

# Money, Prices and Output

## An Integrative Essay\*

By Peter D. Jonson, Sydney/NSW (Australia)

This essay aims to put some recent developments in monetary economics into perspective by drawing out what we have learnt — or relearnt — from them about the structure of the economic system. Following a very brief historical overview the methodology of much recent analysis is illustrated by presenting a very simple one good, one asset model designed to illuminate one or two important relationships. The way in which the simple model provides suggestions about relationships in larger, more complicated, and presumably more realistic models is shown. As noted below, the basic insights about the role of money in the economic system given by this class of model have been tested, and appear to be quite robust. Rigorous testing of economic theory of the sort discussed is a time consuming and expensive business, however, and the essay discusses an alternative way in which the basic insights of modern monetary theory can be applied. The two good one asset model used in quite a bit of recent theoretical writing is introduced, and used to analyze an important policy problem, the shifting trade-off between inflation and unemployment.

Recent developments in the monetary economics of the open economy have been initiated largely by H. G. *Johnson* and R. A. *Mundell* but they are harking back to a much older tradition exemplified best in the writing of David *Hume*. *Hume* stressed the tendency for the balance of payments to vary to equalise “somehow” the supply of money with the demand for money. *Hume* was agnostic about the possibility of understanding in detail the “hundred canals” whereby excess money flowed out of small open economies but was not agnostic about whether this would occur.<sup>1</sup> An analogy can be drawn with the proposition that,

\* The analysis and conclusion do not necessarily reflect those of my employer, or those of my colleagues at the International Monetary Research Program and at the Reserve Bank of Australia who have provided much stimulus to my thinking on this subject.

<sup>1</sup> *Hume* (1955) “Of the Balance of Trade” p. 77.

in a closed economy, doubling the money stock will, eventually and approximately, double the price level. Prominent modern monetary economists, notably M. *Friedman*, appear similarly agnostic about the possibility of understanding in detail how the process occurs.<sup>2</sup> *Hume's* analysis also includes the effect of an increase in the domestic money stock on domestic activity and prices stressed in closed economy models, but was also crucially concerned with the resulting tendency for imports to increase and exports to decrease, producing a loss of international reserves. In this process reserves would be redistributed and prices would tend to equalise throughout the world economic system. The causation was from a monetary disturbance to domestic prices and the balance of payments and then to prices in the rest of the world<sup>3</sup> and although later contributions include discussion of the capital account of the balance of payments, they do not alter the basic emphasis.

As recently as the "Treatise on Money" this view was standard among economists. *Keynes* included in the "Treatise" a lengthy discussion of the effects of Spanish Treasure on European prices, acting by a profit inflation and taking a long time to work its way through the system, and his other historical examples illustrate the point equally clearly. When the Depression of the 1930's shifted the emphasis to quantity adjustment, inflation theory lost favour and models of balance of payments adjustment downplayed price effects and substituted relatively mechanical multiplier analysis. This change in theoretical emphasis occurred at the time when macroeconomic model building became feasible, and has had a pervasive and long lasting influence on the large models used for forecasting and policy analysis. In the British case, to take an influential example, beliefs about zero or low price elasticities in international trade and payments were invoked to explain the continued balance of payments deficit following devaluation of the pound in 1967, and served to distract attention from the enormous domestic monetary expansion occurring at the same time. Ironically, when the International Monetary Fund insisted on quite severe monetary contraction in 1969 as a condition of further assistance, British economists asserted that the system was at last moving up a postulated "J-curve"

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<sup>2</sup> Although *Friedman* has been highly influential both in carrying out and stimulating detailed empirical-historical studies and also in spelling out in qualitative terms the underlying process envisaged, as in *Friedman and Schwartz* (1963 a and b).

<sup>3</sup> *Hume* (1955) "Of Money" pp. 37 - 39.

in the balance of payments, i. e. finally responding to the devaluation induced change in relative prices.

The post-war resurgence of inflation has of course led to renewed interest in monetary economics. In the open economy case the modern contribution has stressed direct world price effects far more than *Hume* and his successors. For example, modern monetary models focus on the tendency for prices to move together throughout the world without necessarily involving trade or capital flows. Direct price effects (including a tendency for interest rates to equalise) lead to a view of the world with more rapid adjustment of prices in different countries than envisaged by *Hume* and the earlier writers. Much of the initial work in this area is presented in *Johnson and Frenkel (1975)*, and consists of simple theoretical exercises and preliminary empirical tests of the basic propositions suggested by the theories. One important contribution is *Johnson's* widely cited article "The Monetary Approach to Balance of Payments Theory" (1972) which focuses on the long run in which domestic inflation rates equal the world inflation rate, domestic interest rates equal world interest rates and real income can be assumed to be given, and in this model an exogenous increase in domestic credit leads to an offsetting decrease in international reserves. Such models ignore the short run dynamic responses of prices and incomes which are of vital concern to the policymaker, and provide no reconciliation with standard payments models or received inflation theory. Some of these gaps are now being filled, however, especially with respect to the short run domestic effects of monetary disturbances, and this emphasis becomes especially important when exchange rates are more flexible.

