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Direct Investment In The U.S. Balance Of Payments-A Portfolio Approach

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DIRECT INVESTMENT IN THE U.S. BALANCE OF PAYMENTS --

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Discussion Paper No. 1

I. INTRODUCTION

The active control and operation of firms in other countries implied by direct foreign investment has dominated the international investment position of the U.S. vis-à-vis the rest of the world. At the end of 1967, 73% of U.S. long-term foreign assets were held in the form of direct investment. On the other side of the coin, 35% of foreign long-term assets held in the U.S. were in this category.

It is the purpose of this paper to explain the demand for these direct investment assets, both U.S. investment abroad and foreign investment in the U.S. It should be emphasized that the demand analysis involves specifying and estimating structural relationships for a given level of these assets rather than for changes in those levels as measured by flows in the balance of payments. In this regard there has been a major shift of emphasis from models which were designed to estimate the flow per period of time to those models which view an international capital flow as an attempt to close the gap between the actual and desired stock of assets, the latter based on optimum portfolio models. It is rather unfortunate that there should have been a lag of approximately a decade between the appearance of general portfolio models as drawn up by Tobin [11] and others and their application to international capital assets. Nevertheless, in the past year this lapse has been partially remedied. Recent theoretical investigations include studies by McKinnon [6], Harkness [3] and Leamer and Stern [4]. Also some empirical work on certain aspects of the problem has been undertaken by Branson [1], Grubel [2], Lee [5], and Miller and Whitman [7]. But these studies have been concerned

with portfolio or financial investment and not direct investment. Only when reliable estimates of all major private foreign assets have been obtained can a complete and consistent model of the balance of payments be constructed.

II. A MODEL OF FOREIGN DIRECT INVESTMENT

A. The Determinants of the Optimum Stock

Assume that a U.S. corporation can hold two types of assets, A_1 , the value of direct foreign investment assets or A_2 , the value of domestic assets.¹ Then we can write the demand for A_1 as

$$A_1 = A_1(R_1, R_2, \sigma_{R_1}, \sigma_{R_2}, \sigma_{R_{12}}, W), \quad (1)$$

where A_1 is the desired or optimum holdings of direct investment assets abroad, R_1 and R_2 represent the expected rates of return on the two assets, σ_{R_1} and σ_{R_2} represent some measure of the risk of the two rates of return, $\sigma_{R_{12}}$ is the covariance of the rates of return² and $W = A_1 + A_2$ is the total portfolio of wealth owned by the corporation or in other words, its net worth.³

By contrast, the basic hypothesis behind a flow model of direct investment can be summarized by the following equation:⁴

$$Q = Q(R_1, R_2), \quad (2)$$

where Q is the desired flow of new investment funds transferred abroad for direct investment purposes.

Note first of all that the stock hypothesis of equation (1) employs a much more complex relationship than the flow hypothesis in equation (2).

This can be seen from the inclusion of risk considerations in the former whereas they are usually not introduced in the latter. Although both approaches rely on profit maximizing behaviour, the portfolio-balance hypothesis maximizes profits under conditions of risk whereas the flow hypothesis operates under conditions of certainty. Also, total net wealth plays an important part in determining the optimum stock of a given asset but usually makes no contribution to the explanation of a flow. In other words, in the stock theory, investors are maximizing subject to a constraint, whereas the flow theory allows for maximizing behaviour which is unconstrained.

But perhaps the most important distinction deals with the specification of the dependent variable. Equation (1) states that, given a certain level of the independent variables and sufficient time for complete adjustment, the stock of a given asset will be in equilibrium and that there will be no flows through the balance of payments. In contrast, equation (2) says that the same level of the independent variables results in a constant flow of funds in one direction or the other with the result that stocks are continually increasing or decreasing. But this implies that investors are not satisfied with the composition of their portfolios and thus equilibrium has not been established. Hence the balance-of-payments effects of the two specifications are different. With the stock hypothesis, in equilibrium there are no gross or net flows and all entries in the capital account are zero since all portfolios are fully adjusted, while with the flow hypothesis it is not possible to specify a zero balance in the capital account as an equilibrium condition.⁵

B. Capital Flows and Changes in the Stock of Assets

But once we accept equation (1) as the correct behavioural hypothesis, we encounter an additional difficulty in translating changes in the stock of an asset into balance-of-payments entries. For illustrative purposes assume that U.S. direct investment abroad is the only capital asset.

