Alternative Exchange-Rate Systems:
Another Look at the Modigliani-Askari Analysis

Introduction

For better or for worse the world has drifted into a system — some might label it a "non-system" — of managed floating exchange rates. These arrangements were adopted piecemeal but all pretence of any underlying allegience to a scheme of adjustable par values or central rates by the major industrial countries vanished in March 1973. Since then the world economy has been buffeted by a series of economic and political shocks including the threatened impeachment of the American president, a Mideast war, the formation of an effective cartel by the oil-exporting countries leading to a four-fold rise in the price of oil and an enormous deterioration in the combined current account of the rest of the world, and an intensified world-wide inflation fuelled by unprecedented money-supply increases in all major countries during 1971 and 1972.

Despite these events, the experience with floating rates has been reassuring. The U.S. competitive position, which urgently needed strengthening, has improved markedly; Japan's excessive export surplus has diminished; and Britain — despite a severe rise in internal prices and adverse terms of trade — has managed to offset the deterioration in her current account by attracting capital inflows. The persistent strength of German exports has proved frustrating to "elasticity optimists" but this apparent anomaly can be explained by a number of special considerations. Moreover, we can be reasonably sure that the German surplus would have been all the greater had the DM not appreciated against other currencies. Perhaps most important, the break with pegged exchange rates has enabled many countries to moderate their earlier excessive rates of expansion in domestic money-supplies.

This recent history provides an interesting backdrop to the Modigliani-Askari (M&A) argument for short-run "exchange-rate fixity", coupled with long-run "exchange-rate variability" (Modigliani and Askari, 1973). The M&A case for sliding parities, as compared with either floating rates or infrequently-adjusted fixed rates, is new and thought-provoking. Nonetheless, we shall argue that this case fails to withstand careful examination. In our judgment, reasonably clean floating rates remain the superior option.

The Modigliani-Askari Argument

M&A base their case for sliding parities on three propositions:

(i) The world is characterized by widespread wage and price rigidities so that the transfer of *real* resources from one country to another, which is

required in order to equalize marginal social yields on capital internationally, entails "appropriate long-run adjustments in exchange rates".

(ii) In the short run, fixed exchange rates are desirable because they tend to *dampen* the transmission of exogenous, transient swings in aggregate demand within a given economy to the outside world.

(iii) Countercyclical macro-policy actions in a country experiencing such disturbances are stabilizing for the Rest-of-the-World (ROW) under fixed exchange rates but are destabilizing for the ROW under floating rates.

In their view, these three propositions imply that optimal international monetary arrangements should combine short-run exchange rate fixity with long-run exchange-rate flexibility — i.e., some variant of the sliding-parity arrangement.

We accept M&A's first proposition without reservation: there is abundant evidence that the world's continuing and ever-changing long-run transfer problem can only be solved through on-going appropriate exchange-rate adjustments. We also accept the logic of their third proposition although, as we shall argue below, we would dispute its quantitative significance and would point to an important offsetting consideration.

It is their second proposition that constitutes the critical issue. This proposition reverses the widely accepted notion that a flexible exchange rate helps to insulate the ROW from the disturbing effect of a transient demand disturbance in a particular country, whereas a fixed exchange rate tends to transmit such a disturbance.

Consider the effect of an autonomous decline in aggregate demand in country A. Under a fixed exchange rate, this recession leads to a fall in A's imports and a sympathetic decline in economic activity in the ROW. Under a flexible exchange rate, so it is usually argued, this tendency will be partially checked by an appreciation of A's currency which cushions the decline in A's imports and induces a reduction in A's exports (thereby stimulating an expansion in the import-competing industries of the ROW).[1]

But as M&A note, this conventional argument for floating exchange rates simply "assumes away the existence of capital flows" (p. 306). If the decline in activity in country A also leads to a decline in her domestic interest rates and if capital flows between country A and the ROW are highly sensitive to changes in normal interest-rate spreads, then a floating rate for A's currency may cause a transient decline in aggregate demand in A to have a greater spill-over effect on the ROW than would occur if A's currency

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[1] With zero capital flows, M&A state that "the disturbing country ends up absorbing the entire disturbance internally" (p. 306).

