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A SYNTHESIS OF THE MACROECONOMIC APPROACHES
TO EXCHANGE RATE DETERMINATION

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Abstract

The paper develops a general model with the goods, money, bond, and labor markets. The special assumptions needed to generate the predictions of the Keynesian, monetarist, and portfolio balance approaches from the model are then found. It turns out that the assumption of perfect capital mobility essentially generates the monetarist predictions, and perfect monetary sterilization by the central bank at a fixed interest rate the predictions of the elasticity-absorption approach. The supply side regime and purchasing-power parity assumptions fix income but do not qualitatively affect the exchange rate responses. The approaches turn out to be independent, rather than contradictory parts of the general model, each approach abstracting from what the other is analysing. This is technically done by dichotomizing the general model, the monetarists making the money market equation, and the Keynesians the goods market and balance payments equations the independent ones. The orthodox neutral monetary policy version of the Keynesian approach generates the predictions of the whole model.

While the Keynesian and monetarist approaches differ in their policy regime assumptions, the portfolio balance approach differs in its equilibrium condition, by constraining the trade balance to equilibrium.

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Pekka Ahtiala^{*}

1. Introduction

In the theory of exchange rates, the dominant schools, the Keynesian school on the one hand, and the monetarist and the portfolio balance schools on the other, seem to be so far from each other in their ways of thinking as to prevent a fruitful exchange of ideas, the propositions of the first two schools on the exchange rate effects of income, the interest rate, and the price level being diametrically opposite to each other. Allen and Kenen (1980) state (p. 4) "The partners (the Keynesian and monetarist approaches) would be incompatible."

The purpose of this paper is to develop a more general theory of exchange rate determination, based on a

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general macro model, with the goods, money, bond, and labor markets. A specific new feature in this is tracing out the effects of the policy regime and the supply side specification, which will indeed turn out to be the key differences between the approaches. It is first seen what theorems hold without special assumptions. The different approaches can then be generated as special cases of that model, whose statements turn out to hold only under special assumptions concerning the values of parameters of the behavior functions - along the lines called for by Johnson (1972, p.14) almost a decade ago:

"But the real practical problem - with which theorists and empirical workers have been struggling for some years in the area of domestic monetary theory - is how to marry the Monetarist and Keynesian analysis in a way relevant to the short-run context (albeit a run of several calendar years) with which the policy-makers are concerned, and which is characterized both by variations in production and employment as well as in money prices, and by variations in the relations among export, import, and non-traded goods prices which are assumed away in the long-run equilibrium analysis of the monetarist approach. ... the achievement of such a synthesis is, to my mind, the really challenging task facing international monetary theory in its next stage of development."

It will be shown that the monetarist, portfolio balance, and Keynesian approaches are complementary, rather than competitive, parts of the general model; combining them in an appropriate way gives the general case. Namely, the monetarist theory is based on the money market adjustment alone, whereas the Keynesian one in its Keynesian neutral monetary policy version is based on the goods market adjustment alone so that the two are independent, not conflicting. This is produced

by the monetarist and Keynesian approaches representing experiments in different policy regimes, which are both rather rare special cases: full monetary sterilization either by capital flows or by monetary authorities. These being the necessary and sufficient basic conditions for the two cases, the earlier conjectures for the differences such as the definition of equilibrium of purchasing-power parity do not affect the qualitative effects of policies on the exchange rate. However, the orthodox neutral monetary policy version of the Keynesian approach produces the policy responses of the whole model.

The paper will proceed as follows. In Part 2, the macro model is developed and simplified. Some properties of the model are discussed. In Part 3, the general solutions are analyzed. Part 4 discusses the effects of some key assumptions in the approaches, leading to the relationships of the different approaches to one another and to the general model. Finally, Part 5 is the conclusion of the paper. In the following, we will abstract from different expectation - generating mechanisms, in order to focus on the essential characteristics of the approaches, since the mechanisms can be built into each one of the models.

2. The General Model

We will analyze a small open economy, with exogenous foreign goods prices and interest rate, and the absence of foreign repercussions. The foreign demand curve of

domestically produced goods is, however, negatively sloped, as a result of specialization: The country engages in the production of a relatively small number of different goods and exchanges its exports for a larger number of foreign goods.