Then we can write the balance-of-payments equation as

$$B = X - M + Y - S - Q, \quad (3)$$

where B is the defined balance of payments, X and M are the values of exports and imports, Y-S represents repatriated profits (Y = earnings on foreign direct investment and S = reinvested earnings) and Q is the flow of new direct investment capital. But a change in the stock of direct investment assets is not necessarily equal to a flow.

Thus the reconciliation between changes in stocks and flows can be written as

$$\Delta A_1 = Q + S + C, \quad (4)$$

where C represents all other changes in the stock of A_1 during the given time period. These changes may be caused by physical depreciation, expropriation of foreign assets, changes in the market value of the assets, changes in the value of the foreign currency and other exogenous changes.

For instance the Department of Commerce shows the following reconciliation for U.S. direct investment in 1967:

Value, beginning of year	\$54,711 million
Capital outflow	3,020
Reinvested earnings	1,578
Other adjustments	-42
Value, end of year	59,267

Although "other adjustments" were quite small in 1967, they have been as large as -\$953 million in 1960 and thus cannot be ignored. Hence there is no simple transformation from a portfolio model to a balance-of-payments model. Since a portfolio can be adjusted by any one, or a combination of, these components, it is necessary to specify the determinants of any two components (the third being determined residually) so that Q and S, which enter the balance of payments directly or indirectly, can be separated from C which does not. While it is possible to make this specification on a theoretical level it would not be empirically testable. This unfortunate result emanates from the Department of Commerce treatment of branch and subsidiary profits. Whereas retained subsidiary profits are not entered in the balance of payments, retained branch profits enter twice, once as repatriated earnings (line 11 of Table 1 in Survey of Current Business, June 1968) and again as new capital outflows (line 33).⁶

In fact one can argue that it is ΔA_1 that should enter the balance of payments rather than Q and Y-S. If the balance-of-payments statement is designed to show equilibrium or deviations from it, then the present accounting system may not be compatible with the results of portfolio models. It was assumed that equilibrium in portfolio holdings is established when $\Delta A_1 = 0$. Yet this condition is not inconsistent with a positive or negative flow in the present balance-of-payments system. For instance, investors may be content with their beginning-of-period asset holdings but may want to offset depreciation during the period by new capital flows. Thus

$$Q = -C \text{ subject to } \Delta A_1 = 0,$$

in which case the portfolio remains in balance but this is reflected as a disequilibrium situation in the balance of payments. As a result, using portfolio balance models may require new concepts in balance-of-payments statistics and greater detail in the source of changes in the international investment position of the United States.

III. EMPIRICAL ESTIMATION OF THE MODEL

A. The General Estimating Equations

Based on equation (1), the following equations will be used to estimate the optimum stock of U.S. direct investment assets abroad and foreign direct investment assets in the U.S.

$$D_t/W_t = \alpha_0 + \alpha_1 (R_t^*/R_t) + \alpha_2 (\sigma_{R^*}/\sigma_R) + \alpha_3 B_{t-1} + u \quad (I)$$

and

$$D_t^*/W_t^* = \beta_0 + \beta_1 (P_t/P_t^*) + \beta_2 (\sigma_P/\sigma_{P^*}) + \beta_3 B_{t-1} + v \quad (II)$$

where D_t = stock of U.S. direct investment assets abroad, billions of dollars, end of period,

W_t = value of U.S. corporate stock, billions of dollars, end of period,⁷

R_t^* = Y_t/D_{t-1} (where Y_t is earnings on U.S. direct investment abroad after foreign taxes but before U.S. taxes), in percent,

R_t = after-tax rate of return on net worth in U.S. manufacturing, in percent,

$$\sigma_{R^*} = [1/3 \sum_{i=0}^3 (\bar{R}^* - R_{t-i}^*)^2]^{1/2} \text{ where } \bar{R}^* = \frac{1}{4} \sum_{i=0}^3 R_{t-i}^*,$$

σ_R = same calculation as for σ_{R^*} ,

B_{t-1} = U.S. balance of payments on liquidity basis in the previous year, billions of dollars,

D_t^* = stock of foreign direct investment in the U.S.,
billions of dollars, end of period,

W_t^* = value of corporate stock in Canada and the U.K., billions
of dollars, end of period,⁸

$P_t = Y_t^*/D_{t-1}^*$ (where Y_t^* is the earnings on foreign direct investment
in the U.S.), in percent,