Though possible, such an extreme degree of "insulation" through floating rates, seems unlikely. Even if economic activity in the ROW is fully maintained despite the economic slump in country A (which might be a very large country), the ROW's terms of trade will probably deteriorate somewhat vis-à-vis the country where the disturbance originates. In this event, real income in the ROW will tend to decline despite the maintenance of full-employment there.

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were pegged. For as interest rates in A fall, capital outflows from A increase, swelling the supply of A's currency in the exchange market. If this increased supply (at the initial exchange rate) exceeds the reduced supply of A's currency stemming from its recession-reduced demand for imports the recession will cause its currency to depreciate rather than appreciate. Such a development would reduce A's demand for foreign goods still further and increase foreign orders for A's exports, thereby weakening economic activity both in foreign export industries and in foreign import-competing industries. Thus the recession in A would be transmitted to the ROW to an even greater extent than would be true if A's currency were pegged.

Moreover, if the exchange rate is floating, policy makers in country A will have an incentive to pursue a policy of "aggressive monetary ease", putting further downward pressure on their domestic interest rates in order to induce increased capital outflows (or reduced capital inflows). M&A argue that this policy will add to the depreciation of the country's currency, strengthening its exports and import-competing sectors all the more, at the expense of export and import-competing industries in the ROW. Accordingly, M&A conclude that this policy will be destabilizing for the ROW.

In contrast, under a fixed exchange rate countercyclical policies in country A would tend to soften the destabilizing impact of A's recession on the ROW. For they would presumably reduce the extent of A's recession and thereby help sustain its demand for imports from the ROW.[2]

Some simple mathematics may help clarify the thrust of the M&A argument. Assume that real income levels in A and in the ROW, denoted by y and y* respectively, are *initially* exogenously determined. Assume that domestic imports (M) are a simple linear function of domestic income and the exchange rate (r) — defined as the A-currency price of one unit of representative currency from the ROW. Similarly, assume that A's exports (X) are a linear function of foreign income and the exchange rate. Assume that A's net capital inflows (K) are determined by interest-rate differentials, which vary one-to-one with the ratio of A's income to income in the ROW. Thus, as a first approximation, take net capital inflows into A to be a linear function of the ratio of her domestic to foreign income (y/y*). If a depreciation of A's currency increases the value of her exports and reduces the value of her imports — both measured in foreign exchange — we then have the following three equations:

$$(1) \quad M = M_0 + ay - br \quad (a, b > 0)$$
$$(2) \quad X = X_0 + cy^* + dr \quad (c, d > 0)$$
$$(3) \quad K = K_0 + e(y/y^*) \quad (e > 0)$$

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[2] Professor Milton Friedman would challenge this proposition. Friedman would argue that active countercyclical policies by A would only take effect with a "long and variable lag", and accordingly would probably exacerbate economic instability in A rather than reduce it. See MILTON FRIEDMAN (1953). Hence they would also exacerbate economic instability in the ROW as long as the world is on fixed exchange rates. For a counterargument under conditions of floating exchange rates, see GOLDSTEIN (1974).

Under a floating exchange rate with no official intervention, the necessary condition for exchange-market balance is:

(4) $M = X + K$.

