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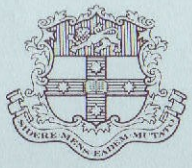
IS AUSTERITY NECESSARY?

by

Eric Kiernan

No. 125 July 1989

DEPARTMENT OF ECONOMICS



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1. Introduction

During the last few years economic policy has faced difficult circumstances, with initially serious stagflation, terms of trade collapse, poor competitiveness and rigid institutions. For several years a consensus on the health of the economy, the strategy of macroeconomic policy and their interaction has been firmly in place. At the risk of oversimplification the conventional views appeared to be, until recently, that the economy was doing pretty well and was on target for a medium-term resurgence. Macroeconomic policies were thought to be appropriately tight, encouraging growth and external balance in the medium-run while not overly contracting output and employment in the short-run. Budgets had been continually tightened while monetary policy maintained interest rates and the exchange rate at high levels.

The official motivation for the macroeconomic strategy was and continues to be that choices in the area of fiscal, monetary and exchange rate policies are so tightly constrained that the only feasible combination comprises a certain amount of fiscal and monetary contraction. Thus, to speak of choice is not useful. More contraction would involve huge economic loss; less would lead to deterioration of the current account and to loss of confidence on the part of foreign exchange markets. This analysis is of course highly convenient. The government could not, up to now, be criticised for

pursuing the wrong alternative if there was no real alternative. Critics could be taken to task for preferring policy stances which lead to disaster one way or another.

This stance continues but the consensus is dissolving. Recent deterioration in the current account has led commentators to question the stance and to recommend, on balance, further restriction.

While it is the case that conditions in the world economy, in international commodity markets and in domestic financial and foreign exchange markets have made for some fine judgement, this paper argues that the government has been and remains too intent on restriction. It is also suggested that some policy difficulties are of the government's own making.

Demand contraction has been shared between monetary and fiscal policy. Heavy reliance on monetary policy under a floating exchange rate counteracts the link from output restriction to current account improvement. Thus the current policy stance has the dubious distinction of preventing the achievement of output recovery and current account improvement simultaneously. Insofar as foreign debt is an issue its amelioration is also retarded.

I ascribe the use of monetary contraction to a shift in policy preferences towards inflation control and the pricking of the housing boom; that is, to choice rather than to necessity. In this sense, of course, what is termed political necessity (actions which increase the probability of re-election) is choice to an economist. Impatient with the progress of the Accord the exchange rate has been used as an

anti-inflationary weapon to the detriment of the current account. This is not the whole story. The propensity of the current account to demonstrate hysteresis by deteriorating more easily than hitherto, especially after a lengthy recession, a phenomenon evident also in the UK at the present time, suggests that the costs of macroeconomic contraction may be underestimated. It also suggests the need to embrace medium-term restructuring seriously.

This paper investigates the interaction between macroeconomic policy and current economic conditions. The structure of the paper is as follows. In the next section an analysis is given of current conditions and policies in the Australian economy. A mathematical appendix sets out a formal model. The analysis downplays the kinds of issues that have dominated recent policy discussions, such as debt problems, expectations or medium-term restructuring. While such considerations raise important points of macroeconomic theory I do not think they constrain policy choices to the extent assumed. There is not the space here to deal with these issues properly. They are dealt with in Kiernan (1989), which argues that constraints are either non-binding or self-inflicted through perverse macroeconomic policies. A brief summary of the some of the arguments is given in section 3.

Section 4 puts a little flesh on the bones of the analysis of section 2 by suggesting some policy initiatives which may be useful in an approach to the economy which does not rely on austerity.

2. A formal analysis

2.1 A modified Swan diagram

A conventional approach to the determination of short-run policy would start from a taxonomy of targets and instruments. Macroeconomic targets would include output, inflation and possibly a balance of payments aggregate with policy instruments consisting of fiscal and monetary policies, possibly exchange rate policy and also possibly an incomes policy.

This section develops a specific application within this framework using the familiar Swan-Mundell apparatus, based on an IS-LM-BP style model (Fleming, 1962; Mundell, 1963; Cuthbertson and Taylor, 1987).

Under a floating exchange rate system internal balance, defined as output consistent with full employment, can be achieved by combinations of monetary and fiscal policies. Both multipliers are positive so expansion using one policy is a substitute for expansion using the other. This translates into a negatively sloped curve, IB(Y), in figure 1.

