National Autonomy of Stabilization Policy

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Several economists, especially Norwegian, Swedish, and French, have in recent years contributed similar, essentially simple, yet highly useful models to the analysis of international economic interdependence and domestic price structure.[1] In rough outline the principal, common ideas of the models are as follows. Assuming substantially unrestricted international commodity trade and fixed rates of exchange, prices on the domestic market of a country of internationally traded goods — both exportables and importables — are exogenous variables relative to the national economy. The national economy is viewed as composed of two sectors, the competitive or exposed sector producing for the domestic market and/or the world market in competition with foreign producers; and the sheltered or shielded sector comprising producers, who are not similarly exposed to direct foreign competition.[2] Even in small, open economies like those of the Scandinavian countries where foreign trade is relatively large the shielded sector is appreciably larger than the exposed sector. From the level of internationally determined prices combined with the level of productivity in the exposed sector the wage level in that sector is derived. Assuming further the wage level in the exposed sector to govern that in the shielded sector — or more simply but less realistically, assuming the labor market to be one homogeneous market — prices in the shielded sector are governed by wages and productivity in that sector. Since recorded productivity usually grows at a higher rate in the exposed sector than in the shielded sector, not only the wage level, but also output prices of the latter sector will follow rising trends if world market prices and exchange rates remain constant.

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[1]Aukrust (1970); Courbis (1971); Edgren et al. (1973); Ringstad (1972).

[2]The public sector may be conceived either as part of the shielded sector or as a separate, third sector.

The principal use for which the Swedish model by Edgren, Faxen, and Odhner (EFO) was designed, was the analysis of the development over time of wages and prices, the model serving to delineate a "main course" for wages, residual incomes (profits) and prices, the development of international prices (translated into domestic currency) of tradables and productivity in the exposed sector defining the margin available for increases of domestic incomes in general and wages in particular. In this way the model may serve as a guide to income policies.

Actually, of course, there can be no sharp and immutable dividing line between the exposed sector and the shielded sector — tourism for one thing prevents that. The main point is not that the dividing line is blurred, but rather that its position is a function of the ratio of wages to prices, introducing an element of circularity into the model. Similarly, the subdivision by commodities of the exposed sector into net exporting and net importing subsectors will depend on the ratio of wages to prices. As a guide to income policies the model can lead to specific recommendations only if target values of the level of employment and the balance-of-payments position are specified.

Increasingly during the post-war period the stabilization problem in the industrialized countries has changed its character from that of stabilizing the level of domestic economic activity by counteracting alternating expansionary and contractionary influences of both domestic and foreign origin towards that of eliminating or at least dampening and containing an almost permanent and apparently growing inflationary pressure. The EFO model may prove useful in the analysis of inflation and in particular in bringing out the different course of events, when on the one hand domestic inflation tends to exceed inflation abroad, and when on the other hand the main inflationary impetus is received from abroad through the rise in the prices of tradables.

Further, the EFO model and especially its expansion to a fairly complete macroeconomic model in the French version have been used for the analysis of the effects of alternative combinations of monetary and fiscal policies on the level of economic activity and the balance of payments, leading to conclusions which in part deviate sharply from those of traditional Keynesian analysis. In this respect work on the model has been combined with analysis by Mundell and others[3] of the implications of international capital movements for the international propagation of activity changes and the effectiveness of monetary and fiscal policies under fixed and flexible exchange rates.

A distinctive feature of the Courbis model is that it integrates the main ideas of the Aukrust and EFO models in a larger macroeconomic model. The Phillips relation plays a central role in an essentially very simple way. The theory of price formation is identical to that of the EFO

[3]Mundell (1963) (1968); Prachowny (1973). An important early paper stressing the distinction between exposed and shielded sectors is McKinnon (1963).

model except that prices of tradables are not considered entirely exogenous, but as (moderately) rising functions of the trade deficit. Investment decisions are governed by the targets of entrepreneurs relating to financial structure implying in particular an upper limit to leverage. This constraint is of major importance for the investments of the exposed sector, selling in markets where prices are largely determined from abroad.

No elaborate calculations are required to see that on the above assumptions total employment is not, except for the short run, governed by total demand. Even an increase in public expenditures, directed primarily towards the shielded sector will not lastingly raise total employment. There will occur a temporary rise in employment which, however, through the Phillips relation narrows the gap between prices and wages in the exposed sector and decreases the flow of internal funds available to finance investment in that sector. Thus, the final result of the increased demand for the output of the shielded sector will be a re-allocation of employment from the competitive to the shielded sector, rather than an increase in total employment. At the same time the balance of payments on current account must deteriorate. Actually, the model implies a kind of natural or equilibrium level of unemployment, determined by the rate of productivity growth and the rate of inflation imported from abroad, and based on a stable Phillips trade-off.

The recent development of the Danish economy provides a pertinent illustration of the working of the model. During the early part of the post-war period balance-of-payments difficulties — partly due to a weak export structure — induced the authorities to pursue policies restricting total demand and maintaining unemployment at a relatively high level. In consequence wages rose rather less than in other OECD countries, while at the same time the initially small exports of manufactures expanded at a high rate. Thus, the industrial structure and the commodity mix of exports changed appreciably, resulting in a favorable shift in the relationship between domestic activity and foreign balance: when in the early part of the 1960s domestic economic activity rose towards the full employment level the balance of payments on current account deteriorated much less sharply than would have been expected on the basis of the experience of the early 1950s. However, from about the middle of the 1960s the trend changed. Expanding public expenditures and residential construction became the leading elements in the growth of total demand and both investment and employment in manufacturing tended to stagnate. Wages now rose more rapidly than in other OECD countries and profit margins in the exposed sector narrowed. Thus, resources were drawn from the exposed into the shielded sector and the balance of payments on current account moved increasingly into deficit.

Briefly stated then, a principal conclusion from the Courbis model is that in an open economy where the firms of the exposed sector may be considered price takers (i.e., quantity adjusters to in the main exogenously given prices) domestic demand management in general and fiscal policies

in particular are not in the long run effective as instruments to achieve high employment.

