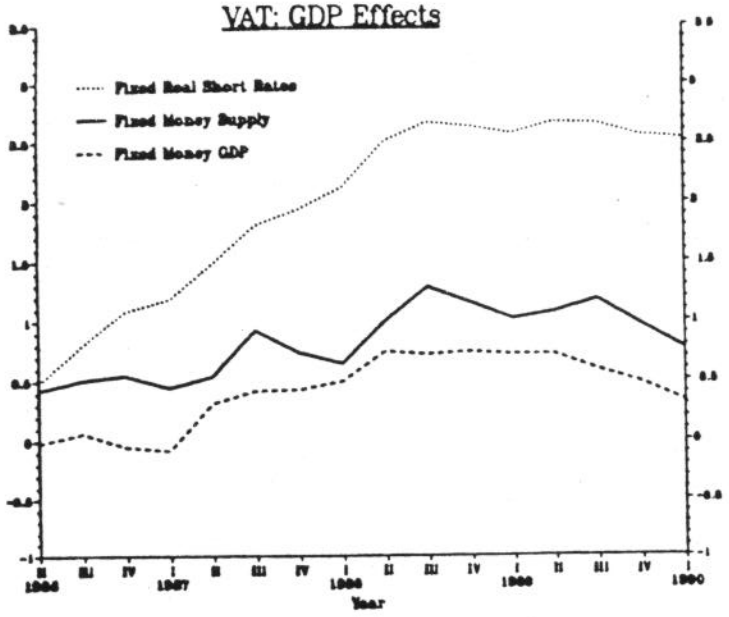


CGI: Exchange Rate Effects

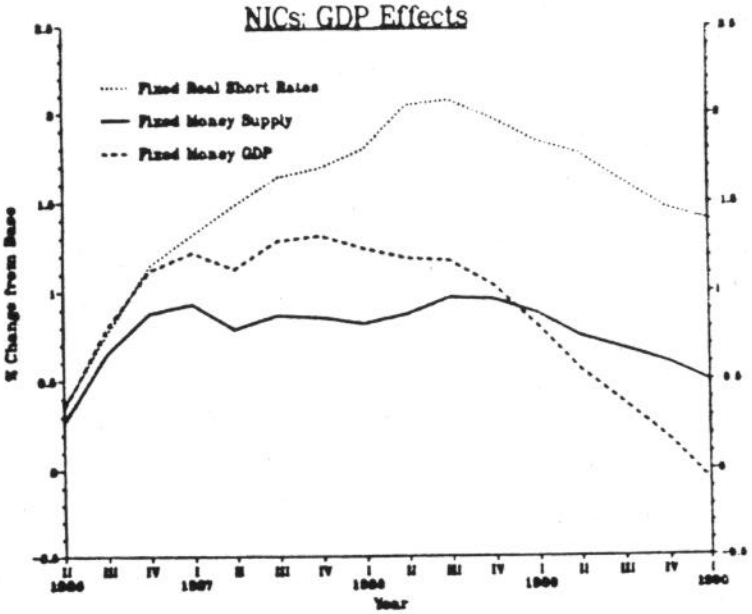


Effects of Fiscal Changes Under Different Monetary Policy Assumptions

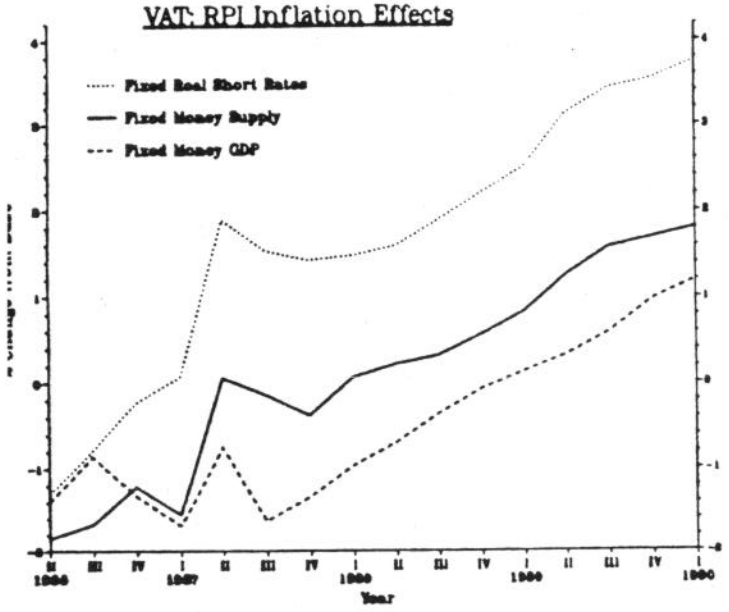
VAT: GDP Effects



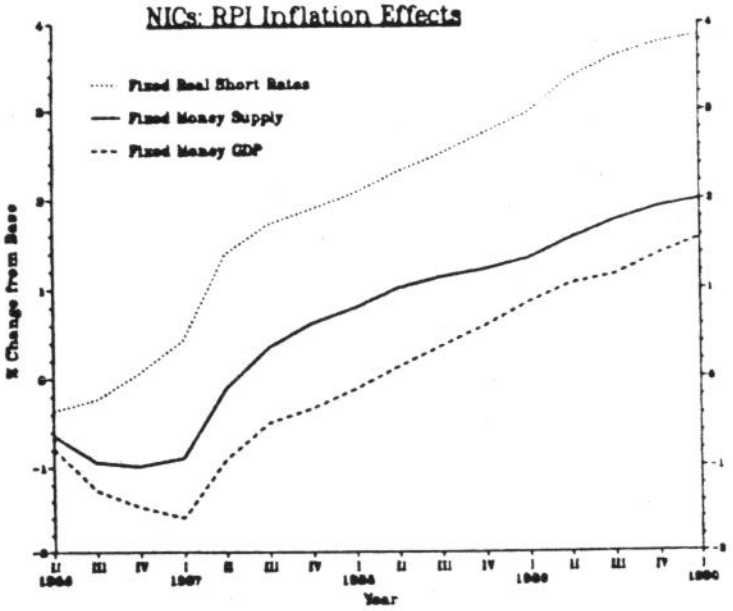
NICs: GDP Effects