P. D. *Jonson and Kierzkowski (1975)*, *Laidler (1975)*, *Mussa (1974)* and *Parkin (1972 and 1974 b)* emphasise respectively the effect of disequilibrium in the money market on goods markets, the interrelationship of price and quantity adjustment, interest rate effects and the dynamic effects of differing rates of domestic credit expansion and unequal rates of growth in different sectors in models with traded and non-traded goods. Much of this work is surveyed and extended by H. G. *Johnson (1975)*, who introduces non-money assets ("bonds") and further disequilibrium effects. These modifications reintroduce domestic effects of monetary disequilibrium and help to reconcile the new approach with existing views of adjustment mechanisms. Even in the fixed exchange rate case induced price and output effects tend to soften the effect of monetary disequilibrium on the balance of payments, at least in the short



run. Thus, for example, if an expansion of domestic credit raises the price of non-traded goods and increases consumption and output, it will be likely to raise the demand for money and other domestic assets and produce a less than proportionate effect on international reserves.<sup>4</sup> These effects will be eroded in the longer run as, for example, a rise in the price of non-traded goods draws resources away from export industries and reduces reserves and the money stock.

Standard neo-*Keynesian* econometric models have incorporated monetary effects operating through interest rate changes, wealth effects on consumption and “availability” or credit rationing effects.<sup>5</sup> Significant interest rate effects on investment are fairly well accepted, but appear to operate with relatively long lags. Wealth effects are usually empirically minor and somewhat suspect theoretically, with a high proportion of money in modern economic systems consisting of inside or interest bearing money (similarly the wealth embodied in government bonds may be offset by future tax liabilities). Availability effects also seem theoretically and empirically unimportant.<sup>6</sup>

A possibly more important channel for the influence of monetary disturbances is what should perhaps be called the disequilibrium real balance effect recently emphasised in balance of payments analysis<sup>7</sup>. Consider the very simple model illustrated in Figure 1. This is the model used by *Archibald* and *Lipsey* (1958) to illustrate the transitory nature of monetary disequilibrium in the *Patinkin* Model<sup>8</sup>.

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<sup>4</sup> This provides an interpretation of the offset coefficients estimated by *Kouri* and *Porter* (1974) and *Porter* (1975) in a simple model of capital flows.

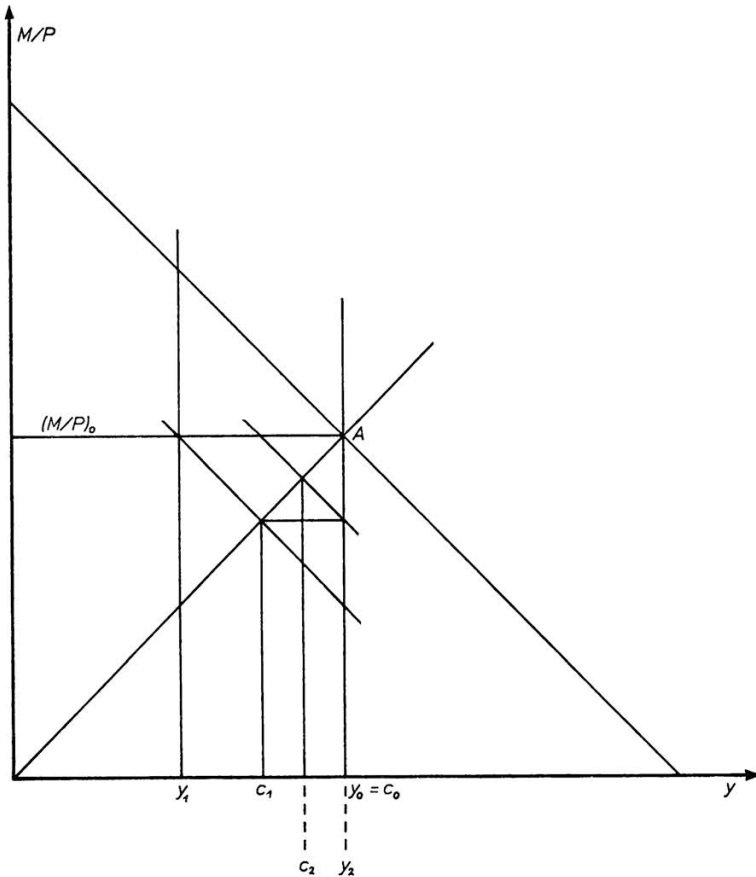
<sup>5</sup> *Fisher* and *Sheppard* (1972) provide a lengthy survey. A further and more critical discussion of the state of the art is given by *Brainard* and *Cooper* (1975).