The Courbis model assumes an international mobility of factors sufficiently low to justify ignoring factor movements to and from abroad, and neither labor nor capital movements are taken into account in the model. Earlier — somewhat different — non-Keynesian conclusions were reached by Mundell[4] on the basis of the assumption of perfect international mobility of capital.

The Mundell model does not distinguish between a competitive and shielded sector and thus can not serve to analyze structural changes in the economy in the way the Courbis model can. Like the traditional Keynesian the Mundell model is a short-run static model supplemented, however, with a somewhat impressionistic account of a dynamic adjustment process. Under fixed exchange rates fiscal policy has an impact on domestic employment, but the propagation of this activity change to abroad through demand effects may be more than neutralized by the effects of the immediate propagation abroad of a tendency for interest rates to change. Monetary policy on the other hand would have no effect on employment, but only lead to a change in exchange reserves. Under flexible exchange rates the tables are turned. Any effect of fiscal policy on employment is neutralized through a change in the balance of trade in response to changing capital movements, whereas monetary policy now will be effective by inducing a change in the rate of exchange.

The assumption of perfect capital mobility implying equality of national interest rate levels and perfect synchronization of their movements is in general rather unrealistic. In the following we shall sketch a model which takes into account the distinction between exposed and shielded sectors and the imperfect mobility of capital. To simplify matters we shall — unless otherwise stated — assume that world market prices of tradables are exogenous, so that the domestic price level of tradables varies in direct proportion to the rate (in domestic currency) of foreign exchange.

The notation used and the equations of the model are as follows:

P_T, P_N : domestic prices of tradables and non-tradables, both initially equal to 1.

A_T, A_N : volumes of domestic private absorption for consumption and investment of tradables and non-tradables.

G_T, G_N : volumes of government absorption of tradables and non-tradables.

Y_T, Y_N : domestic output of tradables and non-tradables.

[4]Mundell (1963).

$Y = Y_T P_T + Y_N P_N$: total money income.

B : volume of net exports, in general initally = 0.

i : rate of interest.

K : capital exports, in general initially = 0.

$$Y_T = A_T + G_T + B \tag{1}$$

$$Y_N = A_N + G_N \tag{2}$$

$$K = BP_T \tag{3}$$

The notation deviates little from that used in the model presented by Prachowny (1973), which, however, assumes perfect mobility of capital and therefore suppresses the constant domestic rate of interest. In the present model the rate of interest is considered a policy instrument on par with G_T, G_N and P_T (representing the rate of exchange).

Equation (l) states the equality of total demand and total supply on the commodity market of the exposed sector. Total output equals domestic absorption plus the balance on current account. Equation (2) similarly states the equality of shielded sector demand and supply. Equation (3) states the equilibrium condition that the balance on current account equals capital exports which are assumed to be a function only of the domestic interest rate level, the interest rate abroad assumed constant. The derivative of K with regard to i, which is of course negative, is generally assumed to be finite.

A main difference from the Prachowny model concerns the way in which credit policy is dealt with. In the Prachowny model perfect mobility of capital is assumed and interest rate policy is therefore out of the question, the rate of interest being tied to the world level. In contrast to the Prachowny model the present model does not explicitly introduce a liquidity function. Since capital mobility is generally assumed to be less than perfect the rate of interest may be varied, and we assume a degree of technical perfection of monetary management which allows us to consider the rate of interest an economic policy instrument. Our model may then be viewed as an economic policy model which includes three groups of instruments: the rate of exchange, the rate of interest, and the levels of government expenditures for tradables and non-tradables, representing fiscal policy. It is, of course, a matter of definition whether one says that unchanged credit policy implies an unchanged quantity of money or an unchanged rate of interest. In any case, if the rate of interest is maintained constant in face of an economic expansion, credit volume must have expanded.

We manipulate the model in the following way: we substitute K for B in (1) and differentiate equations (1) and (2) totally, which gives us two

equations in five variables: ΔP_T (representing also the change in the rate of exchange), ΔP_N, ΔG_T, ΔG_N and Δi. We may then arbitrarily choose three variables and solve for the remaining two, one of which will always be ΔP_N. Assuming the equality of marginal and average propensities to spend we then have:[5]

$$Y_{TPT}\Delta P_T = A_{TPT}\Delta P_T + A_{TPN}\Delta P_N + A_{Ti}\Delta i + A_{TY}(Y_{TPT} - Y_N)\Delta P_T + A_{TY}(Y_{NPN} + Y_N)\Delta P_N + \Delta G_T + K_i\Delta i \quad (4)$$

$$Y_{NPN}\Delta P_N = A_{NPT}\Delta P_T + A_{NPN}\Delta P_N + A_{Ni}\Delta i + A_{NY}(Y_{TPT} + Y_T)\Delta P_T + A_{NY}(Y_{NPN} - Y_T)\Delta P_N + \Delta G_N \quad (5)$$

To simplify the writing out of results, the following symbols are introduced:

$$Z_T = (1 - A_{TY})Y_{TPT} - A_{TPT} + A_{TY}Y_N$$

$$Z_N = (1 - A_{NY})Y_{NPN} - A_{NPN} + A_{NY}Y_T$$

$$X_T = A_{TY}(Y_{NPN} + Y_N) + A_{TPN}$$

$$X_N = A_{NY}(Y_{TPT} + Y_T) + A_{NPT}$$

Note that for plausible values of the partial derivatives

$$Z_T, Z_N > X_T, X_N > 0.$$

The model specification is admittedly rather unsatisfactory in several respects, in particular regarding investment and capital exports as functions of the rate of interest. However, these shortcomings are hardly fatal since in general only the signs of the derivatives A_{Ti}, A_{Ni} and K_i are crucial to the results.

We shall consider the following pure cases: 1) constant rate of exchange and simultaneous variation of the rate of interest and government absorption of tradables or non-tradables; 2) adjustable rate of exchange combined in turn with variation of (a) the rate of interest or (b) government absorption of tradables or non-tradables, other instruments remaining constant.