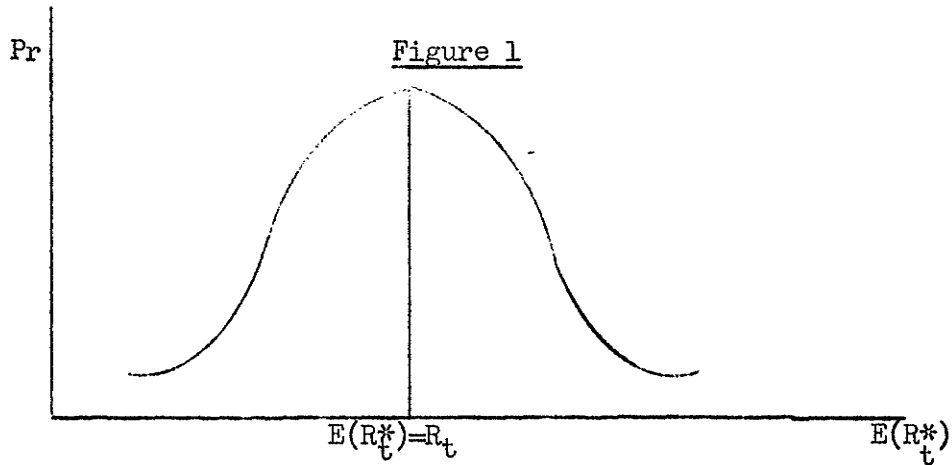
P_t^* = simple average of after-tax rates of return on net worth in
Canadian and U.K. manufacturing, in percent,

σ_P = same calculation as for σ_{R^*} ,

σ_{P^*} = same calculation as for σ_{R^*} .

Before proceeding with the estimates of these equations, the form of the equation and the variables will be discussed. In the first place the dependent variable is the ratio of foreign assets to total assets. This is consistent with the mathematical derivation of optimum portfolios, but it makes the implicit assumption that the elasticity of D with respect to W is one.

Next, the variables for expected rate of return and risk considerations must be discussed.⁹ Although there are a number of plausible methods by which investors are assumed to formulate these variables, the following procedure will be used in this study. An investor in deciding how much out of corporate net worth to hold in foreign direct investment will consider the present rate of return on that investment as the most likely event. This is shown in Figure 1 as $E(R_t^*) = R_t^*$.



This requires that the investor make some projection since R_t^* cannot be known definitely until the end of the year, yet he will be making investments on the basis of this information during the year. Because of this uncertainty and because the investor is aware of other outcomes (but all less likely to occur in his mind) he forms a probability distribution around R_t^* . One parameter of that distribution is its dispersion. In this instance the investor is assumed to view the variability of rates of return over the past four years (including the present year) as the basis for calculating the standard deviation which is his measure of risk.

Although there is little argument about the formulation of σ_{R^*} in the literature,¹⁰ the variable for the expected rate of return is usually of the form

$$E(R_t^*) = \bar{R}^*,$$

so that the most likely event is the mean of the probability distribution. But this does not appear to be an applicable procedure for direct investment assets. If we take a mean of a sample of rates of return over time, it implies that the investor places as much weight on rates of return n years ago as the

present rate. One could define

$$E(R_t^*) = \bar{R}^* = \frac{1}{\sum \lambda_i} \sum_{i=0}^n \lambda_i R_{t-i}^*$$

where \bar{R}^* becomes a weighted average with the weights decaying over time. But a standard deviation of such a weighted array is meaningless.¹¹

As a result of this process of elimination, the variables chosen to represent the expected rate of return and risk, although not elegant from a theoretical point of view, appear to be the best a priori approximations of the decision-making process of investors involved in foreign direct investment.

Finally, B_{t-1} enters the equation as a proxy variable for "external risk". Aside from the variability of the rates of return, foreign investment is subject to a number of risks with no comparable counterpart for domestic investment. These risks include the probability of expropriation, changes in the exchange rate of the foreign country and controls on the repatriation of earnings. Although these risks are likely to appear at discrete time intervals, it is necessary to have a continuous variable or a complex set of dummy variables. It is assumed that the U.S. balance-of-payments position will capture some of these effects. An improvement in the U.S. balance of payments implies a strengthened position for the U.S. and a weakened position for other countries. Under these conditions the U.S. is less likely to devalue or impose capital controls and other countries are more likely to take these actions. Hence an investor (both U.S. and foreign) will shift his portfolio to larger holdings of U.S. assets and smaller holdings of foreign assets. A deterioration in the

in the U.S. balance of payments will, of course, have the opposite effects. In order to avoid the problem of simultaneous determination, the balance has been lagged one year.¹²

Although not specifically dealt with in the equations, the establishment of convertibility of the European currencies in the late 1950's may have influenced both U.S. and foreign owners of direct investment assets. But this influence is neither easy to define nor measure.¹³ In any case it was decided to use a dummy variable (1959 onwards equals 1) in both equations.

