1-1-1981

Monetary Approaches to Devaluation: Comment

Yeung-Nan Shieh
San Jose State University, yeung-nan.shieh@sjsu.edu

19. ———, "Keynes' Monetary Thought: A Study of its Development." *History of Political Economy,* Spring 1976, 1–150.

20. Pigou, A.C., "The Value of Money." *Quarterly Journal of Economics,* November 1917, 38–65.

21. Samuelson, Paul A., "What Classical and Neoclassical Monetary Theory Really Was." *Canadian Journal of Economics,* February 1968, 1–15.

22. Simons, Henry C., "Hansen on Fiscal Policy." *Journal of Political Economy,* April 1942, 161–96. Reprinted in Simons, *Economic Policy for a Free Society.* Chicago: University of Chicago Press, 1948.

23. Tavlas, George S., "Some Further Observations on the Monetary Economics of Chicagoans and Non-Chicagoans." *Southern Economic Journal,* April 1976, 685–92.

24. ———, "Chicago Schools Old and New on the Efficacy of Monetary Policy." *Banca Nazionale del Lavoro Quarterly Review,* March 1977, 52–73.

25. ———, "The Chicago Tradition Revisited: Some Neglected Monetary Contributions of Senator Paul Douglas." *Journal of Money, Credit and Banking,* November 1977, 529–35.

26. ———, "The Last Remake of the New Economics and the Old Economists: Reply." *Southern Economic Journal,* January 1979, 926–31.

27. ———, "Keynesian and Monetarist Theories of the Monetary Transmission Process: Doctrinal Aspects." *Journal of Monetary Economics,* April 1981, forthcoming.

28. ———, "Notes on Garvy, Snyder, and the Doctrinal Foundations of Monetarism." *History of Political Economy,* 1981, forthcoming.

Monetary Approaches to Devaluation: Comment

I. Introduction

In an interesting paper in this Journal, professor Chau-nan Chen [3] ingenously combines the elasticity, absorption and monetary approaches in the simple, open economy IS-LM framework with full employment assumption. He considers the monetary effect of devaluation as a main feature of monetary approach under the assumption of complete sterilization policy. Recently, Collery [4], Kuska [9] and Takayama [10] show that the complete sterilization policy is inconsistent with the familiar IS-LM framework, and suggest that it is necessary to consider the balance of payments disequilibrium arising from the fixed exchange rate system in the money market. Hahn also points out the monetary flows implied by the disequilibrium of balance of payments is "a matter which had been much neglected in the possibly mistaken belief that monetary authorities would and could 'sterilize' these effects" [6, 232].

The purpose of this paper is to explicitly incorporate *the fundamental equation of monetary approach to the balance of payments* in Chen's framework and provide an alternative synthesis of the elasticity, absorption and monetary approaches to devaluation. Within this new framework, we will provide a satisfactory synthesis of all the three approaches without the monetary effect of devaluation. Furthermore, we will show that the Cooper paradox [5] can be resolved, only if the monetary effect of devaluation exists.

II. The Model

Following Chen [3], the small open economy under investigation is a price-flexible full-employment type. Its macroeconomic relationships can be described by the following three equations:

$$X(r) + B(q) = y^* \tag{1}$$

$$L(r) = \{M^*/[wep^* + (1 - w)p]\} + B(q) \tag{2}$$

$$B(q) = B \tag{3}$$

where

X = domestic expenditure
y^* = fixed full-employment output
B = balance of trade in terms of domestic products

M^* = nominal supply of money

r = rate of interest

e = foreign exchange rate, defined as the price of the foreign currency in terms of domestic currency

p^* = foreign currency price of imports

p = domestic currency price

$q = (ep^*/p)$ = prices of imports in terms of exports

For simplicity, it is assumed that $B = 0$, $e = p = p^* = 1$ initially, and the capital is immobile internationally. Equation (2) is well-known and may be termed as the fundamental equation of the monetary approach to the balance of payments.[1] Inclusion of the balance of payments disequilibrium in the money market constitutes the only point departure from the Chen model, but it enables us to combine the monetary approach with the elasticity and absorption approaches more properly.