<sup>6</sup> *Ando* (1974) and *Helliwell* and *Lester* (1975) have argued that the MPS model and the RDX2 models — which incorporate the usual mechanisms — more or less replicate the simple monetarist results for closed and open economies respectively.

<sup>7</sup> The clearest early — and neglected — discussion with an empirical orientation is provided by *Lydall* (1963). I am grateful to G. *Harcourt* for pointing out this reference. *Mishan* (1958) should also be mentioned in this context.

<sup>8</sup> In the following discussion the important point raised by *Marty* (1964), and recently formalised by *Dornbusch* and *Mussa* (1975), that the desired demand for money and the consumption function — and, in principle, other decision rules — should be obtained from an explicit intertemporal choice theoretic approach analogous to the *Ramsey* problem in capital theory is ignored since the existing solution to the problem involves an assumption that

Figure 1



utility is derived from the stock of money balances. This assumption is not very much less arbitrary than the assumption, implicit in figures 1 and 2, that consumers desire to hold a fixed long run money/income ratio. The implications of this decision rule for consumption in the face of exogenous changes in real income suggest why it is sensible. The precise consumption decision rule in the model in Figures 1 and 2 is:

$$c = y - .5 (\hat{m} - M/P) \text{ where } \hat{m} = y \text{ and } M_0/P = y_0 .$$

The model can be complicated by assuming that  $\hat{m}$  is a function of permanent income ( $\hat{y}$ ) and allowing for the possibility that  $\hat{y}$  changes slowly or partially in response to a real disturbance.

This is a model with one asset (money) and one good and illustrates the choices made by an individual who cannot influence goods prices or a small open economy which cannot influence prices in the world economy. In this model the consumer uses his stock of money to smooth the path of consumption over time as illustrated in figure 1 by consideration of the implications of a temporary reduction in income (the classic example being a crop failure). The consumer maintains expenditure above the temporarily lower level of income and money balances are run down in order to make up the part of the gap between production and normal consumption. In the next period, when income has returned to normal, consumption will again be less than income because money balances are below their optimal value. Assuming no further real disturbances, the original equilibrium position at point A will eventually be restored. This example illustrates the role of money as a buffer stock in an uncertain world, not unrelated to the traditional concept of the precautionary motive for holding money<sup>9</sup>, since money balances have enabled the impact of a real disturbance to be spread over a number of periods. To anticipate a later point, “money” rather than “assets in general” may be particularly important because money exchanges directly for all other assets and goods.

In this model and in similar more general models, it also follows that if the consumption path is maintained in the face of a more permanent real disturbance — such as a reduction in crop yields caused by a new plant disease<sup>10</sup> — the fall in money balances will signal the need to reduce consumption (the dynamic path in this case is illustrated in Figure 2). In this case the first period solution is the same as in the case of the temporary income reduction, and real balances are again run down to maintain consumption of  $C_1$ . In the second period, however, in contrast to case one, the consumer notes that income is still at its new lower level, and chooses a still lower level of consumption. The final equilibrium has consumption equal to the new lower level of income, and real balances also reduced, in line with the reduced income level.

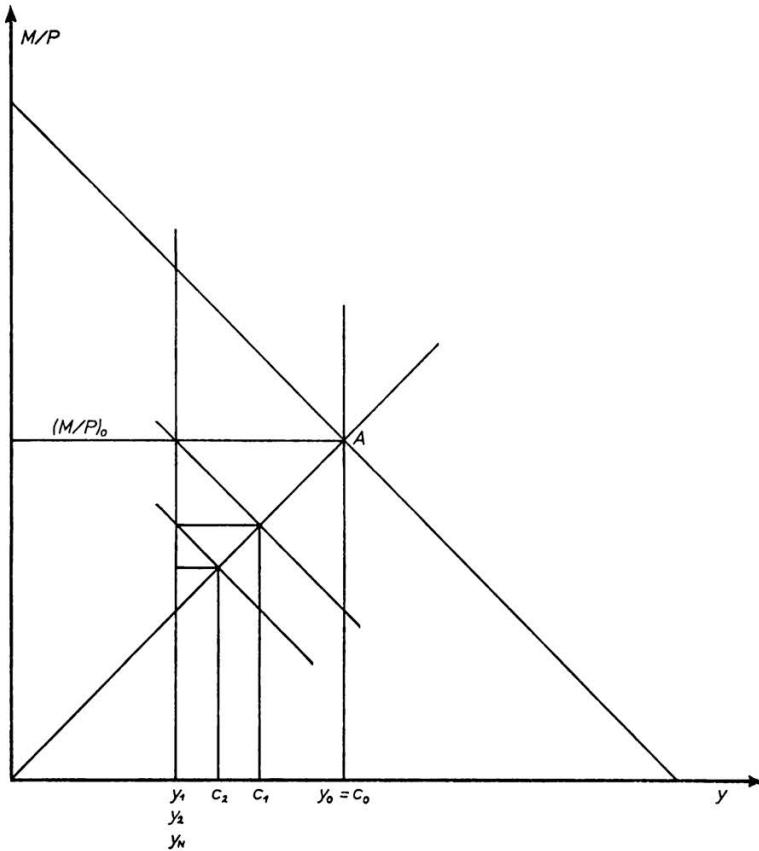
The latter point can be generalised to a model in which both prices and quantities are set by individuals with important monopoly powers in the short run. In such models, which following *Arrow's* (1959) seminal contribution many see as capturing a crucial feature of the economic