The definition of external balance under a floating exchange rate is problematic as the exchange rate itself, if left free, clears the market in foreign exchange, removing the necessity to consider the external account. In the current context, in keeping with conventional policy discussion, external balance is defined as a target current account. This could make sense if foreign debt is, or

is perceived to be, a problem. In any case I merely note that the state of the current account is an important indicator, with large deficits being taken as indicative of the need for policy shifts. Fiscal and monetary policies have opposite effects on the current account. This result applies as long as the BP curve is flatter than the LM curve. A monetary contraction may actually improve the current account if the BP curve is steeper than the LM curve. This case is ruled out ex hypothesi. This restriction in our analysis stems from ranking the substitutability of domestic and foreign bonds higher than the substitutability of money and domestic bonds. Domestic and foreign bonds are frequently considered to be good substitutes. In theoretical and empirical modelling the assumption of perfect substitutability is often invoked. The assumption that money and bonds are perfect substitutes, which gives rise to the liquidity trap, is, however, usually thought to be extreme.

With the BP curve flatter than the LM curve, a fiscal expansion, by raising interest rates, encourages a capital inflow, an appreciation and a current account deterioration. Monetary expansion, on the other hand, by reducing interest rates, causes a current account surplus. Thus, starting from external balance, fiscal expansion needs to be offset, in its effects on the current account, by monetary expansion. This translates into a positively sloped external balance line EB(CA) in the diagram.

One transmission mechanism of monetary policy is the exchange rate and this is not without repercussions on the price level. Improvement of the current account by monetary expansion comes at the expense of depreciation-induced inflation. Given the emphasis in

current policy debates on inflation control the Swan-Mundell framework is extended to include a third schedule which combines those settings of fiscal policy and monetary policy which maintain a constant price level. If domestic costs are assumed to be fixed the constant price locus would be identical to the constant exchange rate locus which has a positive slope, as monetary and fiscal policies have opposite effects on the exchange rate.

When we allow the possibility that domestic costs respond to economic conditions the two schedules are no longer identical. In figure 1 the constant price locus has a positive slope. This requires the assumption that domestic costs do not increase too much along with fiscal or monetary policy expansion.

Two opposing factors come into play in deciding the usefulness of this assumption; the sensitivity of wages to domestic demand and the existence of an effective wage - tax trade-off.

The stronger is the effect of demand on wage rates the steeper is the IB(P) locus. The slope of IB(P) may become negative. As the analysis is confined to region VII where there is a margin of deficient demand the assumption of a positive slope may not be unrealistic. The curve is more likely to become negatively sloped in regions II, III or IV where there is excess demand.

A wage-tax trade-off reduces the slope of IB(P), other things equal, as fiscal expansion is predicated on wage growth being less than it otherwise would have been. Hence a fiscal expansion has three effects on prices: the appreciating exchange rate and wage-tax

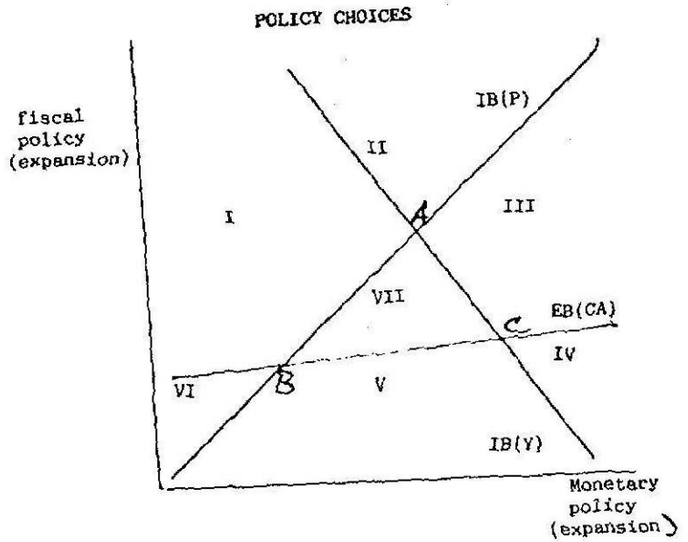
arrangements cause a fall in the price level while additional demand increase prices.