It is assumed throughout in the discussion of the model that wages are constant and that unemployed resources are available.[6]

[5]As pointed out by the discussant, Professor Stanley Black, in the original version of this paper equations (4) and (5) did not account adequately for income effects. In response to this criticism amendments have been made here.

[6]In short, internal balance is assumed. Many modern textbook expositions identify full employment and internal balance. This highly misleading language would never have been adopted if men were robots.

1) Exchange rate constant, i.e., $\Delta P_T = 0$
(Instruments: fiscal and credit policies)

$$\Delta Y_T = 0$$

$$\Delta Y_T = \frac{A_{Ni}\Delta G_T - (A_{Ti} + K_i)\Delta G_N}{-X_T A_{Ni} - Z_N(A_{Ti} + K_i)}$$

$$\Delta Y_N = Y_{NPN}\Delta P_N$$

$$\Delta i = \frac{Z_N\Delta G_T + X_T\Delta G_N}{-X_T A_{Ni} - Z_N(A_{Ti} + K_i)}$$

2a) $\Delta G_T = \Delta G_N = 0$
(Instruments: credit policy and exchange rate)

$$\Delta P_T = \frac{X_T A_{Ni} + Z_N(A_{Ti} + K_i)}{Z_T Z_N - X_T X_N}\Delta i$$

$$\Delta P_N = \frac{Z_T A_{Ni} + X_N(A_{Ti} + K_i)}{Z_T Z_N - X_T X_N}\Delta i$$

$$\Delta Y_T = Y_{TPT}\Delta P_T$$

$$\Delta Y_N = Y_{NPN}\Delta P_N$$

2b) $\Delta i = 0$, hence $\Delta B = 0$
(Instruments: fiscal policy and exchange rate)

$$\Delta P_T = \frac{Z_N\Delta G_T + X_T\Delta G_N}{Z_T Z_N - X_T X_N}$$

$$\Delta P_N = \frac{X_N\Delta G_T + Z_T\Delta G_N}{Z_T Z_N - X_T X_N}$$

$$\Delta Y_T = Y_{TPT}\Delta P_T$$

$$\Delta Y_N = Y_{NPN}\Delta P_N$$

We consider first the fixed exchange rate case. When the price of tradables is assumed exogenous and wages are constant, total output of the exposed sector is also constant. None the less, a change in G_T will change total output and income. If more of the exposed sectors' output is absorbed by the government, net exports must decline. Then, to maintain balance-of-payments equilibrium the rate of interest must rise, depressing domestic investment. The deterioration of the trade balance is modified by

a decrease in domestic investment demand for exposed sector goods at the same time as output for investment of the shielded sector is reduced. This decline in output would not occur if the international mobility of claims was perfect since in that case the domestic rate of interest would not rise.

Even for small industrialized countries the assumption that prices of importables and — especially — exportables are purely exogenous is hardly realistic. Let us then introduce an interdependence between B and P_T such that $BP_T < 0$ and, to simplify matters, assume that in the initial position $B = 0$. In this case an increase in government absorption of exposed sector output will increase that sector's output and price. B, however, must decline, so that again the rate of interest must be raised in order to maintain equilibrium in the balance of payments. But price and output of the shielded sector now receive the impact of two opposite forces: increased demand due to higher prices and output in the exposed sector will tend to raise shielded sector output, while the higher rate of interest will reduce investment demand for the output of the shielded sector. Thus output of the shielded sector may either rise, fall, or remain unchanged.

If in the initial position B is not zero, but negative and large, shielded sector output will fall, because the impact of a higher rate of interest will predominate. If on the other hand B is positive and large (and the sensitivity of B to P_T small) the trade balance may improve, the rate of interest fall and output of the shielded sector rise.

Returning to the assumption of exogenous exposed sector price, let government absorption of shielded sector output increase. This will increase shielded sector output, and in consequence domestic demand for the unchanged exposed sector output will increase. Thus, less is left for net exports and B will decline. Again, the rate of interest must rise, which, however, by restricting investment demand for the output of the exposed sector moderates the deterioration of the trade balance. It follows that the rise in the output of the shielded sector will be the larger, the larger is the sensitivity of capital movements and of investment demand for exposed sector goods with regard to the rate of interest.

It will be seen then that when the international mobility of capital is less than perfect, fiscal expansion (under a fixed exchange rate) must be accompanied by a higher interest rate in order to preserve the balance-of-payments equilibrium. However, assuming unemployed resources to be available, increased government demand for shielded sector output will be more effective in raising total output than increased demand for exposed sector output, which may in fact lead to a decline in total output.[7] But in the long run (with which the model is not adequate to deal) this difference

[7]It follows that with exchange rate fixed and constant interest rate total output may be raised by combining an increase in government demand for non-tradables with a decrease in demand for tradables. In several countries, during the depression of the 1930s and in the early post-war period, considerable attention was given to such expenditure switching leading to a decline in the overall propensity to import.

in effectiveness may diminish or evaporate altogether as increased total employment and in consequence higher wages deteriorate the competitive position of the exposed sector along the lines set out in the Courbis model.

Next we consider those cases where adjustment of the exchange rate is added to policy instruments.

If fiscal policy is unchanged and credit is expanded sufficiently to reduce the rate of interest, demand for the output of both sectors will rise. To preserve the balance-of-payments equilibrium the price of foreign exchange in terms of domestic currency must be raised, so as to adjust to both the increase in capital exports (fall in capital imports) and the effect on the current balance of the increase in domestic activity. In particular for a debtor country that has accumulated considerable foreign indebtedness the sensitivity of the capital balance may confine the possible decline in interest rate levels within quite narrow limits. The scopes for increase and decrease in the domestic interest rate may be distinctly asymmetric. This does not imply a restriction on the scope for increasing domestic activity by changing the exchange rate. But it does restrict the share of domestic investment in the increase of output.