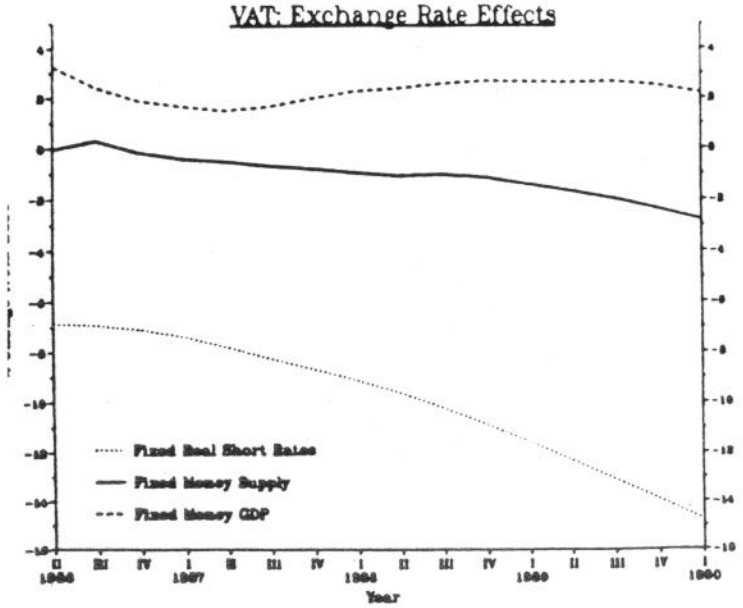
VAT: RPI Inflation Effects



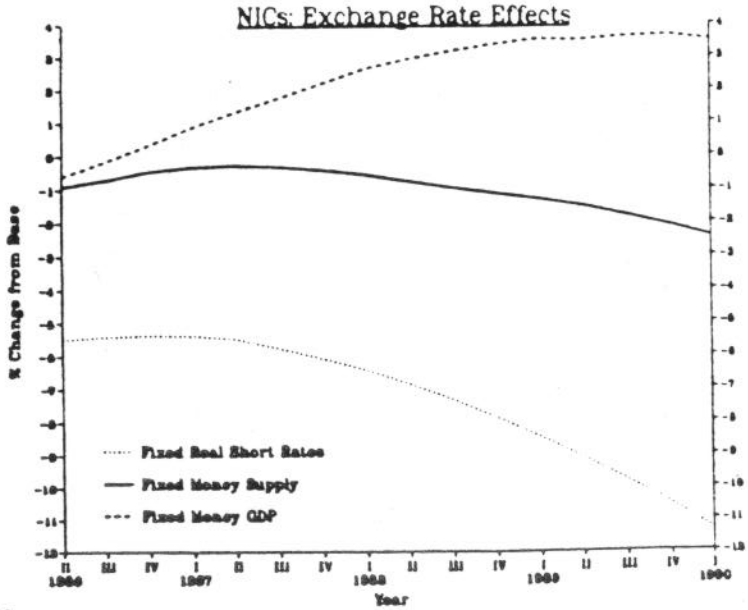
NICs: RPI Inflation Effects



VAT: Exchange Rate Effects



NICs: Exchange Rate Effects



jumps upwards, by between zero and 3 per cent, reflecting higher domestic interest rates relative to the rest of the world.