In the appendix the distinction is made between producer prices and consumer prices. The difference is that, as mortgage interest payments enter into the CPI calculations interest rates have a direct effect on consumer prices. Thus monetary contraction has less of an effect on consumer than producer prices. Producer prices are relevant for international competitiveness but governments may have consumer prices as a target.

The result of adding a third schedule is to increase the normal four quadrants to seven regions. It could be the case that the three schedules intersect at a single point but that would be fortuitous. There are in fact eight possible combinations of imbalance although the diagram shows only seven. There is one degree of freedom in drawing the diagram which has been used to give a region of simultaneous unemployment, inflation and current account deficit. The diagram has been drawn as shown as stagflation remains a serious underlying problem. The omitted region would combine overfull employment, deflation and a current account surplus.

Figure 1

POLICY CHOICES



I	unemployment, deficit, deflation
II	overemployment, deficit, deflation
III	overemployment, deficit, inflation
IV	overemployment, surplus, inflation
V	unemployment, surplus, inflation
VI	unemployment, surplus, deflation
VII	unemployment, deficit, inflation

The diagram illustrates an important, if obvious, point: in general, three targets cannot be hit with two instruments. Hence a policy dilemma may exist. A third independent instrument could resolve the policy conflict and an incomes policy is the obvious candidate. This paper takes the position that the Accord has operated successfully over the past five years; probably more successfully than its critics and even its supporters might have imagined. Evidence for this assumption may be found, for example, in Chapman (1986). The present application assumes, however, that there is little additional leverage to be gained at this time by pursuing slower nominal wage growth, ceteris paribus. This is not to suggest that continued progress cannot be made with, for example, wage-tax bargaining, merely that in this model wages do not constitute an independent instrument. Hence there are two instruments available for short-run economic management.

2.2 Recent policy choices

The nature of the policy conflict is illustrated in figures 1 and 2. In figure 1 the vertices A, B and C represent three polar cases which imply the complete neglect of the current account, unemployment and inflation respectively.

Our contention is that the economy is in region VII, experiencing unemployment, inflation and current account deficit, where it has been for some time. Much official and unofficial commentary seems to suggest, on the contrary, that the economy is experiencing excess demand. This would put the economy in region III.

The diagnosis of excess demand seems to follow rather too readily from the observation of inflation and/or a current account deficit. Given Australia's stagflationary experiences over many years the parallel between inflation and excess demand is less than convincing. The identification of a current account deficit with excess demand underplays the influence of the exchange rate. Even with deficient demand an exchange rate may be chosen which renders an economy uncompetitive,inducing a current account deficit.

Another factor at work is first-derivative illusion. Growth which moves the economy towards the ceiling is confused with actual output exceeding capacity output. It is possibly nearer the mark to summarise the state of the economy as having been in a recession of varying magnitude since 1975. At times progress has been made in approaching the ceiling. Such episodes, however, do not constitute generalised excess demand.

Clearly, provided the schedules remain fixed, the simultaneous tightening of fiscal and monetary policies initiate a movement towards B. This is consistent with the emphasis which the government places on inflation control and current account improvement. The exchange rate is appreciated to reduce inflation while domestic demand is reduced to offset the effect of the appreciation on the current account.

The logic of the above application is dependent on fixed schedules. However it is likely that they have been shifting in specific directions. Figure 2 illustrates some possibilities. The shifts in

IB(Y) and EB(CA) to IB'(Y) and EB'(CA) reflect an exogenous investment boom which makes an output target easier to achieve but makes the achievement of a current account target more difficult. Of course there is less need to hit the current account account target if an investment boom is responsible, as some commentators have pointed out. The shift in IB(P) to IB'(P) represents a shift in official objectives, putting more emphasis on price stability. If a stricter incomes policy could be negotiated the IB(P) curve would shift to the right. This shift can be seen as complementary to a wage-tax arrangement which rotates the IB(P) curve clockwise. Both developments, of course, reduce the conflict between achieving satisfactory output, current account and inflation targets.

These shifts move the triangle ABC south-west to A'B'C'. Continued emphasis on price stability and the current account then require an intensification over time of fiscal and monetary restriction which is what has been observed.

My impression though is that the extent of contraction is not completely explained by this analysis. Three additional factors are:

. additional monetary restriction aimed at curtailing the housing boom; that is, in addition to the restriction aimed at removing perceived excess demand coming through the housing market, which is already included in the derivation of IB(Y).