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<sup>9</sup> See *Brunner and Meltzer* (1971) and *Darby* (1972) for relevant discussions.

<sup>10</sup> Or by cartelization of the oil industry.

Figure 2



system, prices and quantities are influenced importantly in the short run by their past history through expectation-generating mechanisms. Accumulation and decumulation of money balances will signal the need to adjust expectations, and therefore the prices and quantities proximately controlled by the relevant economic agent, a point developed at some length by *Laidler* (1974). An essential feature of this type of analysis is its attempt to come to grips with disequilibrium phenomena, although the word disequilibrium should not be read as implying that economic agents are off profit or welfare maximizing paths. Rather, it is assumed that economic agents are constrained by available information and in particular that it may well be optimal to allow money balances to diverge from the levels that would be held if the system was



in a full long run equilibrium with all variables at their steady state values. If adjustment proceeds in this way, the gap between actual and desired money balances will occur in equations representing decisions about other economic variables; and the resulting adjustments in markets influenced by monetary disequilibrium will themselves tend to indirectly eliminate the monetary imbalance. The resulting dynamic analysis is in strong contrast to much standard monetarist analysis which assumes that markets — and in particular the money market — clear very rapidly; it is also in contrast to much conventional analysis which merely assumes that partial adjustment mechanisms are pervasive and adds the lagged dependent to each behavioural equation.

Empirically, there is considerable support for the influence of adaptive expectations mechanisms of various types on price adjustment, but much less work has been done exploring the possible effects of monetary disequilibrium on price and quantity adjustment. Some forthcoming empirical results provide considerable support for the importance of such effects, however, and in view of their unfamiliarity it is perhaps worth discussing them briefly here.<sup>11</sup> The suggestion that the gap between desired and actual money balances importantly influences aggregate expenditure seems particularly robust. Thus P. D. *Jonson* (1975) finds a powerful and significant disequilibrium real balance effect on British expenditure over the past century. Other work has replicated this result with quarterly post-war data. *Knight* and *Wymer* (1975) include a disequilibrium real balance effect in the consumption function of a U.K. model and P. D. *Jonson*, *Moses* and *Wymer* (1976) find an equally strong effect on Australian consumption. In retrospect, the standard results with wealth (or liquid assets) in the consumption function can be interpreted as the reduced form of a consumption function incorporating a disequilibrium asset effect, although some of the coefficients in such models need to be reinterpreted if this approach

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<sup>11</sup> Much of this work has been carried out at the International Monetary Research Program at the London School of Economics, and more recently at the Reserve Bank of Australia. Distinguishing features of the powerful econometric methods employed, which have only become operational with the development of a suite of computer programs by C. R. *Wymer*, are that hypotheses are tested in a manner which allows for all of the simultaneous interactions specified in a structural macroeconomic model, with due allowance for the fact that economic data is discrete while most macroeconomic models are specified to be continuous, and imposition of sensible long run (steady state) properties on the model prior to estimation.



is accepted. Whether the relevant asset is money or a broader aggregate, and whether such an asset disequilibrium effect (or a vector of them) should appear in a large proportion of equations in models of the economic system, is an important question which is discussed further below.

Allied with the usual arguments that excess commodity demand will raise prices, the disequilibrium real balance effect on consumption is sufficient to produce the standard result that monetary expansion first increases output and then, with a further lag, raises prices. It is, however, possible that an excess supply of money has direct spillover effects on price change, in addition to the indirect effect via goods market disequilibrium. Such an effect can be based on the earlier arguments about the role of money as a signalling device or, in addition, can be formalised in terms of rational or at least “sensible” expectations — generating mechanisms, and a strong direct link between monetary disequilibrium and inflation has been detected in the Australian data by P. D. *Jonson*, *Moses* and *Wymer* (1976). The approach used involves adding the gap between actual and desired real money balances to a standard price equation with unit labour costs and import prices — these variables representing costs as in mark-up models (e. g. *Godley* and *Nordhaus* (1972)) or given an expectations interpretation as in the work of writers with monetarist orientation, for example *Parkin* (1974 a). — and a measure of commodity market disequilibrium. The result suggests that the direct partial equilibrium effect of 10% excess money balances is to raise the annual inflation rate by almost two percentage points (e. g. from 2% to 4%). There are of course many indirect effects — including output effects via consumption which tend to reinforce this direct effect and feedback effects which tend to dampen it — to consider, and the whole system effect cannot be discussed here. In general however, this channel for the effect of excess money balances tends to speed up the price response to monetary disequilibrium relative to models in which the effect is absent. There is some indirect evidence that such an effect has only become important in recent years, in that it is not found in the 90 years of British data analysed by P. D. *Jonson* (1975). At first sight the implied structural change may appear curious, but it must be recalled that the gold standard dominates the inflation experience of much of the past century. In a situation where prices are widely believed to fluctuate about the relatively fixed peg provided by the gold standard, a domestic monetary expansion (for example) will not necessarily signal