Following Chen [3], we can illustrate the synthesis of three approaches by using the familiar IS-LM-BT diagram. To ease our exposition, we will analyse the elastic import demand case only and leave the inelastic import demand case to the interested reader. In Figure 1, each of three lines graphs one of the equations in our system (1)–(3): IS for (1), LM for (2) with $w = 0$ and LM_1 for (2) with $w \neq 0$; and BT for (3) with $B = 0$.[2] The equilibrium is originally established at Q, with an appropriate exchange rate that makes BT pass through the intersection of IS and LM (or LM_1). It is easy to see that any point to the right (left) of BT represents a point of the balance of trade deficit (surplus).

A devaluation means an increase in e. If the monetary effect of devaluation is absent; i.e., $w = 0$, a devaluation shifts both IS and BT rightward by the same distance to IS_1 and BT_1, and shifts LM downward and rightward to LM'. But LM' shifts rightward horizontally by the less distance than IS_1 and BT_1 do.[3] The new equilibrium Q_1 lies to the left of BT_1 and the right of BT. A devaluation will improve the trade balance and increase the price level. Thus, we combine the monetary approach which emphasizes the shift of LM with the familiar absorption and elasticity approaches together, even if we assume away the monetary effect of devaluation.[4]

If the monetary effect of devaluation is in operation (i.e., $w \neq 0$) and substantial, a devaluation will shift LM_1 upward and pass through Q_3, the intersection of BT_1 and LM', because only at this point (with the change in p equaling the change in e) will the reduction in the real money supply be the same for LM_2 and for LM'. The new equilibrium is established at Q_2, the intersection of LM_2 and IS_1, which lies above and to the left of Q. The Cooper paradox result would arise where the devaluation improves the trade balance while depressing the domestic economy. Thus, we can claim that the Cooper paradox can be resolved in this model, only if the monetary effect of devaluation exists.

1. Johnson describes it by "a balance of payments deficit implies either dishoarding by residents or credit creation by the monetary authorities [7, 157]." Mundell expresses it by "B = H − C, where H is hoarding (additional domestic money holdings by public) and C is credit creation by the banking sector as whole [8, 150]." For the detailed proof, see Collery [4], Kuska [9] and Takayama [10]. In fact, Chen [2, 3] is also aware of this problem.

2. Total differentiation (1)–(3), if $B_q > 0$, we can obtain the slopes of IS, LM, and BT as $(dr/dp)_{IS} = (B_q/X_r) < 0$, $(dr/dp)_{BT} \to \infty$, $(dr/dp)_{LM} = - (M^* + B_q)/L_r > 0$, $(dr/dp)_{LM_1} = -[(1 - w)M^* + B_q]/L_r > 0$. Furthermore, it is easy to observe that $(dr/dp)_{LM} > (dr/dp)_{LM_1}$, where $1 > w > 0$.

3. From (1)–(3), it is easy to obtain that IS_1 shifts horizontally by de and BT_1 shifts horizontally by de too. Furthermore, we can show that LM' shifts horizontally by $(B_q/M^* + B_q)de$, where $(B_q/M^* + B_q) < 1$.

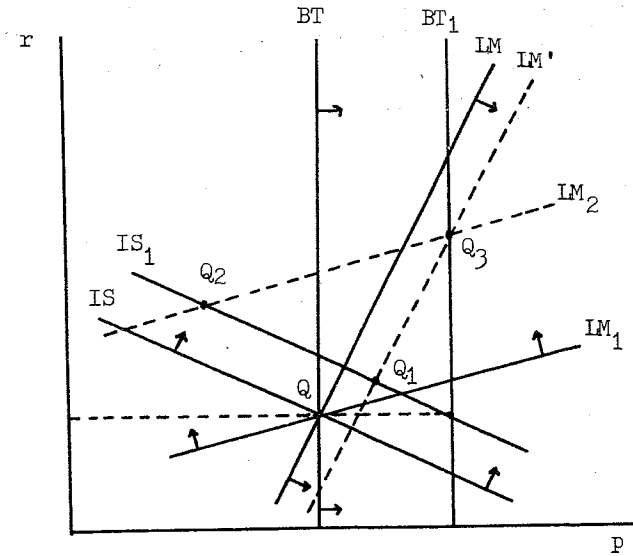4. We will provide a comparative static analysis in Appendix.