. a misreading of the extent to which fiscal policy is already tight. The position adopted here is that, while all deficit figures give misleading indications of fiscal stance, failure to carry out

inflation adjustments are particularly likely to mislead (Eisner and Pieper, 1982; Miller, 1986). The results of such adjustments would show growing surpluses for several years (Nevile, 1985; Kiernan, 1989).

. a mistaken view that a current account deficit necessarily requires fiscal contraction which, if delayed, requires compensatory monetary contraction. While the necessity for fiscal contraction has as little support as the twin deficits hypothesis, which is currently and deservedly in disarray, it remains the case that fiscal contraction could be undertaken in the face of a current account deficit. As figure 1 illustrates, it would be sufficient to remove the deficit, at a cost to output and prices. The counterpart to a current account deficit is an domestic imbalance between savings and investment. However inequality between savings and investment does not necessarily indicate a 'fundamental' problem, as a monetary contraction can be responsible. A monetary expansion reverses the process, removing or reducing both the current account deficit and the savings-investment imbalance, as figure 1 demonstrates.

To summarise the implications of recent policies, it appears that the economy has moved along a path traced out by points 1,2,3 to the detriment of both internal balance and external balance, in pursuit of price stability and a 'well-behaved' housing market.

2.3 Alternative policy mixes

The policy conflict arises from the pursuit of mutually incompatible targets with insufficient instruments. Over the medium-run an

incomes policy might help to reconcile the conflict both by continued negotiation and by changing the institutional framework in which wage decisions are made so as to override the wage-wage dynamics and real wage resistance which underpin secular inflation. This assumes, of course, that governments do not revise targets in such a way as to maintain the conflict. In the short-run there is less scope for conflict resolution with given targets. It is, therefore, worthwhile to question the necessity of setting so many targets or of setting such ambitious targets that serious conflicts emerge.

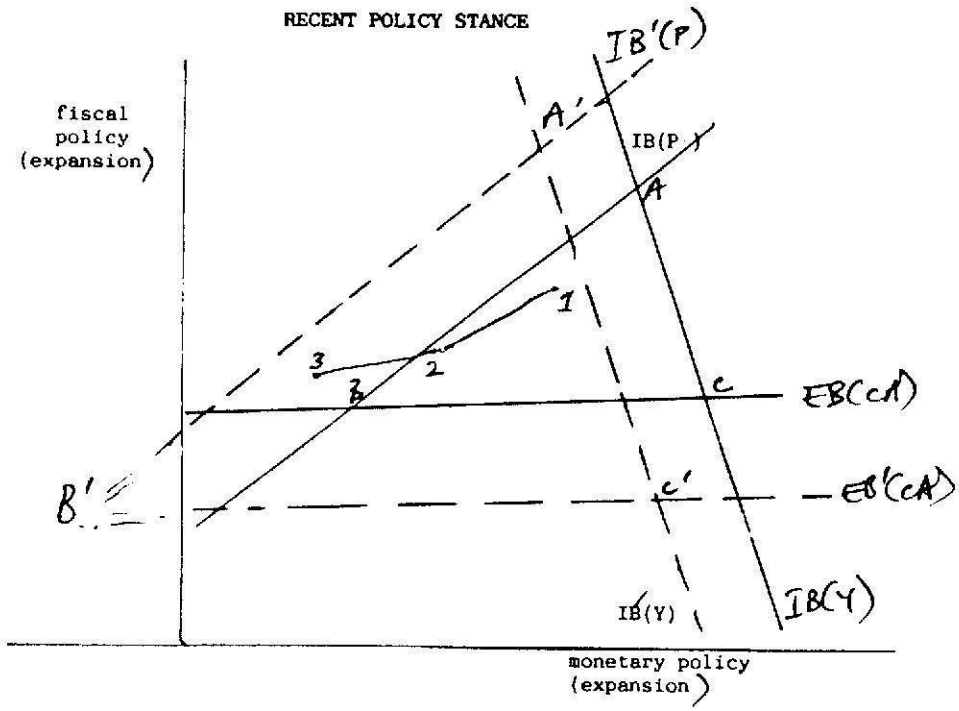
The position taken in this paper is that, with a floating exchange rate and a successful incomes policy, there is less need than hitherto to achieve a very low level of inflation in the short-run; an objective which has been honoured in the breach for the most part, or worse, has been achieved temporarily at huge cost, as for example, in the UK.