the desirability of raising prices. According to this line of argument, it is only in relatively recent years, when the Bretton Woods system of adjustable exchange rates and a dollar standard combined with widespread commitment to full employment policies, that it has become rational to expect excessive domestic monetary expansion to signal domestic inflation. In the countries whose monetary policy is on average more expansionary than in the rest of the world — for example, the United Kingdom — the price rises have been validated by exchange rate depreciation. In less inflationary countries, — Germany for example — relatively tight domestic monetary policies have signalled the need for price restraint, which has also been validated by exchange rate policy.

The introduction of disequilibrium real balance effects into aggregate price and quantity equations is based upon the insights of a very simple one good, one asset model. The results can readily be incorporated in standard one sector macro-econometric models, and with some technical modifications to ensure that such models have sensible long run properties, are sufficient to ensure that the models exhibit the “quantity theory” predictions as properties of their steady states. By themselves however the monetary disequilibrium effects do not throw much light on a major fact of recent economic life, the simultaneous rise in inflation and unemployment rates. Conventional analyses have incorporated a variety of tentative explanations for this phenomenon, and in particular, increased uncertainty associated with higher and more variable inflation rates reducing business investment, a tendency for wages to rise at times considerably faster than prices and productivity, perhaps as an overshooting phenomenon of some kind, and the oil crisis, and such factors are likely to be relevant for understanding in detail the short run dynamics of recent experience. Additional insight into the trade-off debate can however be obtained from consideration of a simple two-sector model.

Figure 3 illustrates the standard two-sector model with traded and non-traded goods in full equilibrium. Monetary disequilibrium is introduced into this model by P. D. *Jonson* and *Kierzkowski* (1975) who otherwise retain the standard assumptions about costless resource transfers and instantaneous adjustment of prices and quantities.

The standard assumptions about perfect markets can be relaxed fruitfully by recognizing that it may be rational for suppliers to delay their response to a shift in the pattern of demand, especially if the shift in

Figure 3

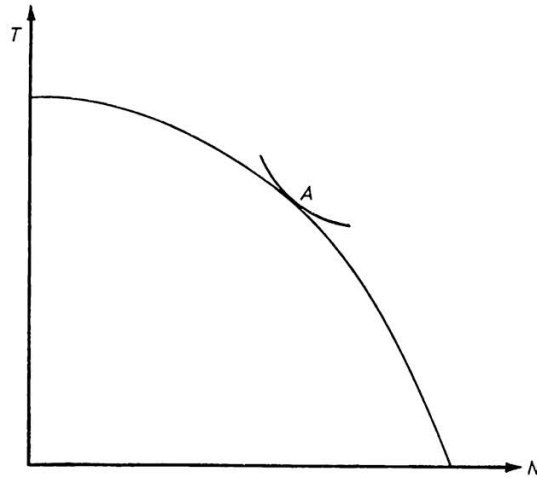
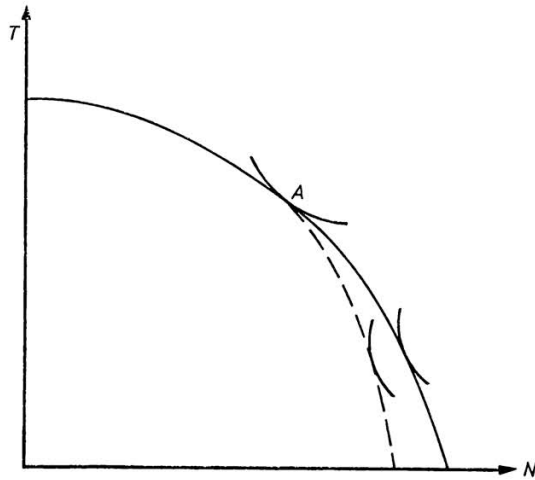