B. Data and Estimating Techniques

The equations for direct investment assets will be tested with annual data. Although adjustments to a given stimulus can be assumed to be fairly complete within one year, it would have been more interesting to use quarterly data to get some idea of the shape and length of the adjustment lag. But, although flow data are available on a quarterly basis, the stock data have only been compiled on an annual basis. (All original data and their sources are contained in the appendix.)

Portfolio theory requires that stocks of assets in the portfolio be market values. But for stocks of direct investment assets it is likely that the series more closely approaches book value rather than market value mainly because these assets rarely enter the market and their market price is difficult to establish.

Since the optimum stock of direct investment assets fits into a much larger framework of the U.S. foreign sector which in turn is only one part

of the whole economy, this study can be viewed as partial equilibrium analysis with the independent variables treated as exogenously given.¹⁴ Hence simultaneous estimating techniques are not appropriate and both equations will be fitted with ordinary least squares.

C. Empirical Results for U.S. Direct Investment Abroad

Table 1 summarizes the regression results for estimating the optimum stock of U.S. direct foreign investment. It should be noted first of all that the observation for 1961 has been omitted from the time series. During 1961 the expropriation of U.S. assets in Cuba amounting to approximately one billion dollars was written off. Since investors may not have had time to readjust their portfolios as a result of this action, the value of D_t/W_t for 1961 was considered to be abnormally low. Also the last observation was for 1964. Later years were excluded from the regression on the assumption that a structural change took place at this time mainly in response to the Voluntary Restraint Program (VRP). Theoretically, the effect of VRP is that the actual stock of foreign direct investment assets would be lower than the optimum stock. One could approximate this structural change by the use of a dummy variable, but since the requirements of VRP changed every year, a separate dummy variable for each observation after 1964 would have to be used. However, this procedure is undesirable on statistical grounds and thus the decision was made to measure the effect of VRP by extrapolating the results of the equation for 1953-64 and comparing the estimated optimum and actual stocks of assets.

Equation I.1 then is the estimate based on the previous discussion. Since the coefficient of B_{t-1} is not significant it was dropped in equation I.2. Equations I.3 and I.4 are other combinations of these same variables. In all cases the relative rates-of-return variable is significant but all risk variables fail to pass the test and, in addition, the Durbin Watson statistic (DW) indicates serial correlation of the residuals. Equations I.5 and I.6 approach the problem in a somewhat different way. Instead of forming separate variables for expected rate of return and risk, the investor is assumed to combine these considerations into one variable. Essentially he makes a "conservative" estimate of the expected rate of return by taking the most likely event, R_t^* , and subtracting σ_{R^*} .¹⁵ By making a similar calculation for domestic investment we arrive at the single variable $(R_t^* - \sigma_{R^*}) / (R_t - \sigma_R)$. The use of this variable brings about results which can be judged to be superior to those of the previous equations. Equation I.5 will be used as the final and best estimate.¹⁶

Having estimated the optimum stock of U.S. direct investment assets for the homogeneous period 1953-64 (excepting 1961), it is possible to estimate the effects of the Voluntary Restraint Program. It will be assumed that the introduction of VRP caused a structural shift in the holdings of U.S. direct investment assets and that this was the only major change that occurred during 1965-67. It is further assumed that the provisions of VRP were adhered to by U.S. corporations. Our task then is to compare the actual results with those that would have obtained in the absence of VRP. The necessary information for such a comparison is contained in Table 2. Column (1) indicates the estimated ratio of direct investment

TABLE 1

REGRESSION RESULTS FOR
U.S. DIRECT INVESTMENT ABROAD, 1953-64 ^{a/}

Equation	Coefficients and t-tests					$\frac{R^2}{R}$ (F)	DW
	Constant	R_t^*/R_t	σ_{R^*}/σ_R	$\frac{R_t^* - \sigma_{R^*}}{R_t - \sigma_R}$	R_{t-1}		
I.1	.011 (.53)	.052 (3.24)	-.005 (1.33)		-.002 (.96)	.48 (4.11)	1.22
I.2	.025 (1.64)	.043 (3.39)	-.003 (1.03)			.49 (5.76)	.97
I.3	.020 (.96)	.043 (2.82)			-.0007 (.44)	.43 (4.33)	1.08
I.4	.027 (1.70)	.040 (3.22)				.48 (10.39)	.97
I.5	.020 (1.56)			.040 (4.86)	-.002 (1.67)	.71 (13.51)	1.48
I.6	.035 (3.80)			.031 (4.50)		.66 (20.21)	1.11

^{a/}The observation for 1961 has been omitted from the regression. See text for explanation.