Also in this case we may take into account the possible interdependence of trade balance and price (in foreign exchange) of tradables. The proportionate rise in the domestic price of tradables will then be less than the proportionate rise in the rate of foreign exchange accompanying the reduction of the rate of interest.

If credit policy is neutral in the sense that the rate of interest is kept constant, fiscal expansion will have a multiplier effect as in a closed economy, since the rate of foreign exchange must rise sufficiently to keep the current balance equal to the, by assumption, constant capital flow. Here then it makes a big difference whether perfect mobility of capital is assumed or not. Under perfect mobility of capital any current account deficit will be financed at a constant rate of interest, and increased government absorption of tradables will be neutralized by a deterioration of the current balance. (Increased government absorption of non-tradables will, however, increase price and output of the shielded sector.) But under less than perfect mobility of capital fiscal expansion through increased government demand for tradables will increase total output even on the assumption that the quantity of money is kept constant, the monetary authorities refusing to accommodate an increased demand for transaction balances. A rise in the rate of interest will in this case limit, but not entirely prevent a rise in output, since the rise in the interest rate will occur only if output increases. Thus government demand is met partly from a fall in B, partly from increased output.

As appears from the above discussion the effects of changing government expenditures may differ greatly according to whether the expenditure change in question concerns expenditures for tradables or non-tradables. The practical importance of this distinction is, however, somewhat limited. In most countries government demand for the output of the

shielded sector accounts for by far the major part of total government demand for goods and services. This holds also in particular for government investment expenditures which without excessive welfare loss may be varied considerably for purposes of economic stabilization.

Fiscal policy in the shape of tax changes and changes in transfer expenditures act by changing domestic private absorption. As, however, in most countries, even small ones, the shielded sector may be judged to be far larger than the exposed sector, it remains true that in general the primary real impact of fiscal policy will be preponderantly on the shielded sector. Main exceptions concern various policies specifically designed to control particular categories of demand as, for instance, investment taxes. Thus the natural main scope for fiscal action is in fields where income effectiveness of such action is large.

Leaving aside our simple model we may point to total employment, the balance of payments and the price level as the targets generally judged to be of most concern to stabilization policies. Destabilizing impacts may be received from abroad or arise domestically. Destabilizing impacts from abroad may concern primarily the current or the capital account of the balance of payments.

If a change in economic conditions abroad takes the form of a fairly uniform rise in all prices, without any pronounced changes in relative prices or in total activity abroad, the matter is at least in principle quite simple, since appropriate variation of the rate of exchange will stabilize domestic prices and leave total activity unchanged. Alternatively, if the rate of exchange is kept constant, the inflation abroad will be transmitted to the domestic economy. This, however, need be no cause for concern if the point of view is accepted that domestic inflation is harmful only in so far as it proceeds at a higher rate than abroad and thus prevents the maintenance of external equilibrium.

Traditionally, the principal harmful effects of inflation have been summarized under these headings:

(1) If inflation is allowed to proceed for a protracted period of time, it will tend to accelerate, culminating in the destruction of the monetary system in galloping inflation.

(2) A redistribution of income from wages to profits is supposed to lead to a more unequal distribution of personal incomes.

(3) A redistribution of incomes from creditors to debtors will occur.

(4) The allocation of resources will be distorted due to the stimulus to investment provided by inflation, and finally

(5) If domestic inflation proceeds at a higher rate than abroad the balance of payments on current account must move increasingly into deficit as long as a constant rate of exchange is maintained — which will of course be possible only for a limited time. Further, the distorting effect on allocation must here be progressively intensified as deviating rates of inflation at home and abroad imply continuing changes in price-wage structure.

However, in recent years it has been claimed[8] that if inflation proceeds in step in all countries — or rates of exchange are appropriately adjusted — and if further the rate of inflation is correctly anticipated, neither the allocation effects nor the redistributional effects will occur. Postwar experience would appear to be that inflation rather than redistributing income from wages to profits does the opposite. And as to both the redistribution from creditors to debtors and the distortion of resource allocation neither should take place if inflation is correctly foreseen, since in that case the rate of interest will adjust to the rise in prices, so that creditors will be compensated for the fall in the value of money, and the comparison of present and future prices will not be distorted. However, experience hardly confirms that inflation — and particularly rapid inflation — is in general fully reflected in a rise in market rates of interest.

Furthermore, the above argument neglects the impact of the income tax, which ignores the distinction between that part of interest payments which compensates for the fall in the value of money and the part which is true income. If in non-inflationary conditions the equilibrium rate of interest gross of tax is 6 percent and thus net of 50 percent income tax is 3 percent, then to obtain the same real rate of interest at 10 percent inflation, the market rate should rise to 26.6 percent, equivalent to 13.3 percent net of tax, which will leave a real rate of return of 3 percent. Assuming the 50 percent tax rate to apply to both creditor and debtor, the relative real positions of the two parties is left unchanged if 10 percent inflation is accompanied by rise in the market rate from 6 to 26.6 percent. More generally, assuming the rise in the market rate to compensate fully for inflation, the elasticity of the market rate with regard to the tax rate t will be $t/1-t$.

In the case of the return from investment in real capital as distinct from financial investment the position is affected by the principles of most countries' income tax laws of prescribing deduction for tax purposes of depreciation based on historical investment costs rather than costs adjusted for subsequent inflation. This principle imposes no extra real tax burden due to inflation, if the turn-over period of capital is so short that all costs may be treated as current costs. Equally, there will be no excess burden due to inflation in the extreme opposite case of investment in non-depreciating real assets. Assuming the money return from the asset to rise over time at the general rate of inflation neither real net returns nor capital value will be affected. But the real after-tax return from an asset depreciating over several accounting periods will suffer a decline due to the failure of depreciation allowances to adjust to the inflationary rise in investment costs. The reduction in the real rate of return will be an increasing function of both the rate of inflation and the tax rate. If owners, like tax authorities, suffer from money illusion, consumption will rise to the detriment of real savings.