Figure 4



demand is regarded as temporary. This can be formalized in the standard model by making the supply curves functions of past as well as current prices, an assumption that is consistent with the notions discussed above that economic agents make decisions on the basis of expected values of prices which may be sticky in the short run. It is also consistent with the usual notions that adjustment — particularly quantity adjustment —



is costly. The introduction of this innovation implies that the short run transformation curve is below that which applies in the long run, and, further, is different in every period following a once for all change in the pattern of demand, although tending towards the long run transformation curve, with the exact pattern of movements in the transformation curve depending on the precise specification of the supply functions. This idea is probably quite unoriginal<sup>12</sup> but its implications for the trade-off debate are worth pointing out. In the usual trade theory framework it is a minor qualification suggesting that there are transitory unemployment effects, as everyone knew anyway. It becomes more interesting when one considers such effects in a model with money, and a government sector which imposes its preferences for (say) a higher proportion of non-traded goods by printing money. Consider the initial effects of the shift in preferences illustrated in Figure 4 (which also illustrates a short run transformation curve corresponding to supply functions which depend on past as well as present prices). The rise in demand for non-traded goods raises the price of non-traded goods, and hence the general price level (since traded goods prices are assumed to be fixed in world markets). The rise in the price level induces a fall in the real value of money balances, thus reducing (“crowding out”) private demands for both traded and non-traded goods and making room for the government consumption of non-traded goods.

In the first period solution illustrated in Figure 5, production of traded goods has declined more than consumption, producing a balance of trade deficit, the monetary effects of which tend to be offset by the increase in domestic credit to finance the government consumption of non-traded goods. The assumption that the private sector uses its money balances as a buffer stock, however, means that the net monetary impact will only be felt in the next period.

In the next period the change in private demands will depend on the net monetary movement: if the government budget deficit exceeds the trade deficit, private demands for both traded and non-traded goods will tend to increase and, depending in part on the supply response, there will tend to be a greater trade deficit, leading to a subsequent reduction in the money stock; if the initial budget deficit was less than the trade deficit, private demand will fall still further, tending to reduce

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<sup>12</sup> I know of an unpublished paper by H. I. *Kierzkowski* which discusses time dependent production functions.

Figure 5

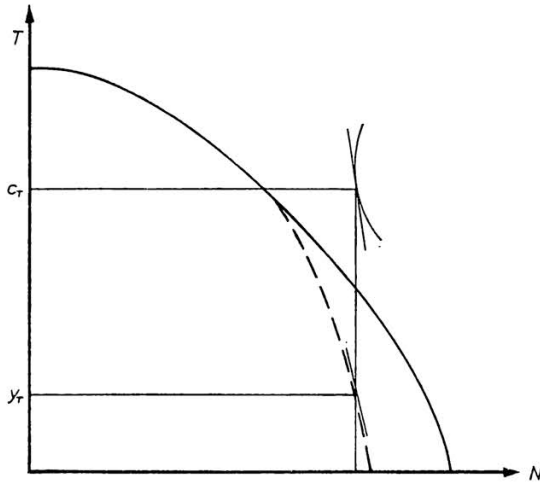
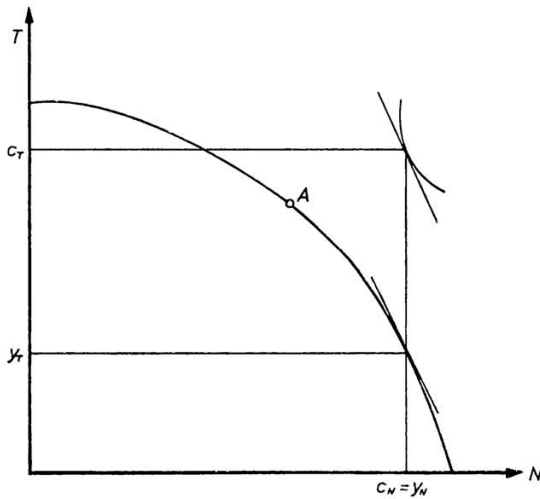


Figure 6



the trade deficit. If the usual stability conditions are met (and the supply response complicates this issue) the model has a solution in which the balance of payments deficit equals the budget deficit and in which output has returned to a full employment level, on the long run transformation curve (figure 6). This cannot be a steady state solution,

however, because the continuing balance of payments deficit means that the country will eventually run out of international reserves. At some stage in the process outlined above the fall in reserves will mean the government will be forced to devalue the exchange rate or, more interestingly for the current analysis, reduce its spending. The latter option will set in train the opposite adjustment path, with further under-employment of resources until the economy eventually settles down to the original equilibrium at point A.<sup>13</sup>