TABLE 2

OPTIMUM AND ACTUAL U.S. DIRECT INVESTMENT, 1965-67^{a/}

Year	(1) \hat{k}_t	(2) \hat{D}_t	(3) D_t	(4) $\Delta \hat{D}_t - C_t$	(5) $\Delta D_t - C_t$	(6) $\Delta \hat{D}_t - C_t - S_t$	(7) $Q_t - L_t$
1965	.0662	47.07	49.42	2.32	5.01	.78	3.34
1966	.0578	40.87	54.71	-6.28	5.36	-8.02	2.79
1967	.0593	46.54	59.27	5.71	4.60	4.13	2.62

^{a/}Estimated values are based on the parameters of equation I.5 in Table 1.

Definition of Variables

$$\hat{k}_t = \widehat{D}_t / \widehat{W}_t$$

$$\hat{D}_t = \widehat{k} W_t$$

L_t = U.S. direct investment financed from non-U.S. sources. See Survey of Current Business, March 1968, p. 20, Table D. L_t enters the balance of payments as a receipt in lines (52) and (54) and as a payment in line (33).

assets to total corporate net worth. Column (2) then calculates the estimated optimum stock of direct investment assets for 1965-67 which can be compared to the actual stock in column (3). In all three years the actual stock was higher than the optimum implying that VRP did not have the desired effect. But comparing stocks may not be the relevant comparison since the Program was concerned with reducing flows in the balance of payments. Thus in column (4) the desired change in U.S. direct investment assets minus C_t , assumed to have no balance-of-payments effects, can be compared to actual changes in column (5). In other words, columns (4) and (5) compare the the desired and actual reinvested earnings and new capital flows. These figures show that VRP had the expected effect in 1967 but not in 1965 and 1966. In fact, in 1966 a negative outflow is the result predicted by equation I.5. Although reducing the stock of real assets other than through depreciation is difficult, in the case of direct investment assets this could be accomplished by selling off investments to foreigners and repatriating the proceeds.

However, the comparison may have to be even more refined than indicated by columns (4) and (5). Although the statements by the Secretary of Commerce are not clear on this issue, one can interpret VRP as applying to new capital outflows only.¹⁷ Also VRP encouraged firms to finance their direct investment ventures by issuing bonds in foreign markets thus reducing the balance-of-payments effects of direct investment. Thus we can compare the estimated capital outflow without VRP in column (6) to the actual net outflow allowing for the foreign financing engendered by VRP in column (7).¹⁸ The results are not too dissimilar to the previous comparisons.

How then can we explain this unusual result? Essentially, our main concern is with the effect of VRP in 1966. The difference between the actual and predicted values for 1965 is too small to have any firm confidence about the effect of VRP and in 1967 one can conclude that VRP appeared to be successful in achieving its aims. But in 1966 the prediction is for a sizeable inflow when in fact a net outflow of \$2.8 billion took place. This result can be explained by the following reasoning. The introduction of VRP caused U.S. corporations to consider the limits imposed on capital flows as minima as well as maxima mainly because it was quite obvious from the outset that the constraints would last for some time and would even be tightened from time to time. Given these anticipations, investors began to optimize over a longer horizon than one year. This would lead to "overinvestment" in periods where the optimum change in the stock of direct investment assets is less than that allowed by VRP and "underinvestment" in periods where VRP was an effective constraint. The year 1966 would appear to fit into the first category. Even though on a year-to-year basis, investors should have reduced their foreign assets in 1966, they in fact increased them in anticipation of a higher optimum stock in future years than could be gained from the maximum allowable direct investment flows during these later years. For the period as a whole the "overinvestment" amounted to \$11.9 billion and it may take some time and very tight constraints before firms are in a position where VRP places a burden on these firms. By the same token, VRP cannot be said to be effective since it has not forced firms to reduce their outflows to lower levels than would otherwise prevail.