Figure 1

III. Conclusions

We have attempted an alternative synthesis of the elasticity, absorption and monetary approaches to devaluation by explicitly incorporating the fundamental equation of monetary approach into the open economy IS-LM model. This modified IS-LM-BT model enables us to provide a satisfactory synthesis of all the three approaches to devaluation in a more proper way, even if the monetary effect of devaluation is absent. Furthermore, it also enables us to show that the monetary effect of devaluation is a necessary condition for the existence of Cooper paradox in our model.

Yeung-nan Shieh
Texas A&M University
College Station, Texas

Appendix

Total differentiation of (1)–(3) with $dM^* = 0$ gives

$$\begin{bmatrix} -B_q & X_r & 0 \\ (1-w)M^* + B_q & L_r & 0 \\ -B_q & 0 & -1 \end{bmatrix} \begin{bmatrix} dp \\ dr \\ dB \end{bmatrix} = \begin{bmatrix} -B_q \\ -wM^* + B_q \\ -B_q \end{bmatrix} de \qquad (A.1)$$

where $X_r < 0$, $L_r < 0$, $0 < w < 1$ and B_q can be expanded into $I(\eta + \eta' - 1)$, with η and η' standing for home and foreign import demand elasticities and I standing for initial value of export.

Solving (A.1), we get

$$(dp/de) = (1/J)[B_q(L_r + X_r) - wM^*X_r] \tag{A.2}$$

$$(dr/de) = (-1/J)M^*B_q \tag{A.3}$$

$$(dB/de) = (1/J)B_qX_rM^* \tag{A.4}$$

where

$J = B_q(L_r + X_r) + (1 - w)MX_r < 0$, regardless of $B_q \gtreqless 0$, if the system is stable.
If $w = 0$, it then follows that

$$(dp/de) > 0, (dr/de) > 0, (dB/de) > 0, \text{ if } B_q > 0 \tag{A.5}$$

$$(dp/de) < 0, (dr/de) < 0, (dB/de) < 0, \text{ if } B_q < 0 \tag{A.6}$$

On the other hand, if $w \neq 0$, it follows that

$$(dp/de) \lesseqgtr 0, (dr/de) > 0, (dB/de) > 0, \text{ if } B_q > 0 \tag{A.7}$$

$$(dp/de) < 0, (dr/de) < 0, (dB/de) < 0, \text{ if } B_q < 0 \tag{A.8}$$

Clearly, (A.5), (A.6) and (A.8) are the traditional result, and the Cooper paradox will arise if (A.7) occurs.

References

1. Chen, C. N., "The Monetary Effect of Devaluation: An Alternative Interpretation of The Cooper Paradox." *Western Economic Journal*, December 1973, 475–80.

2. ———, "Excess Supplies of Money and Balance-Of-Payments Deficits: Comment." *Kyklos*, September 1974, 614–15.

3. ———, "IS, LM, BT and a Simplied Synthesis of the Elasticity, Absorption and Monetary Approaches to Devaluation." *Southern Economic Journal*, April 1975, 1932–36.

4. Collery, A., "Excess Supplies of Money and Balance-Of-Payments Deficits: Reply." *Kyklos*, September 1974, 620–22.

5. Cooper, R., "Currency Devaluation in Developing Countries." *Princeton Essays in International Finance*, NO. 86, July 1971.

6. Hahn, F., "The Monetary Approach to The Balance of Payments." *Journal of International Economics*, August 1977, 231–49.

7. Johnson, H. *International Trade and Economic Growth*. Cambridge: Harvard University Press, 1958, pp. 153–68.

8. Mundell, R. *International Economics*, New York: Macmillan, 1968.

9. Kuska, E., "On The Almost Total Inadequacy of Keynesian Balance of Payments." *American Economic Review*, September 1978, 659–70.

10. Takayama, A., "The Wealth Effect, the Capital Account and Alternative Policies Under Fixed Exchange Rates." *Quarterly Journal Of Economics*, February 1978, 117–47.