[8] Johnson (1963).

Note the different time profiles of the yields from financial investments and investments in real capital. In the absence of inflation and at a rate of return (interest) of 6 percent a perpetual bond of $1,000 market value yields a constant $60 per year to which at 10 percent inflation corresponds a rate of interest of 16.6 percent, so that the constant annual yield from a bond of $1,000 market value amounts to $166. In the case of investment in non-depreciating real capital, on the other hand, both the annual yield and the capital value will rise at the rate of inflation without any change in the instantaneous ratio of the current yield to the capital value. At a constant rate of inflation and real rate of interest the nominal market value of the bond will remain constant and thus decline in real terms; the bondowner must reinvest part of his receipts from the bond in order to keep intact the real value of his capital. As mentioned above, an income tax of 50 per cent will require a rise in the bond rate to 26.6 percent, if in spite of 10 percent inflation the real rate of interest is to be maintained at 3 percent after tax. The introduction of taxation requires no corresponding increase in the return from real assets. The 50 percent tax cuts each annual yield of the rising sequence in half, so that the rate of profit net of tax becomes 13.3 percent, corresponding to a real rate of return of 3 percent adjusted for 10 percent inflation.

The different time profiles of yields due to inflation from financial and real assets create difficulties, especially for the financing of long-term investments in fields where leverage normally is high, such as housing, and where consequently in the early life of the real asset the payments required to service debt may greatly exceed current gross profits. The effect is to lengthen the average period of the net cash flow from such projects and presumably increase the risk and reduce the attractiveness of long-term investments. This may be part of the explanation why market rates of interest fail to adjust fully to inflation, so that the real rate of interest becomes close to zero or even negative for investors liable to income tax. A further main explanation is that pension funds and other tax-exempt institutions account for a large part of the demand side of the capital market.

The discrimination against investment in depreciating real capital is in many countries counteracted by permitting exceptionally rapid depreciation and by other devices conferring preferential tax treatment on rapidly growing firms with a high rate of investment. In consequence, an important net result of heavy personal and corporate income taxation in an inflationary economy will be discrimination between, on the one hand, stagnant or slow-growing firms and, on the other hand, rapidly expanding firms which get an added interest in continued expansion and investment as a means to keep down the burden of taxation. As their higher tax burden must hold down the capital value of the slow growers, mergers into and take-overs by the more progressive firms are promoted.

The idea that long-term inflation will tend to accelerate into hyper-inflation is an old one. Until recently most economists would probably have

denied the existence of any such strong tendency, let alone necessity, for inflation to accelerate. However, inflationary developments of the last few years may have raised new doubts and the theoretical discussion was certainly greatly stimulated by Milton Friedman's address at the 1967 annual meeting of the American Economic Association.[9] Here, commenting on the Phillips curve, he spelled out the thesis that there is only a temporary, but not a permanent, trade-off between wage inflation and unemployment. This propostion, if correct, is of course highly relevant to the question of the existence of a well-defined macroeconomic equilibrium. In the so-called new microeconomics a great many theoretical models for the labor market have been constructed. Common to most is the idea that at each point in time contracts are based on wage and price expectations, which in excess demand disequilibrium are repeatedly revised upwards due to the positive feedback from wages to total demand. Though not always stressed, this feedback is a crucial element in the cumulative inflationary process, marking the decisive difference between markets to which partial analysis is or is not adequate. However, the behavior of dynamic models is so notoriously sensitive to even minor variations in assumptions that prospects appear rather dim for reaching convincing results through theoretical analysis. Beginning with Solow's investigation[10] a great many attempts have been made by regression analysis to clear up the question of the influence of price expectations on the course of wages, using mostly some variant of the adaptive expectations hypothesis. Overwhelmingly such analyses have given the negative result that the influence of price expectations has been less than required for verification of at least a crude version of the hypothesis put forward by Friedman — who, however, explicitly stressed the delays in the learning process. More specifically, in regression equations of the form

$$w = F(u) + a\,p$$

(where w and p are rates of wage and price increases, and u unemployment — or some other variable or combination of variables thought to represent adequately the degree of excess demand in the labor market) the coefficient "a" has generally been found to be considerably less than one — mostly about one-half. However, the value of the evidence depends upon the correctness of the equation specification. Price expectations are relevant, but presumably their influence may already be accounted for through the excess demand function into which they must enter as arguments. With obvious symbols we may write the wage adjustment equation as follows

$$w = k(D(W, P, \ldots) - S(W, P, \ldots))$$

[9] Friedman (1968).

[10] Solow (1969).

the elasticities of demand with regard to W and P being appreciably higher than those of supply. It is certainly not evident that in this equation prices or the rate of price increase should appear independently outside the demand and supply functions. In any case, since excess demand must be influenced by price expectations, these as additional independent variables cannot be assumed to express the full influence of price expectations.[11]

That world market prices of all tradables change in the same proportion, so that the terms of trade remain constant, is rather exceptional. For a small open economy the real income effect of a change in the terms of trade may easily be equivalent to normal annual productivity growth. The most troublesome case is that where a deterioration of export markets is accompanied by a decline in the terms of trade. The adjustment to a lasting change of this kind will reflect that foreign trade has become less advantageous. Supposing the adjustment to be made by exchange depreciation, the depreciation should typically result in a decline in the proportion of foreign trade to domestic output computed at constant prices. In the absence of exchange rate adjustment a deterioration of the terms of trade, say through a rise in prices of imports, may in the first instance be supposed to lead to a decline in the current balance — which must be matched by an increase of domestic investment relative to savings, brought about presumably mainly by an increase in inventory investment. But if the deterioration of the terms of trade gradually leads to an economic contraction, investment would normally decline more than savings and the current balance must improve correspondingly, mainly by a fall in the volume of imports. However, in an inflationary climate and at high