Substituting into (4) from the right hand side of the first three equations and solving for r we obtain:

$$(4') \quad r = \frac{M_o - X_o - K_o}{b+d} - \left(\frac{c}{b+d}\right) y^* + \left(\frac{a}{b+d}\right) y - \left(\frac{e}{b+d}\right) \frac{y}{y^*}.$$

To determine the effect of a change in A's economic activity on the exchange rate we differentiate r with respect to y. This gives:

$$(5) \quad \frac{\delta r}{\delta y} = \frac{a}{b+d} - \frac{e}{(b+d)y^*}.$$

The conventional approach — as M&A point out — has been to assume away the influence of cyclically-determined capital flows on the exchange rate — i.e., to assume implicitly that e has a value of zero. Thus the conventional approach contends that a rise in activity in country A would necessarily increase the price of foreign exchange in A (implying a depreciation of A's currency), and a recession in A would necessarily reduce the price of foreign exchange in A (implying an appreciation of A's currency).

In contrast, M&A contend that cyclically-determined capital flows are likely to be of such importance under a floating-rate regime that they will have a greater impact on the exchange rate than the shift in the import function caused by a change in income. That is, with reference to equation (5) they argue that $(e/y^*) > a$, so that $\frac{\delta r}{\delta y} < 0$.

Whether or not this condition holds is clearly an empirical question. The parameters in question may be such as to cause the inequality to run either way. In any event, M&A present no evidence to support their particular assumption on this critical point.

Some Empirical Evidence

Decisive evidence is hard to assemble. The findings for one country under given historical conditions may not apply to that same country under different conditions; nor may they apply to other countries under *any* plausible circumstances. Nonetheless, some clues — at least — may be gleaned from the Canadian experience during the 1950's when the Canadian dollar was a floating currency with a minimal amount of official intervention.[3]

If M&A's conjecture about the relative influence of income-induced capital flows versus income-induced current-account changes on the exchange rate is correct, we should find that the Canadian dollar appreciated (relative to trend) when Canadian activity was cyclically strong relative to economic

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3 For authoritative accounts of this experience see YEAGER (1956) and PLUMPTRE (1970).

activity elsewhere and that the Canadian dollar depreciated (relative to trend) when Canadian activity was cyclically weak relative to activity elsewhere. If their conjecture about the relative magnitude of these influences is wrong, then we should find the reverse association.

Since the Canadian economy is closely geared to the U.S. economy as regards exports, imports and capital flows it seems plausible to use income variations in the U.S. (or their proxy, variations in industrial production) as the relevant variable for cyclical activity in the ROW as far as Canada is concerned. Accordingly, we define the following variables:

A^i_{can} = an index of cyclical economic activity in Canada during the i-th month, defined as the ratio of seasonally-adjusted industrial production to the trend value of industrial production for the i-th month.

A^i_{us} = a corresponding index of cyclical activity in the U.S. for the i-th month.

r_i = the Canadian dollar price of the U.S. dollar during the i-th month (a monthly average of daily figures).

$\bar{r}_i$ = the trend value of the Canadian dollar price for the U.S. dollar for the i-th month.

$y_{i\text{-can}}$ = Canadian seasonally-adjusted industrial production during the i-th month.

$\bar{y}_{i\text{-can}}$ = trend value of Canadian seasonally-adjusted production in i-th month.

$y_{i\text{-us}}$ = U.S. seasonally-adjusted industrial production during the i-th month.

$\bar{y}_{i\text{-us}}$ = trend value of U.S. industrial production in i-th month.

By definition, we have $A^i_{can} = \left(\dfrac{y_i}{\bar{y}_i}\right)_{can}$ and $A^i_{us} = \left(\dfrac{y_i}{\bar{y}_i}\right)_{us}$

Canada adopted a floating exchange rate in September 1950. The Bank of Canada intervened on a significant scale during the next year or so, however, so that we have taken as our period of analysis the 108 months from January 1952 through December 1960.[4]

Various ways may be used to estimate trend values for a given time series. Graphs of our data suggested that a simple least squares regression against time would be as satisfactory as any other method and accordingly this was the procedure used to obtain values for $\bar{r}_i$, $\bar{y}_{i\text{-can}}$, and $\bar{y}_{i\text{-us}}$. We then regressed the detrended monthly exchange rate on the ratio of the two detrended cyclical activity indices. Our regression results were:

$$\frac{r_i}{\bar{r}_i} = 1.054 - .054 \frac{A^i_{can}}{A^i_{us}} \qquad R^2 = .02$$
$$\quad (.034) \quad (.034) \qquad\qquad DW = .2$$

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4 As has been observed, " The period of float came to an end *de facto* in 1961, when the Canadian Government took a position in regard to the rate... ". See PLUMPTRE (1970), p. 3.