The model is a standard open IS-LM model with a supply side. The goods market equation: income (Y) is the sum of total domestic expenditure (E), the trade balance, ($T = (P^D X - P^F M)/P^D$) and government expenditures (G), all in terms of the domestic good:

$$(1) \quad Y = E^*(Y, r, \frac{V}{P^D}) + T^*(E^*, \frac{P^D}{eP^F}) + G$$

where V = nominal wealth, r = the interest rate, e = the exchange rate (units of domestic currency per unit of foreign currency), P^D = the price level of domestically produced goods (GDP deflator), P^F = that of foreign goods, and P = the final expenditure price as defined in (8) below, X = exports and M = imports. E^* and T^* are function operators. Consistency requires the specification of the trade balance as a function of expenditures, imports being part of total expenditure.

The money supply (S) consists of the money supply of the previous period S_{-1} , plus domestically provided reserves, or the net open market purchases (D). The credit expansion multiplier is set at unity for simplicity. Equilibrium on the money market requires that the money supply equals the quantity of money demanded (L). Consistency requires that income and prices are in terms

of the final expenditure price, since cash is held to buy both domestic and foreign goods.

$$(2) \quad S_{-1} + D = L^* \left(\frac{P^D Y}{P}, r \right) P$$

The balance of payments is the sum of the trade balance in nominal terms and the capital account (K):

$$(3) \quad 0 = T^* \left(E, \frac{P^D}{eP^F} \right) \cdot P^D + K(r, H_{-1})$$

where H_{-1} is the actual stock of foreign capital in the country in the previous period. (Of course, $H = H_{-1} + K$). The capital flow function is obtained from a stock adjustment function as follows:

$$(3') \quad K = \alpha [H^*(r) - H_{-1}]$$

where H^* is the desired stock of foreign capital in the country in the current period and $0 < \alpha \leq 1$. This leads to the above equation. The second argument will be needed in the portfolio balance model, the time span studied being too short in the other models for it to make much difference.

The supply side of the economy consists of the production function (4), the labor demand function (5), the labor supply function (6), and the equilibrium condition for the labor market in terms of wages (7):

$$(4) \quad Y = (C, N)$$

$$(5) \quad W^D = Y_N P^D$$

$$(6) \quad W^S = W(N, P)$$

$$(7) \quad W^S = W^D$$

where C = the given capital stock, N = employment, W^D = the demand wage and W^S = the supply wage. Y_N is the partial of Y with respect to N , subscripts always referring to partials. The difference in the price variables in the labor demand and supply functions comes from the fact that the value of the marginal product of labor depends on the prices of domestically produced goods, whereas rational labor behavior calls for the supply wage being a function of the final expenditure price. (See Salop 1974.)

The final expenditure price is a weighted average of domestic and foreign goods prices:

$$(8) \quad P = aP^D + (1 - a)eP^F$$

Finally, to complete the structural model, nominal wealth is the sum of government (of foreign) bonds in private hands (B), denominated in domestic currency for simplicity¹⁾, and the money supply (S). We get, by observing that government finances its deficits (A) with bond issues and the central bank provides money by open market operations, which change the respective private holdings during the period:

$$(9a) \quad V = B + S$$

$$(9b) \quad B = B_{-1} - D - K + A P^D$$

$$(9c) \quad S = S_{-1} + D$$

This yields, observing (3):

$$(9d) \quad V = B_{-1} + P^D (T + A) + S_{-1}$$

The initial values of e , P^D and P^F are thereby P will be set at unity by an appropriate choice of units.

We get from equations 4 through 8 by total differentiation and substitution:

$$(10) \quad dP = \frac{a\theta dY}{+} + \frac{\psi Y_N de}{+}$$

where

$$\theta = \frac{(W_{+N} - Y_{NN})}{Y_N(Y_N - aW_{+P}^S)}, \quad \psi = \frac{(1-a)}{(Y_{+N} - aW_{+P}^S)},$$

and Y_{NN} is the second derivative of Y with respect to N . Diminishing returns make it negative.

In the multipliers of (10), the value of W_P^S , i.e., the supply side specification, has a key role. Examine the real wage model, where W_P^S obtains its highest value proposed. Equation (6) obtains the form: $W^S = W(N) \cdot P$ so that we get from (5) through (8):

$$(11) \quad (W_P^S) W(N) = Y_N$$

It is seen that $Y_N - aW_P^S > 0$. Thus the denominators in (10) are positive, keeping P_V positive and finite in the real wage model. The same is, of course, true of the

money wage model, with $S_p^S = 0$. This produces the well-known but often neglected fact the classical dichotomy breaks down in an open economy, making the model simultaneous, with a rising aggregate supply curve.