[11]To illustrate the point, simulation runs have been performed on a fairly simple, dynamic two-sector model. In one sector cost-plus-pricing is the rule and the production function is linear; in the other sector firms are pricetakers and the production function is decreasing returns non-linear. In each period production is decided in the first sector on the basis of past sales, unsold stocks in hand at the beginning of the period, and the rate of interest (to represent the influence of credit on investment) in the previous period. In the pricetaker sector production decisions are based on past prices (to represent price expectations) and wages for the coming period. Production decisions combined with specified demand functions determine actual sales in the cost-plus-sector (and thus unsold stocks at the end of the period) and prices in the pricetaker sector. Wages are determined with a one-period lag by a pure Phillips relation lacking any independent price variable. A random element was included both in the wage equation and in the production function of the pricetaker sector. From an initial equilibrium the model was conducted through a number of simulation runs by irregular cyclical variations in exogenous money supply. Because of the fairly important random element in the wage equation the results of the runs gave, of course, only an imperfect correlation between wage changes and unemployment in the preceding period. Further, the price of the good produced by the pricetaker sector (and thus the price level as a whole) would necessarily vary largely in sympathy with total income, production and employment. In consequence, changes in wages tended to conform — with a one-period lag — to changes in prices, so that in a regression analysis the rate of price increases would show up as a significant influence on the increase in wages — in spite of the fact that prices and their changes do not enter the wage equation.

levels of activity, the sharp rise in import prices may well stimulate total demand further, so that the deterioration of the current balance is matched by larger domestic investment. The economic consequences of the international rise in oil prices may in different countries provide examples of both types of development. In any case, if the terms of trade deteriorate through a rise in prices of imports, an evident conflict arises between the targets relating to price stability on the one hand and employment and the balance of payments on the other.

The stabilization problem may be quite complicated in the case of an international Mengenkonjunktur and in particular of a decline in international economic activity. The maintenance of the volume of exports and thus of output in the exposed sector will require an increase in the country's share of export markets which in turn may require a decline in export prices in terms of foreign exchange. While in the long run a small industrialized country's exports may be presumed to be determined mainly by supply factors, in the short run demand factors assume major importance. Under an international recession price elasticities of demand for producers' goods and in particular investment goods may be relatively low, so that the practical chances of maintaining the volume of exports and their purchasing power in terms of imports could be distinctly poor.

Since by definition the primary domestic impact of disturbances from abroad to the current balance will be on the exposed sector, whereas the main field of impact of fiscal policy is on the shielded sector, it follows that in the short run fiscal policy can achieve little more than neutralizing the secondary effects of the disturbances from abroad. Whether it will in fact prove possible through fiscal action to prevent a decline in activity and incomes to spread from the export industries to the rest of the economy, will under fixed exchange rates depend on the exchange reserves and credit facilities available for financing the increased deficit on current account which expansionary fiscal action calls forth. Under clean float — flexible exchange rates without official market intervention — the financing of a current deficit by drawing down exchange reserves is by definition excluded. It does not follow, however, that the exchange rate will depreciate so as to re-establish the position on current account since speculative capital imports may counteract the depreciation of the exchange rate and in the limiting case prevent it entirely — in general a highly improbable outcome, however, if effective domestic policies designed to maintain income and employment are pursued. But that the monetary authorities should entirely abstain from intervention in exchange markets is neither probable nor advisable. Assuming the temporary character of the adverse developments in foreign markets and the availability of sufficient foreign exchange resources, the optimal exchange rate policy would presumably be directed towards maintaining the ratio of exposed sector to shielded sector prices approximately at pre-recession levels.

The most troublesome case of a disturbance from abroad impinging on the capital account of the balance of payments is a reduction of the

possibilities of borrowing abroad, forcing a decline in capital imports to an economy that has become geared to current account deficits and capital imports. Evidently, without reducing employment the current account deficit can only be reduced if the rate of exchange is depreciated or other measures are taken which impinge directly on the current balance.

One might expect economic instability to be more pronounced in small industrial countries with a relatively large foreign trade than in the larger countries. But this is in fact not what one finds,[12] the most obvious, but hardly sufficient explanation being that in countries with a large foreign trade the marginal propensity to import is also high.

As the relative size of the public sector and government intervention has expanded, the course of economic events has increasingly become dependent upon government policy. The very growth of the public sector has contributed to the rising trend of inflation due to the stronger demand effect of real expenditure than of taxes.

It has often been claimed that a large public sector promotes economic stability, partly because public expenditure is presumed not to be subject to similar fluctuations in demand and activity as the private sector, partly because of fiscal drag or built-in-stability due to high marginal tax rates. But when inflation accounts for the major part of the rise in total income, fiscal drag is greatly weakened by the rise in wages and prices, causing public expenditure to rise and thus counteracting the increase in tax revenues.

Confronted with disturbances from abroad an economy combining a flexible exchange rate with inflexible wages would react in much the same way as an economy with flexible wages and a fixed exchange rate. But in the face of domestic excess demand or supply the two economies would react very differently, the flexible wage tending to equate demand and supply in the labor market at the same time as the current account moves towards deficit or surplus, whereas the flexible exchange rate would tend to maintain the foreign balance, but enhance disequilibrium in the labor market. Paradoxically, flexible exchange rates are becoming the fashion at the time when high levels of employment decrease the elasticity of domestic supply and inflation increases the flexibility of wages.

[12]Lundberg (1968).

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Discussion

Stanley W. Black

Professor Gelting's paper provides us with three topics today: a review of recent work on the "Scandinavian" model of inflation, a digression on some effects of inflation on the domestic economy, and a model of monetary and fiscal policy in a small, open economy.

Let me begin with his digression on inflation, which questions some recent views on the desirability of "living with inflation." His primary focus is on the ways in which income taxes affect the adjustment of interest rates to inflation. As Professor Gelting points out, under inflationary conditions the income tax exaggerates the required increase in the before-tax return on fixed value claims that will yield a given after-tax return. With no tax, the return would merely have to rise by the expected rate of inflation to compensate for the loss in real value. I should like to point out that if the losses in real value were tax-deductible, this would still be true. It is the non-deductibility of real capital losses that requires the before tax yield to rise by the expected rate of inflation divided by one minus the tax rate. Much of this increased return must be saved in order to avoid a reduction in real wealth, as has also been argued by William Poole.