At first examination, these results would seem to support the M&A position. The regression coefficient has a negative sign so that — on the average — a rise in Canadian economic activity relative to activity in the U.S. was associated with a below-trend value for the exchange rate defined as the Canadian dollar price of the U.S. dollar. However, the regression coefficient is statistically insignificant;[5] moreover, only two per cent of the total variance in the detrended exchange rate is explained by the equation. In brief, our analysis suggests that variations in cyclical activity in Canada (relative to variations in the U.S.) had virtually no net impact on the exchange rate. The implication thus seems to be that the income effect on the exchange rate through induced trade flows roughly cancelled out the effect on the rate through induced capital movements.

This suggests that — on balance — economic disturbances originating in Canada, whether policy-induced or otherwise, had no appreciably larger or smaller effect on activity in the ROW than they would have had if the exchange rate had been fixed. (Or, correspondingly, that economic disturbances originating in the U.S. had no appreciably larger or smaller effect on activity in Canada than they would have had under a suitably fixed exchange rate.)

Is the external-disturbance effect critical?

But even if M&A were right in their conjecture about the high degree of capital mobility in the current world — relative to income-induced trade flows — their conclusion regarding the consequent inferiority of a free-floating exchange rate to a sliding-parity rate seems a *non sequitur*. For one thing, sometimes the "cyclical problem" in the ROW may be opposite in nature from that prevailing in the country in question. When country A seeks to reflate, its major trading partners may be seeking to deflate — and when country A seeks to depress demand, activity abroad may be weak.

But let us assume with M&A that this is usually not the case. Let us suppose that excess demand in country A is generally accompanied by excess demand in the ROW and vice versa. In this event, a counter-cyclical monetary policy in country A would, through exchange rate induced current-account transactions, have an undesirable impact on the ROW — assuming that policy-makers in the ROW cannot readily neutralize the influence. Even so, would this "transmitted" inflationary or deflationary influence be quantitatively significant? We must bear in mind that the ROW economy is likely to be quite large relative to the economy of most individual countries. Accordingly, the effects in question may well be negligible.

Consider a plausible numerical example. Assume that the combined GNP of countries in the ROW is ten times that of the typical country in question. Let $\Delta B =$ the improvement in the current-account of the domestic country which occurs because of interest rate induced capital flows under a

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[5] The coefficient is less than twice its standard error. Moreover, the low value of the Durbin Watson statistic indicates strong positive serial correlation of the regression residuals. Such a finding implies that the true variance of the coefficient's distribution is greater than the standard-error statistic would otherwise indicate.

floating rate system. Let $\Delta B/X =$ the ratio of this improvement relative to pre-existing domestic exports and let $X/Y_d =$ the ratio of pre-existing exports to domestic final product. Assume that $\Delta B/X = .25$ and that $X/Y_d = 0.2$. Then the interest rate induced increase in GNP of the country in question via the exchange-rate mechanism — ignoring second-order feedback effects —

would be: $\dfrac{\Delta B}{Y_d} = \dfrac{\Delta B}{X} \cdot \dfrac{X}{Y_d} = (1/4)\,(1/5) = \dfrac{1}{20} = +5\%.$

This represents a significant boost to domestic economic activity. But what is its impact — *in percentage terms* — on activity in the ROW? Since income in the ROW is ten times that of the country in question, the answer is that it weakens income in the outside world by only one-half of one per cent.