A similar expression is obtained for domestic prices P^D , to whose expression the same comments apply qualitatively:

$$(10) \quad dP^D = \theta dY + \psi w_p^S de$$

The model now consists of equations 1, 2, 3, 9d, and the level equivalents of 10 and 10' in Y, r, P, P^D, V and e .

Substituting (9d), and (10), and (10') into equations (1), (2), and (3), we get equations (12), (13), and (14). In (12), we have written the trade balance as a function of income and the exchange rate only, having simplified this expression by ignoring the effects of r, A , and T on T through expenditures. This means that the impact effects of these variables on the trade balance are ignored, but the subsequent effects are taken into account through the effects of expenditures on income. This leaves the signs of the comparative-static derivatives, and thus the conclusions, unaffected.

$$(12) \quad Y = E(Y, r, e, A, T) + T(Y, e) + G$$

+ - (-) + + - +

$$(13) \quad S_{-1} + D = L(Y, r, e)$$

+ - +

$$(14) \quad 0 = T(Y, e)P^D + K(r, H_{-1})$$

- + +

Most of the new partials are unambiguous, as can be seen from footnotes 2, 3, and 4, where they have been derived. E_Y in (12) is assumed to remain positive and smaller than one partly because of the Pigou effect. E_e is negative in the general case and in the real wage model, and zero in the money wage model. T_Y is negative. T_e is positive in the general case even if the Marshall-Lerner condition ($T_{(P^D/e)} < 0$) is not satisfied, provided the second term in its expression in (A2) dominates the first. In the real wage model T_e is always positive, this condition being totally irrelevant, since the multiplier is zero. In the money wage model, however, the condition is necessary for the positiveness of T_e . L_Y and L_e are positive.⁴

Totally differentiating the model of equations (12), (13) and (14), we get the matrix, observing that $dA = dG$ for given tax receipts and $T = 0$ in the initial stationary state equilibrium.⁵

[matrix here]

$$\begin{bmatrix}
 1 - E_Y - qT_Y & -E_r - (E_e + qT_e) \\
 L_Y & L_r & L_e \\
 T_Y & K_r & T_e
 \end{bmatrix}
 \begin{bmatrix}
 dY \\
 dr \\
 de
 \end{bmatrix}
 =
 \begin{bmatrix}
 qdG \\
 dD \\
 0
 \end{bmatrix}$$

where $q = 1 + E_{(V/P)}$

3. The General Solutions

We obtain the following values for the derivatives:

(Table 1 here)

D_2 is assumed to be negative as a necessary condition for the stability of equilibrium. As the reader can verify, this condition is easily satisfied: a sufficient condition is that either $qT_e \geq |E_e|$, or $L_Y K_r - L_r T_Y \leq 0$, i.e., the reduced-form LM curve is no steeper than the BP curve. The other stability conditions are satisfied.

The effects of fiscal expansion are conventional: a rise in income and a trade balance deficit. A depreciation of the exchange rate, i.e., a rise in (e) follows if the reduced-form LM curve is flatter than the BP curve and vice versa.

Monetary expansion leads to a fall in the interest rate to depreciation, and a trade surplus independently of the Marshall-Lerner condition: The fall causes a capital outflow so that a depreciation sufficient to produce a matching trade surplus is called for. Income rises if $(E_e + q^T e)$ exceeds $E_r T_e / K_r$ or vice versa. As explained, the latter term, or the net monetary effect is expansionary. However, on the goods market, depreciation improves the trade balance but lowers expenditures through the Pigou effect. The former dominates the latter in the money wage model, whereas in the real wage model the reverse is true. An ambiguous net effect results in the general case.

It can be seen that the two ambiguities obtained in

the general case result from the fact that the goods and money markets fail to respond in the same direction. This is of crucial importance when the Keynesian and monetarist approaches to the balance of payments are discussed.

4. The Effects of Key Assumptions in the Approaches

i. The Role of Capital Mobility

The assumption of perfect capital mobility makes $K_r \rightarrow \infty$, which makes r constant. The solutions are shown in Table t.

[Table 2 here]

D_3 is assumed to be positive as a necessary condition for the stability of equilibrium. It is strictly so in the money wage model. The fiscal policy effect on income is positive and on the trade balance negative. However, the exchange rate change is basically that prescribed by the monetarists, or the amount needed to satisfy the change in the demand for money, i.e., $-\frac{L_Y}{L_e} \cdot qdY$. So it will appreciate, bringing down the price level, until the price decline has offset the increase in the demand for money, caused by the rise in income.