Professor Gelting argues that the elasticity of the before tax yield with respect to the tax rate is t/1—t. This result depends on the assumptions that all returns are taxable and that none of the opportunity cost of capital is deductible from the income tax. More generally, let the tax rate be t, the percent of returns on investment that are taxable be v, and the percent of cost of capital that is deductible be x. Then one can show that the elasticity of the before tax return with respect to the tax rate is

$$\frac{(v - x)t}{(1 - xt)(1 - vt)},$$

which is positive or negative as the taxable fraction of returns is greater

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or less than the deductible fraction of costs ($v > \text{or} < x$).[1] The case emphasized by Gelting has $x = 0$ and $v = 1$, as in personal earnings on financial investments or business earnings on equity capital. But for mortgage-financed housing, $x > v$ and the market yield can fall with a rise in the tax rate, since the deduction becomes worth more.

Passing on to his discussion of the Phillips curve, I would disagree with Professor Gelting's claim that the rate of price increase should not appear independently outside the demand and supply functions of labor. Wage changes can be regarded partly as a response to existing disequilibrium in the labor market, as Gelting views them, and partly as a response to shifts in the location of the equilibrium wage rate, as prices and productivity change.

Let me now return to the main point of Professor Gelting's paper. The model he presents marries the Mundellian analysis of monetary and fiscal policy to the Scandinavian assumptions of fixed terms of trade. He is thus responding to a challenge recently put by our Chairman "to combine 'structuralist' and monetarist models of inflation for open economies by showing the interdependence between the markets for money, credit, commodities, services, and labor, considering the influence on domestic prices of international price changes and the different rates of productivity increase in various sectors."[2]

To place this work in context, let me briefly mention the major strands of work on the small, open economy. The earliest contributions were the "Australian" models of Swan, Salter, and Waterman. These models focused on the consequences of fixed terms of trade for policies aimed at expenditure-switching and expenditure-reducing to achieve internal and external balance. The capital account was not emphasized, but the two-sector model of tradable and non-tradable or home goods was adopted. Then we have the "Canadian" models of Robert Mundell with their emphasis on capital flows and the differences between monetary and fiscal policy. Prachowny's recent article combines the "Australian" analysis of tradable and home goods with the Mundellian policy framework.

The third major strand of work is the Scandinavian model, begun by Aukrust in Norway and extended in Sweden and France. This model has focused on the supply side of the economy, rather than on demand factors, and has drawn out the implications of fixed world market prices for wages and prices in a small, open economy. The Aukrust model uses the price side of a Leontief system to show the effects of changes in wages, external prices, and productivity on profits in the various sectors of the economy. Clearly, monetary and fiscal policies play no role in such a theory.

[1]Let the before tax return be Q and the before tax cost of capital be R. Then after taxes, $(1 - vt)Q = (1 - xt)R$, whence $Q = \frac{1 - xt}{1 - vt}R$. The result follows by differentiation.

[2]Assar Lindbeck "Reseach on Internal Adjustment to External Disturbances: A European View," in C. F. Bergsten, *The Future of the International Economic Order* (Lexington, 1973) p. 66.

But Courbis has grafted the Aukrust incomes policy model onto a macroeconomic demand framework. As I understand Courbis' model, he uses a modified Aukrust model as a breakeven condition to determine wages and domestic prices, given external prices, productivities, and investment requirements. The Phillips curve then implies the employment level and aggregate supply that is compatible with wages as given by foreign prices. Imports are a residual. As pointed out by Gelting, in such a model the main effects of monetary and fiscal policy are on the trade balance rather than employment. An increase in aggregate demand spills over onto imports, since output is given by costs and profits. A shortcoming is the assumption of capital immobility, certainly not very acceptable in today's world of Eurocurrency markets.

Professor Gelting takes Prachowny's version of a Mundellian model as his basis for analysis and, at least implicitly, criticism of the Courbis model. Before proceeding to discussion of his results, I would like to draw attention to the ways in which Prachowny's model is not up to the burden it is being asked to carry. First, as noted by Gelting, the assumption of rigid money wages cannot accommodate the Phillips curve analysis of the Courbis model. A closer approximation would be full employment with completely flexible wages, so that the reallocation of resources between sectors would be more explicit. Secondly, the "structuralist" element of the model bears at best a distant resemblance to the Aukrust model. The problem is that the cost functions assumed for traded and non-traded goods depend not on wages and productivity, as in a Leontief production function, but on quantity produced, as in the neoclassical theory of production. Thus the independence of costs from demand factors characteristic of the Scandinavian model has been lost. Perhaps that is a good thing, but at the same time the focus on wages, profits, and productivity has also been lost. As a result, Gelting's model is more monetarist than structuralist, although the supply side does play a role.

The main assumptions of the model are as follows: (1) world market prices of exportables and importables are fixed, as are the terms of trade, so that the domestic price of tradables varies with the exchange rate; (2) unemployed resources exist in both the tradable sector and the non-tradable goods sector; (3) money wages are constant; (4) fiscal policy can take the form of purchase of either tradables or non-tradables, with the latter more likely; (5) capital is less than perfectly mobile; (6) no reserve movements occur, since balance-of-payments disturbances are resolved either by monetary policy to affect capital movements or by flexible exchange rates; (7) the central bank controls the interest rate; (8) government spending is fixed in real terms, rather than in money terms; and (9) the demand functions for domestic absorption of tradables and non-tradables are defined in *nominal* terms, even though the absorption variables are originally defined in real terms. The first four of these assumptions are taken over from Prachowny, but the latter five are new. Incidentally, variable interest rates raise the problem of wealth effects on saving, excluded by assumption from Prachowny's model.