In a fixed exchange rate world the maintenance of international competitiveness requires control over the domestic price level. With a floating exchange rate competitiveness can be maintained by operating on the domestic price level or the exchange rate. However, an increase in competitiveness obtained by depreciation is only useful if real wages are not preserved either by automatic complete indexation or by negotiated settlements. As neither of these cases apply to Australia currently an alternative approach may put less emphasis on inflation control and more emphasis on the achievement of satisfactory levels of output and unemployment. This amounts, in the diagram, to moving towards point C - the simultaneous achievement of output and current account targets.

A shift in the relative importance of targets (a movement towards C) certainly requires monetary expansion. The essence of this solution is that monetary expansion is expenditure switching. As it is also expenditure increasing a fiscal contraction may be required. This is not logically necessary however. Fiscal policy could be expanded, contracted or left unchanged. The appropriate response depends on the distance the economy is judged to be from an acceptable level of capacity utilisation compared with the extent to which it is missing the current account target.

Figure 2

RECENT POLICY STANCE



If,for example, fiscal expansion were chosen it would increase output, appreciate the exchange rate and worsen the current account. The implication of this model is that a simultaneous expansion of both policies may increase output without worsening the current account, either through trade or through invisibles. Alternatively an expansion could be engineered which kept the exchange rate constant, avoiding adverse valuation effects. This is a movement towards A. Monetary policy might be preferred in the current situation as the balance of payments implications are more favourable.

With a depreciating exchange rate there is likely to be more inflation. However this is to be expected. The appreciation of the last couple of years has achieved lower inflation than would otherwise have occurred. One of the inherent limitations on the use of the exchange rate as an anti-inflationary instrument is that reductions in inflation bought by appreciation invariably need to be paid back. The gain is in timing, not in a reduction in the long-run rate of inflation. The repayment may be better made when there is an effective incomes policy in place, breaking the link between depreciation and wage awards. It is also the case that the existence of a secular difference between domestic inflation and inflation in the rest of the world is precisely the kind of development which a floating exchange rate may be expected to handle adequately, especially with an effective incomes policy.

3. Limitations on the use of fiscal and monetary policies

There is not sufficient space to discuss the merits of the arguments which are assumed to override the case made in the previous section and which lead instead to a recommendation of austerity. In Kiernan (1989) the rationale for contraction is systematised as a set of constraints and objectives which may modify the above analysis. The paper then argues point by point that the constraints are not binding, or that, in some cases, current policy serves to impose difficulties which would not constrain a different and superior policy mix.

The main points are summarised here without discussion. Consider the argument that foreign debt constrains the level of demand which can be tolerated in the short-run. As the model of this paper is flow-oriented it is impossible to be definite about the consequences of stock effects for macroeconomic outcomes. A comprehensive analysis which introduces stocks would need to consider at least three avenues: wealth effects in consumption, wealth effects in portfolio choice and the effects of interest income on the current account. Such an approach is to be found in, for example, Branson and Buiter (1983).

However the foreign debt argument is suspect because the deterioration in the current account caused by tight monetary policy probably worsens the debt situation. Valuation effects work the other way of course, but as a practical matter it would be highly speculative to suggest that valuation effects in the Australian economy would prevent a current account improvement from carrying

over into a reduction in foreign debt, except perhaps in the very short term.

It is also the case that the level of debt is comfortably within the early projections of a critical level made by EPAC (1986). The logic of this 'slack' was not pursued by EPAC in its follow-up study EPAC (1988). These points suggest that the spectre of an 'outside agency' forcing us to make sacrifices may be too convenient to jettison when it comes to persuading electorates of the necessity for tight policies and real wage restriction.

Another argument for contraction is that fiscal policy is still responding too slowly. In fact correction of deficit data to account for inflation indicates that fiscal policy is very tight and has been so for several years. An associated point is that government debt is unlikely to have been a serious issue for many years, if at all. An additional cyclical correction would reinforce these points.

A third reason for contraction is the presumed existence of excess demand. This argument seems very difficult to maintain. Neither output nor unemployment data indicate excess demand and it is clear that even were the economy at full employment the kind of growth now being experienced would be unlikely to cause undue strain on capacity.