The income effect of monetary policy is positive if $qT_e > |E_e|$, as in the money wage model (Marshall-Lerner permitting), and negative if the reverse is true (as in the real wage model). The exchange rate change is again monetarist: it will depreciate in response to monetary expansion until the cash balances created have been absorbed

Table 2: The Policy Effects under Perfect Capital Mobility

	$dY/$	$de/$
$/dG$	$\frac{L_e}{D_3} (>0)$	$-\frac{q L_Y}{D_3} (<0)$
$/dD$	$\frac{E_e + q T_e}{D_3}$	$\frac{1 - E_Y - q T_Y}{D_3} (>0)$

$$D_3 = L_e (1 - E_Y - q T_Y) + L_Y (E_e + q T_e) ,$$

by the increase in the demand for money due to the price rise and income change. Therefore perfect capital mobility is a sufficient condition for monetarist exchange rate responses, except that income changes.

Consequently, the Mundell-Fleming effect of powerless fiscal policy and powerful monetary policy breaks down: fiscal policy continues to have an effect, whereas monetary expansion may even have a contradictionary effect, as shown. The Mundell-Fleming effect crucially depends on the inconsistent assumption of a fixed price level, which would make $L_e = E_e = 0$. However, the reverse Mundell-Fleming would hold in the real wage model if the Pigou effect is abstracted form.

a. The Monetarist Assumptions

A prototype of monetarist assumptions, as summarized by Kreinin and Officer (1978) (p.13), are the following:

1. A stable money demand function
2. Countries do not pursue sterilization policies
3. Wage-price flexibility fixes output at its full employment level (the natural rate) at least in the long run.

Perfect substitution across countries both on the goods and capital markets: i.e.,

4. Each good sells at the same price at home and abroad.
5. $K_r \rightarrow \infty$

However, these assumptions were already in effect with perfect capital mobility above so that they are not sufficient to fix the output level: full employment does not imply fixed employment, since the classical dicotomy does not hold. To get this monetarist prediction, as well, it is further necessary that:

6. The foreign demand elasticity for domestically produced goods is minus infinity (the very small country or PPP assumption). This is often made by monetarists (e.g. Johnson 1976, p.155). It fixes P^D , given e , and relative prices. We get from equation (10') by substituting $dP^D = de$:

$$(15) \quad (Y_N - W_P^S)de = \frac{W_N - Y_{NN}}{Y_N} dY$$

To eliminate even this output effect, it is necessary to add the classical assumption of

7. the real wage model: $W^S = W(N) \cdot P$. We get, by substituting (11) into (15) the original monetarist assumption of the fixity of income and the classical dichotomy: the expression in the brackets goes to zero so that also dY goes to zero.

To sum up, assumptions 6 and 7 together fix the income level, and 5 the interest rate, at the same time leading to the stock adjustment equations on the money market as overall balance of payments effects, discussed

above. Our model now changes, since all the terms involving the now exogenous (i.e., supply- determined) dY are shifted to the exogenous variable vector. However, this would make the model overdetermined so that another endogenous variable is needed. If it is put on the goods market, we get the monetarist propositions. The variable is the change in the trade balance dT_0 , which becomes the residual term on the goods market: any difference between the given output and expenditures is passively accommodated by the trade balance - a fact whose longrun consequences have been overlooked in the monetarist approach. We get the monetarist propositions from this model under the above assumptions:

[Table 3 here]

The income effects of policies are now zero. Monetary expansion leads to a depreciation of the exchange rate to raise the price level enough to equilibrate the money market. Fiscal expansion leads to a permanent matching trade balance deficit, and monetary expansion to a trade balance surplus. The latter is equal to the decrease in domestic expenditures brought about by the decline in real wealth, due to the depreciation of the exchange rate.^{6,7} It is, however, notable that the assumption of perfect capital mobility is alone sufficient to produce the monetarist exchange rate responses. The additional assumptions were needed only for income responses. It follows that the earlier conjectures, such PPP (Gylfason and Helliwell

Table 3. The Policy Effects in the Monetarist Model

	$dY/$	$d(TP^D)/$	$de/$
$/dG$	0	$-\frac{1}{q} < 0$	0
$/dD$	0	$-\frac{E_e}{qL_e} > 0$	$\frac{1}{L_e} > 0$

1982) or the definition of equilibrium (Johnson 1972) will not suffice.⁷

However, the characterization of the monetarist equilibrium as a long-run equilibrium is inappropriate. As just proposed, the trade balance is left in disequilibrium, which changes real wealth. This is inconsistent with equilibrium in the long run. We will return to this question in connection with the portfolio balance approach.