D. Empirical Results for Foreign Direct Investment in the U.S.

The results for the regression equations for foreign direct investment in the U.S., as shown in Table 3, are mostly symmetrical to those obtained for U.S. direct investment abroad.¹⁹ As was the case previously, the separate risk variable in equation II.1 does not meet a priori expectations. Dropping that variable results in equation II.2 and combining it with the expected rate of return gives us equation II.3. In this case however, it is not clear that the last version is better than equation II.2. It may be that the risk factor enters into the decision-making process in a much more complicated fashion than is depicted here, but in the absence of more specific knowledge about the formation of risk variables, equation II.3 will be accepted as the best result.

In addition to the variables reported for equation I, there are two extra variables in equation II. One is designed to capture the influence of convertibility which was discussed in a previous section. The last variable is a time trend. There is no theoretical justification for a downward trend in the proportion of foreign direct investment assets to total corporate assets in the rest of the world. However, considering the method by which W^* was "manufactured", it is easy to conceive of reasons why it has an upward bias over time.

IV. CONCLUSIONS

Given the estimates of the holdings of direct investment assets, what can be said about influencing these holdings through policy decisions? In the first place, one can have legitimate doubts about the effects of the Voluntary Restraint Program. Unless VRP can be designed so that the actual flow of direct investment funds is less than that implied by optimum portfolio

TABLE 3

REGRESSION RESULTS FOR
FOREIGN DIRECT INVESTMENT IN THE U.S., 1953-64

Equation	Coefficients and t-tests							\bar{R}^2 (F)	DW
	Constant	P_t/P_t^*	σ_P/σ_{P^*}	$\frac{P_t - \sigma_P}{P_t^* - \sigma_{P^*}}$	B_{t-1}	CONV	t		
II.1	.262 (8.62)	.152 (4.91)	.022 (1.59)		.026 (4.01)	.089 (3.19)	-.029 (9.16)	.98 (93.11)	2.26
II.2	.258 (7.70)	.161 (4.86)			.023 (3.25)	.078 (2.52)	-.027 (8.66)	.97 (95.05)	2.41
II.3	.291 (7.47)			.107 (3.33)	.023 (2.52)	.074 (1.81)	-.025 (6.19)	.95 (55.46)	1.89

decisions, it cannot be said that VRP has improved the balance of payments. In order for this to be true, it would be necessary to estimate the desired flow for each period and then constrain the actual flow to a lesser amount. In addition, a much clearer statement is required concerning the place of retained earnings in the Program since reducing repatriated earnings (thereby increasing retained earnings) is a substitute for new flows and has the same effect on the balance of payments.

Aside from selective instruments such as the Voluntary Restraint Program and the Interest Equalization Tax, what effects can be expected from monetary and fiscal policy on the holdings of direct investment assets and indirectly on the balance of payments. In a Mundellian framework [8,9] one would rely heavily on monetary policy to influence the balance of payments since it has a comparative advantage over fiscal policy in this respect. But the Mundell analysis has serious limitations once it is applied to a portfolio model. In the first place his theory is based on the assumption that an increase in the interest rate resulting from tighter monetary policy will give rise to a constant higher inflow (or reduced outflow). However, when wealth constraints and risk considerations enter the portfolio manager's decision this can no longer be true. At best, such a policy will result in a short-term improvement in the balance of payments, but once portfolios are adjusted, the higher interest rates will have no further effect. In fact, one is hard put to find any economic policy instrument that has a permanent effect (making the standard ceteris paribus assumption) on the balance of payments. Aside from the anomalies in the present accounting system, the only equilibrium in a static framework is one which shows a zero

balance in the capital account. Thus a surplus (deficit) in the current account with an offsetting deficit (surplus) of equal absolute magnitude in the capital account is not a sufficient condition for equilibrium in the overall balance of payments.

Given that a policy change cannot have a permanent effect on the balance of payments it can at least have a temporary effect by influencing the optimum stock of assets. For instance, assume that the U.S. has a short-term deficit in its balance of payments. To aid in the adjustment process it can increase the optimum stock of foreign direct investment assets in the U.S. and decrease the optimum stock of U.S. direct investment assets abroad.²⁰ Both of these effects will improve the balance of payments. However, it is no longer clear that monetary policy is better suited than fiscal policy to bring about this result.