4. A different strategy

A judicious interpretation of official objectives would put forward the following rather uncontroversial list:

relaxation of the current account constraint

improvement in the productive capacity of the economy and its capacity to respond to changed circumstances

a shift in resources towards the tradeables sector

These are valid objectives but they do not appear to require the imposition of short-term costs on the economy in general and on already disadvantaged groups in particular.

A credible policy framework resists demand contraction while encouraging a shift in demand towards investment and supply towards tradeables. The general approach is to suggest supply-side friendly demand expansion.

A suitable instrument for a supply-side friendly demand expansion is monetary expansion. The consequent real depreciation switches expenditure out of the current account, encourages the supply of tradeables and stimulates demand. Its encouragement of investment also supports demand in the short-run while increasing supply in the medium-run.

While some reductions in tax rates are currently being implemented, they amount to partial offset for past fiscal drag. Fiscal policy could be managed in a less blunt way with the use of specific incentives. Some examples are:

a) Investment subsidy

While the rate of investment is not currently an issue, its cyclical nature militates against complacency. Indeed the current investment activity could be seen as merely a partial catch-up for the quiescent performance over much of the 1980s. Over the medium-term there may be a case for an investment subsidy, which combines demand expansion with favourable supply-side effects. It avoids the crowding out which is a factor which may mitigate pure fiscal expansion.

b) Employment subsidy

Again while employment growth currently presents few problems it is astonishing employment is perenially inhibited by the imposition of a payroll tax. Abolition of the tax is desirable on the grounds that it provides a useful stimulus to demand while simultaneously encouraging an increase in aggregate supply and employment.
A full analysis of the proposition would need to analyse the effects of abolition in the context of imperfect goods markets.

c) Government investment

The arguments in favour of private investment apply equally to government investment, which has borne the brunt of fiscal contraction, with an important difference. The import content of (non-defence) public investment is significantly lower than for private investment. The supply-side argument is a bit different in that one has to argue, and this is not controversial that, for example, government investment in education shifts the aggregate supply curve by the improvement it offers in labour force skills, as does investment in health. These may not be regarded as the main

reasons for providing public assistance in these areas but they are sufficient to bolster the macroeconomic arguments.

d) Labour market institutions

From the point of view of this paper the Accord scores highly in the area of wage restraint and in encouraging acceptance of the need for developing new institutions which aid in the solution of economic problems. However there is a lack of vision of the medium-term shape to be encouraged in labour markets. Certainly the idea that a deregulated labour market would work in the medium-term any better than it could be expected to work in the short-term can be based only on a giant act of faith. An extension of the spirit which forged the Accord would emphasise the need for trades unions and firms to develop enlightened macroeconomic vision, based on the proposition that there are economic positions which can be achieved collectively which are not available atomistically.

e) Marginal tax rates

Reduction of the highest marginal tax rates is likely to switch consumption towards imports readily - BMWs and overseas holidays.

f) Foreign exchange markets

While the political economy of financial reform may suggest that the removal of an existing system requires total commitment to its opposite, we are now in a position to consider the pros and cons of a free foreign exchange market more rationally. With a view to preserving its good points and removing some of its weak points,such as its tendency to over-respond (excess volatility), economists have

suggested a variety of modifications. They all attempt to curb the volatility of capital account movements. Thus there is the capital flows tax (Tobin, 1978), the dual exchange rate system (MacDonald, 1988), a real interest rate equalisation tax (Liviatan, 1980) and administrative capital controls. While support for such changes may be muted given Australian experiences, a rational approach might encourage enlightened intervention rather than self-seeking intervention institutionalised by bureaucratic fiat. At the same time it is important to argue against the dysfunctional conventions which see regulations preserved long after they have ceased to serve a useful purpose.

5. CONCLUSION

The government has access to economic institutions, the absence of which has often limited the pursuit of desirable macroeconomic initiatives in the past. The combination of a floating exchange rate and an incomes policy provide opportunities which need to be utilised rather than squandered.

This paper has argued the case for monetary expansion. Fiscal contraction is not necessarily required as a complement to the changed stance of monetary policy. Indeed, specific expansionary fiscal initiatives may be helpful, especially if supply-side encouragement can be combined with demand expansion. Two difficulties may stand in way and, ironically, they are of the government's own making. They are the reactions of the foreign exchange market and the housing market to expansion.