The monetarist model can be looked at in another way. By their choice of assumptions and variables of interest, the monetarists have turned our general simultaneous model of equations (12), (13), and (14) into a dichotomous one, the money market (13) being the independent equation. It has only one endogenous variable, e . The assumption of fixed foreign prices together with the real wage model fixes Y , the capital mobility assumption fixes r , and D is a policy variable. For consistency, the rest of the equations, (12) and (14) must contain two additional endogenous variables, K and T_0 , e being given for them. As seen, the monetarist model does not contradict the consumption, investment, and import functions, as is generally proposed, but is independent of them. All that it calls for is that whatever the endogenous variables in the rest of the model, they may not appear in the money market equation. The monetary part of the adjustments is the only part which remains when sufficient behavioural assumptions are made so as to eliminate all the other parts.⁸

b. The Keynesian Assumptions

The Keynesians implicitly assume full monetary sterilization by treating the money supply ("orthodox neutral monetary policy") or the interest-rate ("Keynesian neutral monetary policy"), rather than the domestic component of the money supply, as the control variable.⁹ The reader can verify that the former assumption produces the policy responses of the general case so that the ambiguity regarding the exchange rate response to fiscal policy remains. Keynesians generally assume the money wage model, which makes monetary expansion expansionary, provided the Marshall-Lerner condition is satisfied.

However, the assumption of Keynesian neutral monetary policy produces interesting complementarities with the monetarist approach. In this regime, r becomes a policy variable and D an endogenous variable so that the two variables exchange places in the model. It is seen from Table 4 (where the responses are shown in the general form without the money wage assumption) that this assumption produces the policy responses proposed by the elasticity-absorption approach and generally regarded as Keynesian in empirical work: expansionary policies are expansionary and lead to depreciation, which is a function of the trade and capital flow partials.

The income response of monetary policy, furthermore, requires the money wage model. Then both income responses also require the Marshall-Lerner condition.

[Table 4 here]

Table 4. The Policy Effects Under Keynesian Neutral Monetary Policy.

	$\frac{dY/}{qT_e}$	$\frac{de/}{qT_Y}$
$/dG$	$-\frac{D_4}{D_4} > 0$	$\frac{D_4}{D_4} > 0$
$/dr$	$-\frac{E_r T_e - K_r (E_e + qT_e)}{D_4}$	$\frac{K_r (1 - E_Y - qT_Y) + E_r T_Y}{D_4} < 0$
$D_4 = - (1 - E_Y) T_e - E_e T_Y < 0$		

It is notable that the exchange rate responses stand also if the two assumptions needed to fix income in the monetarist model are built into the model, thanks to expenditure changes. Therefore Keynesian neutral monetary policy is a sufficient general condition for the exchange rate responses of the elasticity-absorption approach. The money wage model and the Marshall-Lerner condition are required for the income responses.

This assumption also makes the system of (12), (13), and (14) dichotomous. The independent equations are now those of the goods market (12) and the balance of payments (14), determining Y and e , and containing no other endogenous variables. These variables are then given to the money market, for which it remains to determine D . Again, the approach does not contradict the money demand function or the monetarist approach, but is independent of them. All it calls for is that whatever the endogenous variable left for the money market equation to determine, it may not enter the goods market or balance of payments equations. In other words, where the elasticity-absorption approach makes D the residual variable on the money market, the monetarists make T_0 that on the goods market and K in the balance of payments equation, eliminating the effects of the respective market.

c. A Synthesis of the Monetarist and Keynesian Approaches

The relationship between the Keynesian and monetarist approaches now becomes clear. First, the former approach

in its version of orthodox neutral monetary policy studies the whole model, and the income responses require the money wage assumption and the Marshall-Lerner condition. Under Keynesian neutral monetary policy it studies the very case that the monetarists abstracted from and vice versa, as can best be seen from the dichotomization of the general model done in the approaches just explained. This is achieved by making the policy regimes different, the former assuming full monetary sterilization by the monetary authority, and the latter by capital flows; whatever is accommodated by the central bank in the former approach is accommodated by capital flows in the latter. When the issue is the balance of payments or the exchange rate, this is crucial. I.e., in the monetarist approach, capital flows automatically finance the trade balance disequilibria so that it remains for the foreign exchange market to accommodate any changes on the money market. This holds also under Keynesian assumptions other than the policy regime, as can be seen from Table 2. In the elasticity-absorption approach, both the money demand and trade balance changes are automatically accommodated by the central bank at a fixed interest rate (when there are no changes in capital flows), so that only the trade balance disequilibrium shows on the foreign exchange market and affects the exchange rate. This holds also under the two monetarist assumptions needed to fix income.