By lowering corporate taxes, the after-tax rate of return in the U.S. is increased and hence encourages investors to shift assets from abroad to the U.S.²¹ Thus from the optimum stock equations I and II and defining

$$R_t = (1 - T)R_t^{\dagger}$$

$$P_t = (1 - T)P_t^{\dagger},$$

where T is the rate of taxation and R_t^{\dagger} and P_t^{\dagger} are the pre-tax rates of return, then the balance-of-payments effect is measured by²²

$$\frac{dB}{dT} = - \frac{\partial D}{\partial T} + \frac{\partial D^*}{\partial T} = - \frac{\alpha_1 R_t^* R_t^{\dagger} W_t}{[(1-T)R_t^{\dagger}]^2} - \frac{\beta_1 P_t^{\dagger} W_t^*}{P_t^*}.$$

But again it should be emphasized that this is a temporary change in the balance of payments. In this model, the tax reduction would have its effect within one

year, after which the new tax structure would have no further influence on the optimum stocks or the balance of payments.

On the other hand, monetary policy may not even have a predictable short-run effect on the balance of payments. In a portfolio model, where a whole spectrum of rates of return enters the decision-making process of the investor, it is no longer acceptable to imply that a higher "interest rate" will attract capital from abroad. Tighter monetary policy will presumably increase the Treasury bill rate and the long-term government bond rate but its effect on the profitability of real investment is more difficult to measure. The effect of higher interest rates on rates of return on investments discussed in this paper requires a more sophisticated analysis than is presently available.²³ In addition, there is little empirical evidence that all the relevant rates of return move together. A simple correlation matrix in Table 4 indicates this.

TABLE 4

Simple Correlation Coefficients Among Interest Rates
and Rates of Return

	$i_{us}^a/$	$r_{us}^b/$	R_t
r_{us}	.96		
R_t	.54	.35	
P_t	.35	.29	.53

a/ i_{us} is the annual average of Treasury bill yields.

b/ r_{us} is the annual average of interest rates on long-term U.S. government bonds.

Even though lagged relationships may have shown higher correlation coefficients, the evidence appears to point to a much more complex determination of rates of return on direct investment assets. Hence, higher interest rates may attract portfolio capital, both long-term and short-term, but the effect on direct investment flows is at best ambiguous.

No attempt has been made in this study to analyse the balance-of-payments effects of direct investment in a dynamic framework. It is obvious, however, that if the net worth of U.S. corporations is growing faster than that of foreign corporations, then the outflows of direct investment capital will be larger than the inflows, leading to a deficit in the balance of payments.²⁴ Any other dynamic changes in the independent variables will also have balance of payments effects. Since elementary observation of balance-of-payments data tell us that there has been no tendency towards smaller capital flows - an indication that the system is settling down to a static equilibrium - it is these dynamic properties of portfolio models that must be investigated more fully in order to gain better insights into the balance-of-payments adjustment process over time.

Footnotes

1. The exposition will be in terms of a U.S. firm holding assets at home and abroad. An analogous treatment of foreign direct investment in the U.S. would involve a foreign firm holding assets in the U.S., A_1^* , and assets in the domestic economy as well as in other countries except the U.S., A_2^* .
2. Because the effect of $\sigma_{R_{12}}$ on A_1 is ambiguous, it will be left out of the subsequent discussion.
3. Alternatively the function can be written as

$$A_1/W = f(R_1, R_2, \sigma_{R_1}, \sigma_{R_2}, \sigma_{R_{12}}) \quad (1')$$

- whereby the proportion of the total portfolio held in the foreign asset is determined by the other independent variables. In fact, this is the form that will be used in the empirical section, but equation (1) is more suitable for present purposes.
4. For an example of this type of equation see Prachowny [10, pp. 72-76].
 5. Of course in a dynamic framework where total wealth is growing, flows are compatible with an equilibrium position. See Grubel [2] and Harkness [3].
 6. This latter procedure has been recommended by Bernstein [12], but the asymmetrical treatment of branch and subsidiary profits, although not affecting the balance of payments, leads to difficulties in estimating stock adjustments in direct investment assets.
 7. Since this variable as reported in the flow of funds accounts is dominated by stock prices at the end of the year, it does not adequately reflect the net worth that U.S. corporations have at their disposal during the year. Hence $W_t = VCS \times SP_y/SP_D$ where VCS is the value of corporate stock as reported in the flow of funds, SP_y and SP_D are the Standard and Poor Industrial stock price indexes for the year and December, respectively.
 8. Since neither country publishes flow of funds accounts, this variable had to be "manufactured". In both cases, the book value of corporate stock is obtained from taxation data. These series are then multiplied by the relevant stock price index (yearly average, 1956=100) and then converted to U.S. dollars and aggregated. Since an index number is involved in the calculations, only in the loosest sense can the final figure be said to be denominated in dollars. Various other forms of W^* were investigated without better results.