Given these assumptions, Gelting first shows the effects of stabilization policies under pegged and flexible exchange rates. Then he discusses policy response to various disturbances, such as imported inflation or recession, change in terms of trade or in access to foreign capital.

The main conclusions on stabilization policy are interesting, but not too surprising. Under pegged exchange rates, monetary policy is shackled to the balance of payments even when capital is not perfectly mobile, because of the avoidance of reserve movements. Under flexible rates, monetary policy can affect both internal and external balance. Fiscal policy, especially with respect to non-traded goods, can affect output under both regimes. But it is more effective under flexible rates, since interest rates do not have to be raised to equilibrate the external accounts.

These results can be shown in the following two diagrams. Figure 1 refers to the case of a pegged exchange rate and thus a fixed price for tradable goods. In the market for tradable goods, shown by the curve TT, a rise in the price of non-tradables will increase demand and cause a fall in the balance of trade. These effects must be offset by a rise in the interest rate, leading to an upward sloping TT. In the market for non-tradable goods, a rise in price will usually reduce demand and increase supply, requiring a fall in the interest rate to maintain equilibrium, for a downward-sloping NN curve. An easier fiscal policy directed toward either market will cause a shift in the relevant curve in the direction of the arrow. In both cases the balance of payments will tend to deteriorate, requiring a tight monetary policy. The effect on total output depends on what happens to the price of non-tradables. A purchase of home goods will raise total output, while purchase of tradable goods will reduce it. In Prachowny's case of perfectly mobile capital, the TT curve is horizontal and does not shift if the government buys tradable goods.

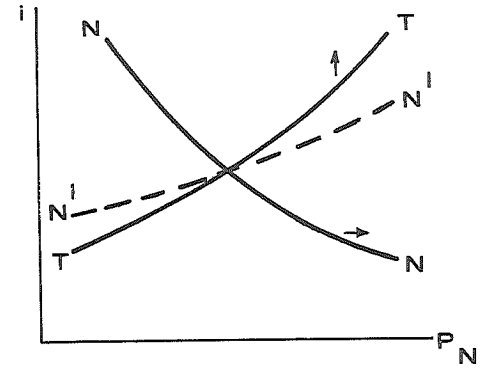

Fig. 1. PEGGED EXCHANGE RATE

In the case of a flexible exchange rate, both domestic prices can vary, and the relevant curves are shown in Figure 2. Fiscal expansion would shift the relevant curve in the direction of the arrow, depending on which type of goods were purchased by the government. In both cases output rises and the exchange rate depreciates. Monetary policy, which is now free to follow its own way, will cause *both* curves to shift opposite to the arrows as interest rates rise. The effects of imported inflation or recession and other external disturbances can be studied in these diagrams by shifting the TT and NN curves in the relevant direction. Gelting's discussion of disturbances proceeds *outside* of the model, since inelastic foreign demand and changes in the terms of trade violate assumptions of the model.

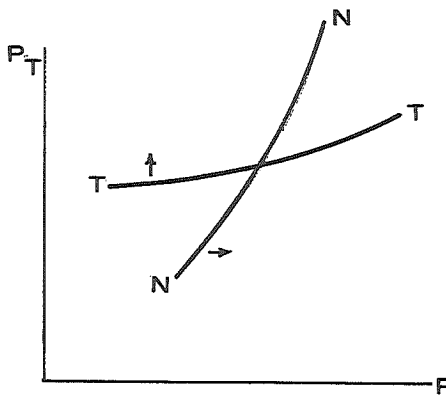

Fig. 2. FLEXIBLE EXCHANGE RATE

This picture of Gelting's model is, however, subject to one qualification. By defining demand functions in nominal terms and fiscal variables in real terms, Professor Gelting has left the model vulnerable to some potentially troublesome income effects. His equations (4) and (5) contain terms A_{NPN} and A_{TPT} that can be either positive or negative since they include the effects of a price increase on the value as well as the volume of demand. Thus the coefficients he calls Z_T and Z_N can be negative, because of the income effects of higher prices. Inflation raises the money incomes of producers, who will spend the increase just like an increase in real income. These income effects can conceivably outweigh the substitution effects of the price increases and cause the curves of Figures 1 and 2 to have different slopes. For example, we could have the curve N'N' in Figure 1, which remains stable as long as TT is steeper. Here an increase in government purchases of tradable goods would lower the price of non-tradables, leading to a *decrease* in demand for non-tradables because of

the strong income effect. Then interest rates would have to fall, leading to an outflow of capital and a trade *surplus*! Similarly, both curves in Figure 2 could slope in the opposite direction. Presumably, these possibilities should be ruled out by assumption.

A final interesting case discussed by Gelting is the effects of a variable world price of tradables, under pegged exchange rates. In this situation fiscal expansion will raise the price of tradable goods and deteriorate the trade balance. Since capital flows must meet the change in the trade balance, the interest rate must rise or fall depending on the change in the *value* of the trade balance, which can go either way. Regardless of the effect on the interest rate, it should be noted that the *volume* of trade must decline.[3]

I believe that this sort of policy model has substantial usefulness in exploring the nature of choices open to the small, open economy. Professor Gelting has my thanks for a very stimulating paper. Nevertheless I would like to emphasize the need for modifying the assumptions concerning the use of exchange reserves and hence monetary policy under pegged exchange rates. It is doubtful that monetary policy has the freedom under flexible rates that he assumes. Also I believe a full employment model would be better equipped to test in a comparative static framework the conclusions of dynamic models including a Phillips curve. An alternative is a *truly* dynamic model with a Phillips curve, as in the recent paper by Scarfe in *Oxford Economic Papers*. If a Phillips curve is to be used, presumably wage changes should depend *both* on unemployment and on productivity growth, as in the Swedish model by Edgren, Faxen and Odhner. And what about a Leontief production structure? That would seem much closer to the Aukrust framework.

[3]Since $B(P_T)P_T = K(i)$, $di/dP_T >$ or < 0 as initial $B >$ or $< -B'P_T > 0$. But $dB = d(K/P_T) = B' < 0$.