This comparison once more shows the complementary, rather than competitiveness, of the latter two approaches:

as long as there is perfect monetary offset (Keynesian neutral monetary policy) by the central bank, the elasticity-absorption approach alone (i.e., the goods market adjustment) predicts the exchange rate change. If the offset is provided by capital flows, the monetarist approach alone (the money market adjustment) predicts it. And in general case with full monetary sterilization from either source, or orthodox neutral monetary policy, both components are acting. Whether or not income changes depends on the foreign demand and labor supply assumptions as shown, but the above conclusions on the exchange rate are qualitatively unaffected by them. Therefore, the antagonists should be married as independent complementary parts of a general model.

Since different countries have different policy regimes, it is natural that empirical studies of "the" balance of payments or exchange rate equation have given mixed results, particularly since these approaches represent uncommon polar cases of the general model. In reality, one would normally expect both mechanisms to be acting, as empirical studies on capital flows and central bank reaction functions suggest. Therefore, the parameter estimates for "the" balance of payments equation represent the net effects of the mechanisms and cannot be interpreted as lending support to either one over the other, as has been done. This explains the point made by Frenkel, Gylfason, and Helliwell (1980), within the context of our more general model.¹⁰

d. The Portfolio Balance Approach

Even the monetarist definition of equilibrium as a money market equilibrium typically leaves the trade balance in disequilibrium also in the general model, as shown. This cannot go on forever, implying an accumulation or decumulation of financial assets indefinitely. This is where the portfolio balance approach comes in.

The basic proposition of this approach is that, in the short run, the exchange rate and the interest rate are basically determined on the asset markets so as to equate the quantities demanded with the given stocks. These prices affect trade and expenditure decisions, which affects the stocks of the assets, feeding back on exchange rates and interest rates. Thus, the long-run portfolio balance equilibrium depends on these flows.

Our flow equilibrium is longer term than the short-run of the portfolio balance approach. Though the short-term equilibrium could be generated from our model, we will restrict our analysis to the long-run, referring to Branson (1979) regarding the short-run models with the note that these models are appropriate if the asset markets respond quickly relative to the goods market, and one is interested in a time horizon so short that this distinction makes a difference.

In long-run portfolio balance, both the asset market model and ours should give the same result if the behavior assumptions are the same. Our approach should, however, give some insights into the consequences of the different

supply side specifications, assumed away or treated inaccurately in portfolio balance models so far, as well as into the relationships of this approach with the other approaches discussed above.

Portfolio balance requires that, in addition to the flows, total wealth and its components must be in equilibrium. This implies $H^X - H_{-1} = K = dK = K_r dr = 0$, [which makes dT zero through (14)]. As a result, element 32 in the Jacobian becomes zero. We then get the statements of the portfolio balance approach by substituting zero for K_r in Table 1.

[Table 5]

It can be seen from Table 5 that D_5 is negative and the equilibrium stable. So the long-term derivatives are all positive, except for the negative de/dT_1 and dr/dD , and the ambiguous dr/dT_1 . Thus, expansionary policies lead to a rise in income and a depreciation in the exchange rate. The rise in income also in the real wage model results from the effect of depreciation on total wealth, which reduces expenditures and pushes the trade balance towards surplus (equation A2). So an increase in income is necessary to restore trade balance equilibrium. However, in the money wage model, the Marshall-Lerner condition has to hold for these results. As can be seen by taking $d[(de, dY)/dG, dD]/dK_r$ in general case (Table 1), the exchange rate undershoots in response to fiscal, and overshoots in response to monetary policy. The income

Table 5. The Policy Effects in Portfolio Balance Equilibrium

	$\frac{dY}{dG}$	$\frac{dY}{dD}$
	$\frac{qL_r T_e}{D_4} > 0$	$\frac{E_r T_e}{D_4} > 0$
	$-\frac{qL_r T_Y}{D_4} > 0$	$-\frac{E_r T_Y}{D_4} > 0$
	$\frac{-E_e L_r + E_r L_e}{D_4} > 0$	$-\frac{(1-E_Y)L_r + E_r L_Y}{D_4} < 0$

$D_4 = L_r(1-E_Y)T_e + E_r(L_Y T_e - L_e T_Y) + L_r T_Y E_e < 0$, and
 dT_1 = exogenous change in the trade balance.

effect of monetary policy undershoots, whereas that of fiscal policy is ambiguous in the general case.