9. Only the formulation of R_t^* and σ_{R^*} will be dealt with in detail since the other rates of return and risk variables are determined in a like manner.
10. One could argue whether σ_{R^*} which is an objective measure of dispersion can adequately convey the subjective evaluation of uncertainty that investors must make.
11. The discussion up to this point has been in terms of a probability distribution based on historical data. But cross-section data are also a possibility. In a sense R_t^* is a weighted average of rates of return across all industries or countries. But the dispersion of cross-section rates of return may not be an applicable measure of risk since the deviation of the rate of return in industry y from the mean may be of no importance to a firm in industry x .
12. For a similar discussion of the use of B_{t-1} see Miller and Whitman [7, p. 9].
13. For a fuller discussion of this point see Prachowny [10, p. 73].
14. The interactions within the balance of payments and between the foreign and domestic sectors of the U.S. economy are more fully dealt with in Prachowny [10].
15. $R_t^* - \sigma_{R^*}$ should not be construed as a confidence limit, since it will be remembered that R_t^* is not the mean of the probability distribution from which σ_{R^*} is calculated. Also this variable implies a linear indifference curve between expected rate of return and risk.
16. The convertibility variable was not significant in any of the equations.
17. This is corroborated by the Department of Commerce data published on VRP. See Survey of Current Business, March, 1968, p. 20, Table D.
18. This comparison is the most generous to VRP, since it assumes that foreign financing of direct investment occurred only because of VRP and would not have taken place in the absence of this Program.
19. The equation was tested for the period 1953-64, the cut-off being dictated by the lack of data on the Canadian component of W^* and P^* after 1964 on a basis comparable to data for earlier years.
20. Assume now that the adjustments to these changes in the optimum stocks are entered in the balance of payments and do not take place through non-entries.

21. This increase in the rate of return increases the investors measure of risk and might offset some of the improvement in the balance of payments, but one could argue that a variation in the rate of return brought about by a tax cut would not alter the investors appraisal of risk factors. On the other hand, this makes the standard deviation a less suitable measure of risk since it cannot distinguish between predictable and unpredictable variations in the rate of return.
22. It is also assumed that this policy does not affect any other items in the balance of payments (directly or indirectly) during the adjustment period.
23. See Harkness [3] for a discussion of the effect of monetary policy on bond prices and the supply price of capital and the ambiguity of monetary policy effects on the balance of payments.
24. The same would occur if the growth rates are equal but the U.S. net worth starts from a larger base.

References

- [1] William H. Branson, Financial Capital Flows in the U.S. Balance of Payments, Amsterdam, 1968.
- [2] H.G. Grubel, "Internationally Diversified Portfolios: Welfare Gains and Capital Flows," American Economic Review, December, 1968, pp. 1299-1314.
- [3] Jon P. Harkness, Monetary and Fiscal Policy in Closed and Open Economies -- The Portfolio Approach, (unpublished Ph.D. thesis, Queen's University), 1969.
- [4] E.E. Leamer and R.M. Stern, Quantitative International Economics (forthcoming).
- [5] C.H. Lee, The Demand for Foreign Securities and International Long-Term Capital Movements (unpublished Ph.D. thesis, University of California, Berkeley), 1966.
- [6] Ronald I. McKinnon, "Portfolio Balance and International Payments Adjustments", in Monetary Problems of the International Economy edited by Robert A. Mundell and Alexander K. Swoboda, Chicago, 1969.
- [7] N.C. Miller and M. Whitman, "A Mean-Variance Analysis of United States Long-Term Portfolio Investment." (Mimeographed), 1969.
- [8] R.A. Mundell, "The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability," International Monetary Fund Staff Papers, March 1962, pp. 70-79.
- [9] R.A. Mundell, "On the Selection of a Program of Economic Policy with an Application to the Current Situation in the United States," Banca Nazionale Del Lavoro Quarterly Review, September 1963, pp. 262-284.
- [10] M.F.J. Prachowny, A Structural Model of the U.S. Balance of Payments, Amsterdam, 1969.
- [11] James Tobin, "Liquidity Preference as Behaviour Towards Risk," Review of Economic Studies, February, 1958, pp. 65-86.
- [12] Review Committee for Balance of Payments Statistics, The Balance of Payments Statistics of the United States: A Review and Appraisal, Washington, 1965.