It may be objected that foreign exchange markets may respond to monetary expansion by moving out of $A. This is, of course, exactly the appropriate response. What is needed is an improvement in competitiveness. The government bought disinflation by appreciating the exchange rate. Now it may be the time to pay it back.

If, however, and this may be what commentators have in mind, foreign exchange markets behave irrationally, by equating monetary expansion with a trend towards a banana constitutional monarchy, then this is valuable evidence that such institutional arrangements may not be in the best interests of a small open economy. The government has taken the path of trying to placate FX markets by agreeing with their 'analyses', rather than improving the level of analysis undertaken in those markets, equating monetary independence with following the dictates of the foreign exchange market. The limitations of the approach are increasingly evident.

The second problem with monetary expansion is the housing boom, although I cannot see just what the problem is in social welfare terms. However, in terms of the government's own philosophy, allowing the housing tail to wag the monetary dog is a reversal, which opens up a whole area, not treated here, of deficiencies in financial deregulation.

In summary the best policy may be to proceed cautiously with monetary expansion and possibly some fiscal expansion also, as supply-side friendly as possible, with some well thought out plans for rational

intervention in foreign exchange and housing finance markets, should it prove necessary.

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APPENDIX

The Model

$$Y=E(Y,i)+G+B(Y,eP^*/P) \qquad E_1>0,\ E_2<0,\ B_1<0,\ B_2>0 \qquad (1)$$

$$M/C=L(Y,i) \qquad L_1>0,\ L_2<0 \qquad (2)$$

$$O=B(Y,eP^*/P)+K(i-i^*) \qquad K'>0 \qquad (3)$$

$$P=[D(W,Y)]^{\alpha}(eP^*)^{1-\alpha} \qquad D_1>0,\ D_2>0,\ 0<\alpha\leq 1 \qquad (4)$$

$$C=P^{\beta}i^{1-\beta} \qquad 0\leq\beta\leq 1 \qquad (5)$$

Definition of variables and model description

e nominal exchange rate (domestic price of foreign currency) (endogenous)

C consumer price level (endogenous)

G government expenditure on goods and services real terms (exogenous)

i nominal interest rate on domestic bonds (endogenous)

M money supply (exogenous)

P producer price level (endogenous)

P^* world price level (exogenous)

W nominal wage rate (exogenous)

Y real national product (endogenous)

Equation (1) is the IS curve, which summarises goods market equilibrium. The consumption and investment functions are combined into an expenditure function E. Net exports are explained as a function B of income and the real exchange rate. The LM curve is written in a standard way in equation (2) with the consumer price index as the deflator of the stock of money. The

exchange rate floats so in equation (3) there are no changes in reserves and the private capital account is the obverse of the current account. Capital flows are a function of the difference between domestic and foreign interest rates. The price equation (4) allows both domestic costs and import prices to have an influence. Domestic costs depend on wages and on income, incorporating a supply function in the model. The final equation (5) distinguishes between producer and consumer prices, the difference being that consumer prices are directly influenced by the interest rate.

The model is solved by substituting for P and C from (4) and (5) into (1)-(3).

Total differential of the system

$$\begin{bmatrix} 1-E_1-B_1+\alpha B_2D_2 & -E_2 & -\alpha B_2 \\ L_1+\alpha\beta D_2 & L_2+(1-\beta) & (1-\alpha)\beta \\ B_1-\alpha B_2D_2 & K' & \alpha B_2 \end{bmatrix} \begin{bmatrix} dY \\ di \\ de \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & -\alpha B_2D_1 \\ 0 & 1 & -\alpha\beta D_1 \\ 0 & 0 & \alpha B_2D_1 \end{bmatrix} \begin{bmatrix} dG \\ dM \\ dW \end{bmatrix} \qquad (6)$$

Inverse (all terms are multiplied by $1/\Delta$, where Δ is the determinant of the Jacobian)

$a_{11}=\alpha B_2(L_2+1-\beta)-(1-\alpha)\beta K'$ <0

$a_{12}=\alpha B_2(E_2-K')$ <0

$a_{13}=\alpha B_2(L_2+1-\beta)-(1-\alpha)\beta E_2$?