Monetary Approaches to Devaluation: Reply

I. Introduction

In the comment upon our earlier paper [2], Shieh incorporates the so-called fundamental equation of the monetary approach to the balance of payments in an open-economy IS-LM framework. He then asserts that this fundamental equation will assure the upward shift of the LM curve following devaluation, thus properly showing a main characteristic of the monetary approach to the balance of payments. We know that the monetary approach to devaluation has two main characteristics. Earlier literature emphasizes the tight money effect of devaluation [1; 4; 5, 114–115; 6, 92]. The tight money effect arises as a result of the decline in the real value of cash balances. In the IS-LM framework this means an upward shift of the LM curve [2]. Shieh also emphasizes the upward shift of the LM curve, but his result comes from his careless mistake. Any careful reader can detect from his equation (1) that the LM curve will shift downward rather than upward as a result of devaluation. Intuitively one should be aware of the fact that if the trade balance surplus caused by devaluation is not sterilized, the money supply will increase and hence the LM curve will shift downward. Shieh in effect is emphasizing the easy money effect rather than the tight money effect of devaluation.

Later development in the monetary approach focuses attention to the issue of absorption versus relative prices. Its main conclusion, as Frenkel and Johnson [3, 42] put it, is that "the effects of a devaluation on the terms of trade have little to do with their effects on the flow of reserves." In this note we shall demonstrate that the key to this strong conclusion of the monetary approach is due to its special assumption that domestic demand for imports is a function of expenditure rather than income.

II. Absorption versus Relative Prices

Except that the domestic demand for imports is assumed to depend on expenditure and that the "tight" money effect of devaluation is ignored, the model to be used is basically the same as that of Chen [2]. Following Chen, we write the following three equations to describe the macroeconomic relationships of a small open economy with full-employment and flexible prices:

$$X(r) + B(q, X) = Y^* \tag{1}$$

$$L(r, Y^*) = M^*/P \tag{2}$$

$$B(q, X) = B \qquad (3)$$

where

    X = domestic expenditure
    Y^* = fixed full-employment output
    B = balance of trade in terms of domestic products
    M^* = fixed nominal supply of money
    r = rate of interest
    e = foreign exchange rate
    P^* = fixed foreign currency price of imports
    P = domestic currency price of domestic products
    $q \equiv eP^*/P$ = price of imports in terms of exports.

Devaluation means an increase in e. Without loss of generality, assume that before devaluation $P = P^* = e = q = 1$ and $B = 0$. Differentiation of (1)–(3) yields

$$\begin{bmatrix} -B_q & (1-m)X_r & 0 \\ M^* & L_r & 0 \\ -B_q & -mX_r & -1 \end{bmatrix} \begin{bmatrix} dP \\ dr \\ dB \end{bmatrix} = \begin{bmatrix} -B_q de \\ 0 \\ -B_q de \end{bmatrix} \qquad (4)$$

where $m \equiv -(\partial B/\partial X) > 0$, $X_r < 0$, $L_r < 0$, and where $B_q \gtreqless 0$ depending on whether the Marshall-Lerner condition is satisfied or not.

Solving (4), we get

$$dP/de = B_q L_r/\Delta, \qquad (5)$$

hence

$$dq/de = (1 - m)X_r M^*/\Delta; \qquad (6)$$

and

$$dr/de = -B_q M^*/\Delta \qquad (7)$$

$$dB/de = B_q X_r M^*/\Delta, \qquad (8)$$

where $\Delta = B_q L_r + (1 - m)M^* X_r < 0$, regardless of $B_q \gtreqless 0$, if the system is to be stable.

From (7) and (8) we know that

$$\text{sign } (dB/de) = \text{sign } (dr/de) \gtreqless 0 \text{ as } B_q \gtreqless 0. \qquad (9)$$

The absorption (expenditure-reducing) effect is a necessary and sufficient condition for a devaluation to improve the balance of trade. On the other hand, a comparison of (6) with (8) tells us that the terms of trade (expenditure-switching) effect is neither a necessary nor a sufficient condition for a devaluation to improve the balance of trade. Let $B_q > 0$ and $m > 1$, then $dB/de > 0$ obtains despite of $dq/de < 0$. And let $B_q < 0$ and $m < 1$, then even though $dq/de > 0$, still $dB/de < 0$.