27. There is one further feature of the Table A results which requires some explanation. This is the tendency for nominal short-term interest rates to be lower when monetary policy is non-accommodating than when it is accommodating. This partly reflects the fact that, when policy is accommodating, the economy follows a higher-inflation path and nominal interest rates will therefore be correspondingly higher. To attain the lower-inflation path implied under fixed money, on the other hand, may only require temporarily higher interest rates - after which nominal, though not real, rates will tend to be lower. But this phenomenon is also, to some extent, a product of the zero-overfunding assumption since the initial boost to the PSBR requires higher gilt sales and therefore a fall in the flow demand for £M3. If the weighted aggregate is fixed, this allows some increase in MO, with the result that the pressure on short-term interest rates is reduced. Note that this effect does not depend on our assumption about the degree of substitutability between gilts and money.

28. The fixed money GDP simulations are intended to illustrate the effects of a combination of easier fiscal and tighter monetary policy on:

a. the short run output-inflation split

b. the composition of GDP

c. the level of employment, conditional on output

The output-inflation split generally improves in the first two years of a simulation particularly for a cut in employers' NICs, which has a powerful direct effect on labour costs. In subsequent years, tax cuts continue to produce higher real output, because of their effects on earnings growth (income tax, VAT) or labour costs (employers' NICs). Central government investment, on the other hand, would not be expected to improve the output-inflation split in the long run, given that it is assumed to have no beneficial effects on productive potential. Indeed, the model suggests that output would actually be lower by year 4 in the case of higher public investment (though this is a cyclical response to higher real interest rates, and eventually unwinds).

29. The rise in real interest rates required to keep money GDP on target will displace both consumption and investment elsewhere in the economy, but the figures in Table C indicate that investment is reduced by more, as a percentage of GDP, than consumption. Investment here is defined to comprise both domestic fixed investment and overseas investment (the counterpart to the current account balance). The incentive to invest overseas is reduced by the increase in domestic, relative to foreign, interest rates, and a higher real exchange rate ensures that the implied reduction in net capital outflows is

"financed" by a current account deficit. Note that, in the case of a fiscal stimulus generated by higher public sector investment, the direct effect on the overall proportion of GDP invested is, by year 4, more than offset by crowding-out of investment elsewhere.

30. All five fixed money GDP simulations show a rise in employment relative to output. This is due partly to the effect of higher short and long term interest rates on the cost of capital, encouraging substitution of labour for capital. In the case of tax cuts, there is an additional effects either on labour supply, through the retention ratio, or on labour demand (if employers' NICs are reduced), both of which tend to raise the labour intensity of production

(iii) **Simulations of monetary changes**

31. Table B shows the results of assuming an increase in the rate of monetary growth (implemented using different combinations of instruments). These simulations are essentially variants of the income tax simulations in Table A, but conditioned on the change in monetary growth rather than the PSBR ratio.

32. The main point of interest is that demand effects increase, for given monetary growth, as the balance shifts towards easier fiscal policy and higher interest rates (as it does, progressively, from columns 1 to 3 in Table B). This suggests that cuts in income tax (and wealth effects associated with the higher PSBR) stimulate demand, at least in the short run, by more than higher interest rates depress spending - for given monetary growth. There is some evidence that this asymmetry is beginning to wear off by year 4 of the simulation period.

(iv) **Simulations of faster growth in money GDP**

33. The first two columns of Table D show the effects of a "balanced" expansion of money GDP by one per cent per annum - that is, using a combination of fiscal and monetary expansion which is roughly compatible with a stable public sector debt - income ratio in the long run. Columns 1 and 2 incorporate slightly different definitions, ex ante, of what constitutes a "balanced" policy but, as we would expect, give broadly similar answers in terms of output and inflation.

34. The main difference between columns 1 and 2 is that the long-rate response in column 2 is larger. This reflects the fact that, in column 1, the rise in the PSBR ratio falls gradually as the economy settles on its new, higher money GDP path, whereas in column 2 the PSBR ratio remains 0.5 above base (by construction) for ever.