These results are in broad agreement with the results of the portfolio balance approach, except that the income effects of policies in the real wage model are zero in these studies. (See, e.g., Allen and Kenen (1980), p.101). The reason is the definition of the classical regime as one with a constant output rather than the open real wage model. Furthermore, we specified imports as a function of expenditures because they are part of expenditures. Second, the exchange rate response to fiscal expansion is ambiguous in their model. They get the same result if, in terms of our notation, $|(E_{V/P}/E_r)| > |(L_{V/P}/L_r)|$, i.e., given the rise in the interest rate, needed to make the whole bond issue willingly held, total saving will have to increase by more than the demand for money.¹¹

The reason for the difference is the fact that we left out the wealth effect from the money demand function because empirical evidence lends support to this specification (see Goldfeld 1973). So the bond rate rising enough to make the whole new bond issue willingly held, the demand for money declines. This increase is therefore not enough to crowd out private expenditures by a corresponding amount, leaving the trade balance in deficit, and the foreign exchange market in an excess demand situation. So depreciation is needed to do the rest via the Pigou effect - at the same time restoring the trade balance - our equivalent for the change in foreign bonds.

However, an exogenous trade balance surplus leads to a rise in income and an appreciation of the exchange rate.

The portfolio balance students get a matching appreciation, in the real wage model, which restores the value of foreign securities, leaving everything else unchanged. This again results from the definition of the classical model as implying a constant labor supply rather than the open-economy real wage model.¹²

It is seen that to get these results, the Marshall-Lerner condition is necessary only in the money wage model. T_e is positive in the real wage model (equation A2), because devaluation, in reducing real wealth, improves the trade balance so that an increase in income is needed to restore trade balance equilibrium. The wealth effect also guarantees stability of equilibrium in a general equilibrium context.

5. Summary and Conclusions

The monetarist and Keynesian approaches lead to seemingly inconsistent policy effects in most cases. However, the approaches are not inconsistent. In fact, the former and the Keynesian neutral monetary policy version of the latter, are independent: they are dichotomous parts of the general model. The monetarist approach concentrates on the policy effects on the money market, leaving out the goods market, whereas the Keynesian approach concentrates on the goods market, leaving out the monetary effects. The difference is achieved by a

difference in the policy regimes the approaches study. The Keynesian approach studies the case of full monetary sterilization by the central bank, (Keynesian neutral monetary policy), and the monetarist approach one by capital flows. When the response of the economy to disturbances is at issue, this is crucial. Accordingly, since capital flows automatically finance all trade balance disequilibria in the monetarist approach, only the money demand adjustment remains. In the Keynesian approach, the central bank accomodating both adjustments, only the trade balance disequilibria show on the exchange market.

The point about their relevance is that both the money and goods market adjustments are there, as empirical studies on capital flows and central bank reaction functions have suggested. Therefore, also the theory of exchange rates should be based on the whole model, not on either of its parts, though the parameter values may sometimes turn out to be such as to produce either special case. Contrary to the view of Johnson (1977), not only are the partners not incompatible, but they should be married. Therefore, the ambiguity of the policy responses in the general model in the cases where the monetarist and Keynesian predictions are opposite is not a non-result, but a consequence of the fact that the respective markets respond in opposite directions. Indeed the orthodox neutral monetary policy version of the Keynesian approach comprises both parts and thus produces the policy responses of the whole model.

Besides, these responses turn out to be qualitatively robust to the earlier conjectures for the reasons behind the differences between the approaches, such as the definition of equilibrium (partly) and the endogeneity of relative prices on the international market: constant terms of trade in the real wage model fix income but Keynesian policy exchange rate responses still follow in a Keynesian policy regime. In the monetarist regime basically monetarist responses follow also in the money wage model.

In the stationary state, also the trade balance has to be in equilibrium. This is where the long-run portfolio balance models come in. The long-term effects of fiscal and monetary expansion continue to be expansionary, though in the money wage model the Marshall-Lerner condition has to hold. The exchange rate depreciates in both cases. Therefore, even in the long run, the policy effects do not go to zero. An exogenous surplus in the trade balance leads to an increase in income and an appreciation of the exchange rate.

These new results were produced by the inclusion of the Pigou effect in the model and by the notion that imports have to be specified as a function of expenditures, since they are part of expenditures. As far as the short-term portfolio balance models are concerned, they are appropriate if the asset markets adjust quickly relative to the goods market, and one is interested in so short a run that it makes a difference.