The key to this strong result is the special assumption that imports are a function of expenditure. If they are assumed to be a function of income, the paradoxical result that $dq/de < 0$ but $dB/de > 0$ will never arise. For the terms of trade will always deteriorate as a result

of devaluation.[1] Mathematically, if B is written as $B(q, Y^*)$, then all the m terms in (4)–(8) will disappear. Thus $dq/de > 0$, and $dB/de \gtreqless 0$ as $B_q \gtreqless 0$.

III. Graphic Depictions

The above arguments can be depicted more clearly with the aid of diagrams. Let us consider first the case where $B_q > 0$, $m > 1$ and hence $dq/de < 0$, $dB/de > 0$. In Figure 1, IS graphs (1), LM graphs (2), and BT graphs (3) with $B = 0$. From (4) we can easily derive that all the three curves have a position and that IS should be steeper than LM due to the stability condition ($\Delta < 0$) while the slopes of LM may be steeper or flatter than that of BT.[2] The equilibrium is established at Q, the intersection of IS, LM, and BT. Now a devaluation shifts both IS and BT rightward by the same distance (by de) to IS_1 and BT_1. The new equilibrium moves to Q_1, which lies left to BT_1, implying that the balance of trade has improved. Compared to Q, Q_1 represents a higher rate of interest but a lower price of imports in terms of exports, for P has increased more than proportionate to eP^*.[3] Despite an improvement in the terms of trade, the balance of trade still improves due to a reduction in expenditure caused by a rise in the rate of interest.

We now turn to the case where $B_q < 0$, $m < 1$ and hence $dB/de < 0$ despite of $dq/de > 0$. From Figure 2 we can see now BT has a negative slope. After devaluation the equilibrium moves from Q to Q_1, which lies left to BT_1, implying that the balance of trade is in deficit.[4] In contrast to the previous case in the present case the rate of interest falls while the price of imports in terms of exports rises. But the balance of trade deteriorates notwithstanding. Once again, the terms-of-trade effect proves to have little to do with the balance of trade. The effect which counts is the absorption effect. The balance of trade deteriorates because the rate of interest falls and hence expenditure increases.

IV. Concluding Remarks

The monetary approach to devaluation discussed above amounts to arguing that the balance of trade "depends on the aggregate relationship between domestic expenditure and income and does not depend on the composition of expenditure between exportables and importables [3, 23]." This central view of the monetary approach can be seen clearly from equation (1). Rewrite (1) as

$$Y^* - X(r) = B(q, X). \qquad (1')$$

1. See Chen [2] for a detailed discussion.
2. From (4) we know that the slopes of the three curves are

$$dr/dP|_{IS} = B_q/(1 - m)X_r$$
$$dr/dP|_{LM} = -M^*/L_r$$
$$dr/dP|_{BT} = -B_q/mX_r$$