The result of this process will be higher rates of inflation and less output for the entire period that the economy is in disequilibrium than would be the case if stable government policies were followed. This conclusion — which appears likely to be highly relevant for comparisons of the performance of post war British and German stabilization policies, and for understanding the deteriorating inflation-employment performance in many countries in recent years, when macro-economic policy appears to have become more variable — is of course in marked contrast to that of the standard *Keynesian* model in which an increase in government spending automatically increases output. The contrast remains even when this model includes a *Phillips* curve — even of the expectation augmented variety — and allows eventual crowding out of private expenditure through a tendency for tax receipts to rise more than proportionately to nominal income (although such mechanisms can be included in more complex and realistic versions of the above two-sector model). The two-sector model seems to throw further light upon the results obtained by *Lucas* (1973), who also argues that countries with relatively variable government policies have a less favourable trade-off than countries with more stable policies. The present model highlights the point that variable demand management policies imply resource shifts which reduce supply during the adjustment period; in contrast to *Lucas*, the model incorporates demand factors and provides an explicit structural view of the problem.<sup>14</sup> Although similar results will obtain in

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<sup>13</sup> The former option, devaluation, can lead to an alternative steady state in which government spending is financed by taxing money balances by a sustained inflation, and the exchange rate continuously depreciates so that traded goods remain competitive on world markets, to the extent that domestic demand for money is not reduced by the rising prices. Even in this case partial reversals of the tendency to draw resources to the government sector may induce temporary unemployment effects.

<sup>14</sup> The *Lucas* model could be incorporated in the present one by the specification of *Lucas* type supply functions.



larger and more complicated models, with alternative ways for governments to finance resource shifts in their favour, the simple one-asset model is likely to be highly relevant in a world in which it appears cheaper, especially in the relatively short run which dominates the horizon of most governments, to obtain resources by printing money. Yet there are at least two further reasons for focusing on “money” rather than “assets in general”.

Firstly, money may be a proxy for financial assets in general for a wide range of problems involving the effects of inflation on asset values and the subsequent goods market effects. The detailed portfolio models favoured by *Tobin* and his followers are designed for tracing the chain of substitution effects following say, an open market operation, but have been singularly unproductive in throwing light on the dynamics of inflation and output adjustment. Even if one is committed to a multi-asset view of the world, monetary disequilibrium is a good proxy for asset disequilibrium in general if the composition of portfolios adjusts relatively rapidly. While this is a relatively unexamined subject, rapid adjustment of the composition of portfolios but not of the levels of asset holdings seems to be the case in the U. K. in the period to 1939, although the composition takes time to adjust in the post-war period when direct controls of various sorts, especially on the capital account of the balance of payments, have been endemic.<sup>15</sup>

This subtle and probably somewhat controversial issue aside, the strongest argument for the importance of money comes from insights about its role as a buffer stock and signalling device. If, in an uncertain world, people use money as a buffer stock and make their decisions about consumption, the labour they will supply or demand, purchases of durable assets, holdings of bonds and other decisions, and, at the end of the day, look to their money balances to signal the aggregate impact of their economic decisions, money plays a crucial role.

This argument suggests that it is disequilibrium in the money market rather than in a whole set of associated markets which is the relevant variable for inclusion in the appropriate adjustment functions. It does not answer the question about which markets or equations monetary disequilibrium will influence. One possible answer is “all of them”, but quite a bit of work with post-war Australian data decisively refutes this hypothesis. Clearly some higher order theorising is required, but a tenta-

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<sup>15</sup> P. D. *Jonson* (1975).

tive conjecture is that decisions about the holding of bonds, net capital flows, investment in real assets, areas where monetary disequilibrium does not seem to produce any significant improvement on conventional explanations, are taken with a longer time horizon than consumption and pricing decisions, where the direct monetary effects seem to be strong. To the extent that monetary disequilibrium influences consumption and, therefore, output, and prices, it will of course have powerful induced effects on other variables; existing results do suggest however that there are no additional direct spill-over effects.

A problem which arises for some with the above analysis is that the money as buffer stock approach is in apparent contradiction to the simple open economy monetarist model in which money balances always equal the demand for money. This superficial contradiction arises from failure to consider the distinction between the short run and the long run. Even in models in which money is determined residually as a buffer stock in the short run, appropriate incorporation of monetary disequilibrium in consumption and price adjustment functions ensures that money balances equal money demand in the longer run. Recognition of this point resolves the (usually unstated) conflict between economists who estimate the demand for money function<sup>16</sup> and those who emphasise the money supply process.<sup>17</sup> The arguments presented above suggest that the quantity of money will be determined as the outcome of all other decisions in the short run, both because governments tend to use the printing press for residual financing and because the private sector allows its money balances to take the burden of adjustment in the short run. The arguments also suggest that the standard practice of estimating the demand for money function by single equation techniques with observed money balances as the dependent variable may be quite perilous and may suggest that money demand is unstable when it is not. In this connection it is interesting that demand for money functions estimated in the normal way have tended to break down when the control regime is changed from one in which interest rates and exchange rates are pegged (when normal estimation techniques may be more or less appropriate) or when considerable monetary instability is introduced.<sup>18</sup> The alternative approach may involve identifying the parameters of the desired or long

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<sup>16</sup> Note that *Friedman's* use of cycle averages in his empirical work helps ensure that the long run demand function is identified.