It is seen that the distinction between the Keynesian

and monetarist approaches is in the behavior assumptions, which also leads to a difference in equilibrium conditions. The portfolio balance approach differs in its equilibrium condition, and our results hold in both regimes. Which equilibrium condition is appropriate in any given situation depends on the time span studied, and on the speed of adjustment of the asset, as opposed to the goods market.

NOTES

1. The same qualitative results hold also with foreign-denominated bonds, as long as $[B^F/(B+B^F+S)] < 1 - a$, where B^F is foreign-denominated bonds. The percentage on the L.H.S. is a small fraction of that on the right in the countries known to the author.
2. The expression for the change in expenditures reads:

$$\begin{aligned}
 (A1) \quad dE &= [E_Y^* - E_{(V/P)} \Theta (V - T - A)] dY \\
 &+ E_r^* dr - E_{(V/P)} \Psi W_P^S (V - T - A) de \\
 &+ E_{(V/P)} (dA + dT)
 \end{aligned}$$

In the multiplier of dY , which is the new E_Y , the multiplier of the second term in the brackets is positive and finite, as shown. In the brackets, all net nominal assets (V) are a multiple of the possible net addition ($A+T$) of the current period so that the expression is positive, making the term negative. Ando and Modigliani (1963) have obtained the value of .06 for $E_{(V/P)}$. This Pigou effect weakens the marginal propensity to spend. E_e is nonpositive.

3. We get from (1), by totally differentiating T^* and then substituting 10':

$$(A2) \quad dT = (T_E^* E_Y + T_{(P^D/e)} \Theta) dY - (T_{(P^D/e)} \frac{Y_N - W_P^S}{Y_N - a W_P^S} - T_E^* E_e) de$$

The multiplier of dY , or T_Y , is negative, since both its terms are negative, $T_{(P^D/e)}$ being negative if the Marshall-Lerner condition holds.

4. We get from (2), as above:

$$(A3) \quad d(LP) = \{ \theta [(1-a)L_Y^* Y + aL^*] + L_Y \} dY \\ + L_r^* dr + \psi [L^* Y_N - (Y_N - W_P^S) L_Y^* Y] de.$$

L_Y is positive. Goldfeld (1973) obtained an income elasticity for the demand for money of 0.7. This implies $L^* - L_Y^* Y > 0$, making L_e positive.

5. Of the stock-flow relationships we thus take into account the effect of the trade balance and fiscal deficit on total wealth, and informally, the effect of the saving flow on private wealth in the portfolio balance sense, but stop there, keeping the capital stock in the production function constant. We also ignore the changes in the interest payments on securities held abroad, caused by capital flows. The last abstraction is potentially significant in the portfolio balance context. However, this would make the sign of the determinant ambiguous with the Pigou effect in the model. This is why one generally sees either one of the effects in the model but not both.
6. In the case of fiscal deficit, the adjustment for the wealth effect is not in order, since the trade balance deficit accrues as a liability on the government; in specifying the model, we did not make a distinction between public and private external debt.

7. Gylfason and Helliwell (1982) (G-H) generate what they call the standard monetarist propositions with variable aggregate supply from their general model by imposing Purchasing-Power Parity, i.e. our condition 6 and quote a few cases when this is indeed the case. As proposed in connection with the analysis of equation (15), income remains constant except for changes in the exchange rate. The reader can verify by substituting equation (15) into the general model that fiscal expansion would raise both Y and e under PPP. However, the monetarist proposition is that e will decline: the increase in income raises the demand for money so that the currency has to appreciate, to lower the price level and equilibrate the money market, as in Table 2. PPP will not therefore produce the monetarist propositions even with variable income.
8. Hahn (1977), p.246 says "... a desire to accumulate financial assets must always mean a balance of payments surplus because it is assumed that the market for goods is always in equilibrium." As shown, the markets for goods do, of course, clear but the domestic one does not have to be in equilibrium, capital flows financing any trade balance disequilibria.
9. See e.g. Alexander (1952), Meade (1951), and Tsiang (1961).
10. For a survey of the empirical results, see Kreinin and Officer^{(1978).}
11. See Allen and Kenen (1980), pp. 135 -
12. Allen and Kenen, pp. 95-97. However Dornbusch and Fischer (1980), p. 963, get an increase in external assets in response to such an increase, when the resulting decline in saving restores trade balance equilibrium. This mechanism is the counterpart of our income rise.

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