In general, the difference in economic size between the typical country and the outside world makes it likely that the effect of an active counter-cyclical policy by the country on the ROW — whether desirable or undesirable — would be relatively insignificant.

Furthermore, any undesirable external effect must be weighed against the benefits which a flexible rate gives to individual countries in improving the counter-cyclical potency of their respective individual monetary policies. When exchange rates are fixed (even on a short-term basis), policy induced changes in domestic credit conditions have no effect on domestic economic activity through the impact of induced credit flows on the exchange rate; when rates are flexible they do. And we can expect this effect — for the country in question — to be quick-acting and significant. This consideration — in our judgment — is an important argument in favour of free-floating exchange rates which is likely to outweigh any accompanying undesirable effects on other countries.

A technical weakness of the sliding-parity scheme

Any assessment of the pros and cons of the sliding-parity scheme needs to allow for a significant "technical weakness" inherent in the proposal. By its very nature, the sliding-parity arrangement does not permit exchange rates to adjust appropriately in response to "economic shocks" except over a relatively prolonged period of time. (Such shocks imply a substantial change in a country's equilibrium exchange rate: examples are the May-June 1968 wage increases in France; the severe effects of the oil-price increases on Japan; the recent wage-rate settlements in Italy.) In the absence of such adjustment, speculators obtain the same sort of one-way option that proved such a fatal weakness of the Bretton Woods system.

In theory, the problem can be overcome by having central banks peg short-term interest rates at levels that offset the anticipated change in exchange rates. But this policy puts monetary policy into a strait jacket and is likely to aggravate domestic instability. Aware of this difficulty, M&A remark: "It should be recognized that even with a system of sliding pegs, one may need some occasional, discontinuous large change in parity if a sudden

'permanent' shock of large proportions occurs. In such cases, the appropriate policy measure is to float the exchange rate for a short period until a new maintainable level has been established" (p. 310).

But such a policy is easier to recommend than to execute. In many instances, it will take the authorities some time to recognize the significance and "permanence" of the shock, and to decide to let the rate float. Before this action is taken, speculators will have a one-way option and will have a chance to profit handsomely at the expense of the government, i.e., the taxpayers. Moreover, the *unwinding* of previously established speculative positions at a newly established pegged-but-sliding rate will itself tend to complicate the scheme's management.

Conclusions

M&A make two important contributions:

(1) They show that long-run exchange-rate flexibility is a necessary condition to achieve a more efficient distribution of real capital among the nations of the world. In so doing, they expose a significant oversight in the well-known Mundell analysis (Mundell, 1963). This analysis argued that payments balance and domestic stability could both be achieved under fixed exchange rates even with sticky internal prices and wages. But it failed to perceive — as M&A point out — that such policy arrangements lead to a non-optimal international distribution of real capital.

(2) They point out that the existence of interest-sensitive capital flows may reverse the usual presumption that floating rates serve to insulate, and fixed rates to conduct, disturbances from one country to another — at least insofar as this transmission takes place via induced exchange-rate movements.

Despite these significant insights, we do not believe that M&A have advanced a persuasive case in favor of a sliding-parity arrangement. Our examination of the Canadian experience during the 1950's suggests that the floating rate arrangement was neutral on balance insofar as the transmission or non-transmission of disturbances between Canada and the outside world was concerned. The "capital-flow effect" on the exchange rate seems only to have roughly offset the induced-imports effect — not swamped it.

Even if it is conceded that free-floating rates serve to transmit economic instability, rather than to insulate countries from instability originating abroad, this still does not condemn them as a second-best arrangement. As we have argued, such transmitted instability is likely to be relatively small and to be more than offest by the benefits accruing to individual countries from the improved potency of countercyclical monetary policy under free-floating exchange rates in a world of high capital mobility.

Finally, the sliding-parity scheme suffers from a severe technical weakness which in practice may be impossible to overcome.

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