<sup>17</sup> Notably *Brunner* and *Meltzer* and their followers.

<sup>18</sup> The most notorious example is provided by the U. K. data.

run money demand function indirectly by way of the disequilibrium real balance effect in price and quantity equations, whatever the control regime adopted by the authorities. This has the advantage both of being theoretically more general and, as suggested by results of the empirical work noted above, empirically more robust.

In conclusion, it is interesting to note that although much of the stimulus for recent work in monetary economics has come from consideration of the fixed exchange rate small open economy case, the insights into the mechanisms by which monetary disequilibrium influence the economy apply equally to the closed economy case or to the open economy with a flexible exchange rate regime. In the large closed economy, with a high proportion of its goods and assets not traded in world markets, domestic monetary stimulus will influence domestic prices and output relatively more than the balance of payments. Consequently, the canals by which monetary stimulus flows to the rest of the world will be mainly direct price effects rather than the monetary effects acting through the balance of payments which were emphasized by *Hume*. Conversely, the small open economy will find that domestic monetary disequilibrium will mainly affect its balance of payments in the longer run, although there are important domestic affects in the short run.

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## Zusammenfassung

### Geld, Preise und Output: Ein zusammenfassender Aufsatz

Der Aufsatz will einige neuere Entwicklungen der Geldtheorie und -politik in eine bestimmte Perspektive bringen, indem dargelegt wird, was wir von ihr über die Struktur des volkswirtschaftlichen Systems gelernt — oder wieder gelernt — haben. Nach einem sehr kurzen historischen Überblick wird die Methode der meisten neueren Untersuchungen erläutert, indem ein sehr einfaches ein Gut/eine Anlage-Modell angeboten wird, um ein oder zwei bedeutende Beziehungen zu beleuchten. Es wird aufgezeigt, wie das einfache Modell Annahmen über die Beziehungen in größere, kompliziertere und wahrscheinlich realistischere Modelle überführt. Die hauptsächlichsten Erkenntnisse über die Rolle des Geldes im Wirtschaftssystem, die durch diese Art von Modell gewonnen wurden, wurden getestet und scheinen ziemlich standfest zu sein. Das strenge Testen ökonomischer Theorien in der erörterten Art ist aber eine zeitraubende und teure Angelegenheit. Deshalb wird in dem Aufsatz ein alternativer Vorschlag gemacht, wie die Haupteigenschaften der modernen Theorie angewandt werden können. Das zwei Güter/eine Anlage-Modell, das nur in ganz wenigen neueren Arbeiten verwendet wird, wird benutzt, um ein wichtiges wirtschaftspolitisches Problem zu untersuchen: den wechselnden Trade-off von Inflation und Arbeitslosigkeit.

## Summary

### Money, Prices and Output: An Integrative Essay

This essay aims to put some recent developments in monetary economics into perspective by drawing out what we have learnt — or relearned — from them about the structure of the economic system. Following a very brief historical overview the methodology of much recent analysis is illustrated by presenting a very simple one good, one asset model designed to illuminate one or two important relationships. The way in which the simple model provides suggestions about relationships in larger, more complicated, and presumably more realistic models is shown. The basic insights about the role of money in the economic system given by this class of model have been tested, and appear to be quite robust. Rigorous testing of economic theory of the sort discussed

is a time consuming and expensive business, however, and the essay discusses an alternative way in which the basic insights of modern monetary theory can be applied. The two good one asset model used in quite a bit of recent theoretical writing is introduced, and used to analyze an important policy problem, the shifting trade-off between inflation and unemployment.

## Résumé

### Monnaie, prix et output: Une récapitulation

L'article entend présenter quelques récents développements de la théorie et de la politique monétaires dans une certaine perspective, c. à. d. en décrivant ce qu'elles nous ont appris — ou réappris — sur la structure du système économique global. Après un bref survol historique, l'on explique la méthode de la plupart des nouvelles recherches qui offrent un modèle très simple: un bien/un placement, en vue d'éclairer une ou deux relations importantes. Et l'on montre comment le modèle simple conduit à des hypothèses sur les relations dans des modèles plus grands, plus complexes et probablement plus réalistes. Les notions essentielles sur le rôle de la monnaie dans le système économique que ce genre de modèle permet de découvrir furent testées et sont apparues assez solides. Les tests sévères des théories économiques tels qu'ils sont expliqués ici sont cependant des exercices coûteux et longs. C'est pourquoi l'auteur propose une alternative permettant de mettre en oeuvre les notions essentielles de la théorie moderne. Le modèle: deux biens/un placement, assez peu répandu dans les travaux récents, est utilisé pour examiner un problème primordial de politique économique: l'alternance du « trade-off » de l'inflation et du chômage.