$a_{21}=(1-\alpha)\beta(B_1-\alpha B_2D_2)-\alpha B_2(L_1+\alpha\beta D_2)$ <0

$a_{22}=(1-E_1)\alpha B_2$ >0

$a_{23}=-(1-\alpha)\beta(1-E_1-B_1+\alpha B_2D_2)-\alpha B_2(L_1+\alpha\beta D_2)$ <0

$a_{31}=K'(L_1+\alpha\beta D_2)-(L_2+1-\beta)(B_1-\alpha B_2D_2)$?, >0

$a_{32}=-(1-E_1-B_1+\alpha B_2D_2)K'-E_2(B_1-\alpha B_2D_2)$ <0

$a_{33}=(1-E_1-B_1+\alpha B_2D_2)(L_2+1-\beta)+E_2(L_1+\alpha\beta D_2)$ <0

$$\Delta=(1-E_1-B_1+\alpha B_2D_2)(\alpha B_2(L_2+1-\beta)-(1-\alpha)\beta K') + (L_1+\alpha\beta D_2)(\alpha B_2(E_2-K')) +(B_1-\alpha B_2D_2)(\alpha B_2(L_2+1-\beta)-(1-\alpha)\beta E_2) \quad <0$$

In signing the coefficients in the inverse several additional assumptions have been made. In a_{11} β has been assumed not to be large enough to change the slope of the money demand curve from negative to positive, by reducing real money balances too much (through its effect on consumer prices). The sign of a_{31} is negative as long as the BP curve is flatter than the LM curve.

The solution

$$\begin{bmatrix} dY \\ di \\ de \end{bmatrix} = \begin{bmatrix} + & + & ? \\ + & - & + \\ - & + & + \end{bmatrix} \begin{bmatrix} 1 & 0 & - \\ 0 & 1 & - \\ 0 & 0 & + \end{bmatrix} \begin{bmatrix} dG \\ dM \\ dW \end{bmatrix}$$

$$= \begin{bmatrix} + & + & - \\ + & - & + \\ - & + & ? \end{bmatrix} \begin{bmatrix} dG \\ dM \\ dW \end{bmatrix} \qquad (7)$$

The sign of $\partial e/\partial W$ is ambiguous as are the signs of $\partial B/\partial W$ and

$\partial(eP^*/P)/\partial W$.

Slopes of the balance schedules

Along an internal balance line dY=0. Hence $dY=(\partial Y/\partial G)dG+(\partial Y/\partial M)dM=0$. The slope is given by $dG/dM|_Y=-(\partial Y/\partial M)/(\partial Y/\partial G)<0$.

Along the external balance line the current account does not change, so dB=0. As $dB=(B_1-B_2D_2)dY+\alpha B_2 de$, substituting for dY and de from the model solution yields

$dB=((B_1-B_2D_2)(\partial Y/\partial G)+\alpha B_2(\partial e/\partial G))dG+((B_1-B_2D_2)(\partial Y/\partial M)+\alpha B_2(\partial e/\partial M))dM$

$=\gamma_1 dG+\gamma_2 dM$, with γ_1 negative and γ_2 positive (it nets out to $-\alpha B_2(1-E_1)K'$). This gives $dG/dM|_B>0$.

The slopes of both price level loci are indeterminate. Starting with P

$dP=(\partial P/\partial G)dG+(\partial P/\partial M)dM$

$=((\alpha D_2(\partial Y/\partial G)+(1-\alpha)(\partial e/\partial G))dG+((\alpha D_2(\partial Y/\partial G)+(1-\alpha)(\partial e/\partial M))dM$.

As $\partial Y/\partial G$, $\partial Y/\partial M$, $\partial e/\partial M$ are all positive and $\partial e/\partial G$ is negative the sign of $\partial P/\partial G$ cannot be determined. There are two effects of fiscal expansion on the price level. The appreciation reduces prices while the output increase raises prices.

Assuming a relatively strong appreciation effect gives a positively sloped price stability locus, which is the diagram drawn in the text.

Consumer prices are related to producer prices according to $C=P^{\beta}1^{1-\beta}$. The slope of the constant consumer prices curve IB(C) is given by

$$\partial G/\partial M|_C=-(\beta\partial P/\partial M+(1-\beta)\partial 1/\partial M)/(\beta\partial P/\partial G+(1-\beta)\partial 1/\partial G)$$

The sign is ambiguous even if $\partial P/\partial G$ is signed because the terms in the numerator have opposite signs. A monetary expansion increases producer prices but reduces the interest rate.

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