We assume that LM is flatter than BT. The alternative assumptions leads to the same result.
  3. Notice that the borderline case is $m = 1$. In that case IS is vertical, and q remains unchanged.
  4. Contrary to the case of $B_q > 0$, in the case of $B_q < 0$, any point left (right) to BT represents a point of the trade balance deficit (surplus).
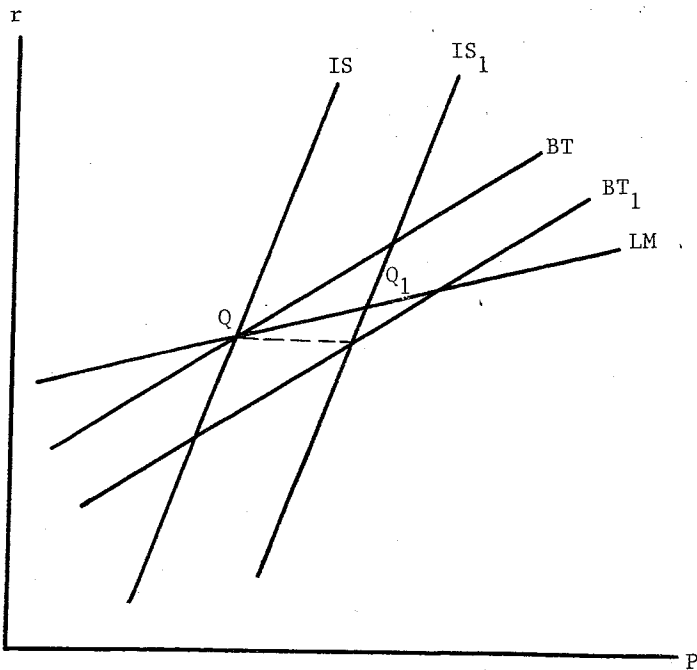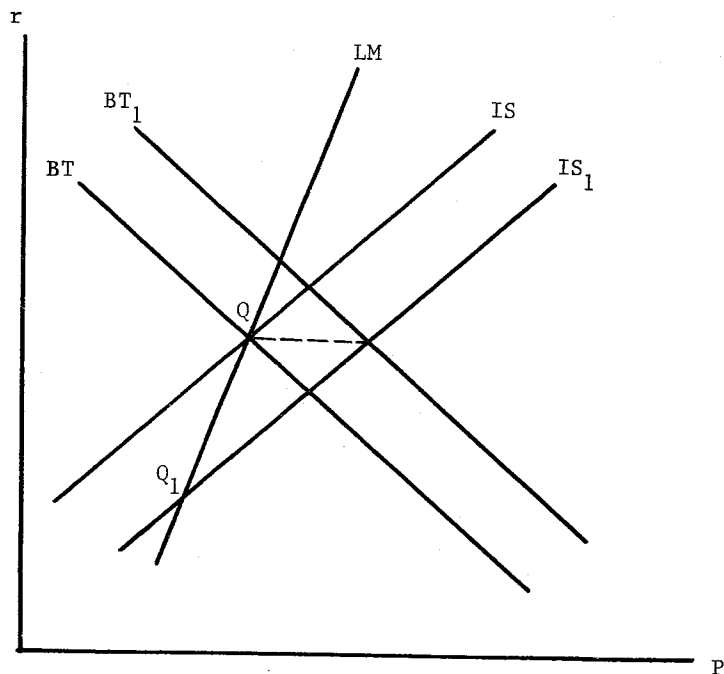
r

Figure 1

Differentiation of (1′) with respect to e gives

$$-X_r(dr/de) = B_q(dq/de) - mX_r(dr/de). \qquad (10)$$

The left-hand side of (10) represents the aggregate absorption effect. Domestic expenditure reduces by the amount of $X_r(dr/de)$. This decrease in absorption has to be shared by a reduction in expenditure on importables and/or exportables. From the right-hand side of (10) we know that if $m = 1$, the decrease in absorption is matched by equal decrease in imports and the terms of trade remains unchanged. If $m < 1$, the terms of trade has to deteriorate so as to generate further decrease in consumption of importables and exportables. Finally, if $m > 1$, the reduction in imports exceeds the decrease in absorption, so the terms of trade has to improve to raise consumption on exportables and to cut down the reduction in imports. Thus, the composition effect represented by the right-hand side of (10) does not necessarily play a negligible role as is asserted by the writers of the monetary approach.

Chau-nan Chen
Tien-wang Tsaur
Institute of Three Principles of the People, Academia Sinica
Nankang, Taipei, Republic of China

References

1. Chen, C. N., "The Monetary Effect of Devaluation: An Alternative Interpretation of the Cooper Paradox." *Western Economic Journal,* December 1973, 475–80.
2.———, "*IS, LM, BT* and a Simplified Synthesis of the Elasticity, Absorption, and Monetary Approaches to Devaluation," *Southern Economic Journal,* July 1975, 132–36.
3. Frenkel, J. A. and Johnson, H. G. *The Monetary Approach to the Balance of Payments.* Chicago: University of Chicago Press, 1974.
4. Komiya, R., "Monetary Assumptions, Currency Depreciation and the Balance of Trade." *Economic Studies Quarterly,* December 1969, 9–23.
5. Mundell, R. A. *International Economics.* New York: Macmillan, 1968.
6. ———. *Monetary Theory: Inflation, Interest and Growth in the World Economy.* Pacific Palisades, California: Goodyear, 1971.

r

Figure 2