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DIRECT INVESTMENT AND THE BALANCE OF PAYMENTS OF THE UNITED STATES: A PORTFOLIO APPROACH

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1 INTRODUCTION

THE active control and operation of firms in other countries implied by direct foreign investment has dominated the international investment position of the United States vis-à-vis the rest of the world. At the end of 1967, 73 per cent of the long-term foreign assets owned by residents of the United States were held in the form of direct investment. On the other side of the coin, 35 per cent of foreign-owned long-term assets in the United States were in this category.

The purpose of this paper is to explain the demand for these direct-investment assets, both those arising from investments abroad by U.S. residents and those from investments in the United States by foreign residents. 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 designed to estimate the flow per period of time to those models that view an international capital flow as an attempt to close the gap between the actual and desired stock of

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assets, the latter based on optimum-portfolio models. It is unfortunate that there was a lag of approximately a decade between the appearance of general portfolio models, as drawn up by Markowitz [9] and Tobin [16], and their application to international capital assets. Nevertheless, in the recent past this lapse has been partially remedied. Theoretical investigations include the pioneering work of McKinnon and Oates [8], and other studies by McKinnon [7], Harkness [3], and Leamer and Stern [5]. Also, some empirical work on certain aspects of the problem has been undertaken by Branson [1], Grubel [2], Lee [6], and Miller and Whitman [10]. But these studies have been concerned with portfolio, or financial, investment and not with 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.

2 A MODEL OF FOREIGN DIRECT INVESTMENT

A. THE DETERMINANTS OF THE OPTIMUM STOCK

The derivation of the optimum-stock equation is based on a Tobin-Markowitz portfolio model. Assume that a corporation has a utility function, $U = U(R)$, so that $U' \gtrless 0$ and $U'' < 0$, where R is the rate of return on its wealth. It 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

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

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 types of assets, σ_{R_1} and σ_{R_2} represent some measure of the risk attached to the two expected rates of return, $\sigma_{R_{12}}$ is the covariance of

[1] The exposition will be in terms of an American firm holding assets at home and abroad. An analogous treatment of foreign direct investment in the United States would involve a foreign firm holding assets in the United States, A_1^*, and assets in the domestic economy, as well as in other countries except the United States, A_2^*.

the rates of return,[2] σ_e represents external risk factors which arise because the investment takes place in a foreign country, and W ($= A_1 + A_2$) is the total portfolio of wealth owned by the corporation, or in other words, its net worth. (Put yet another way, W represents the shareholders' equity in the corporation, which equals assets minus liabilities. Since we can derive an optimum portfolio of assets as well as of liabilities, shareholders' equity is also optimized. In the remainder of the paper, the term "assets" refers to net assets or shareholders' equity.)

This demand equation does not rely on any specific theory of direct investment. Instead, its underpinning is the eclectic assumption that corporations maximize profits under conditions of risk and subject to constraints. Kindleberger [4, pp. 389–407] summarizes a number of views on direct investment, and—although they stress different aspects of the behavior underlying international firms—it would be difficult to conceive of a theory that denies categorically the assumption made here. Nevertheless, no claim is made that equation (1) can completely capture the behavior of every corporation with foreign assets. There are times and places when other arguments (some economic, some noneconomic) enter the decision-making process and require modifications of the approach taken in equation (1). But in view of the aggregation involved in the empirical estimates in this paper, one can justifiably relegate these factors to secondary status without at the same time denying their existence. Indeed, it is not necessary to assume that every direct-investment decision is made within a portfolio framework; all that is necessary is that the decision be consistent with the predictions of a portfolio model. For instance, the specific decision for a direct-investment venture may reflect the desire to get inside a newly erected tariff wall. But this stimulus can be viewed as an increase in the expected rate of return on production abroad or a reduction in the rate of return on domestic assets. In essence, the appeal of a portfolio model of direct investment is its generality, that is, its ability to subsume a number of specific reasons for direct investment.

[2] The effect of $\sigma_{R_{12}}$ on A_1 is ambiguous. If rates of return become more harmonious, diversification in asset-holding becomes less important. In the extreme, the investor will buy only the asset with the higher expected rate of return.

There remains the argument that direct-investment assets are not sufficiently liquid to allow for alterations in a corporate portfolio to maintain its efficiency when underlying conditions change. While it is true that it is easier to create real assets than to destroy them, thus creating problems of liquidity, the same does not hold true for titles to these assets, which can be bought and sold with not much more difficulty than other long-term portfolio assets.

B. CAPITAL FLOWS AND CHANGES IN THE STOCK OF ASSETS

Once we accept equation (1) as the correct behavioral hypothesis, we encounter difficulties in translating changes in the stock of an asset into balance-of-payments entries. For illustrative purposes, assume that direct investment abroad by U.S. residents is the only capital asset. Then we can write the balance-of-payments identity as

$$B \equiv X - M + Y - S - Q, \tag{2}$$

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

$$\Delta A_1 \equiv Q + S + C, \tag{3}$$

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.

Although these "other adjustments" were quite small in most years, they have been as large as −\$953 million in 1960 and −\$916 million in 1957, 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 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 treatment of profits of branches and subsidiaries in the data compiled by the Department of Commerce. Whereas retained profits of subsidiaries are not entered in the balance of payments, retained profits of branches 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).[3]

3 EMPIRICAL ESTIMATION OF THE MODEL

A. THE GENERAL ESTIMATION EQUATIONS

Based on equation (1), the following equations will be used to estimate the optimum stock of direct-investment assets abroad owned by U.S. residents and direct-investment assets in the United States owned by foreigners:

$$D_t/W_t = \alpha_0 + \alpha_1(R_t^*/R_t) + \alpha_2(\sigma_{R^*}/\sigma_R) + \alpha_3\sigma_{R^*,R} + \alpha_4 B_{t-1} + u, \quad \text{(I)}$$

and

$$D_t^*/W_t^* = \beta_0 + \beta_1(P_t/P_t^*) + \beta_2(\sigma_P/\sigma_{P^*}) + \beta_3\sigma_{P,P^*} + \beta_4 B_{t-1} + v, \quad \text{(II)}$$

where:

D_t = stock of direct-investment assets abroad owned by United States residents, billions of dollars, end of period

W_t = value of American corporate stock, billions of dollars, end of period[4]

[3] This latter procedure has been recommended by the Bernstein Committee [14], 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.

[4] 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 American 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.

$R_t^* = Y_t/D_{t-1}$ (where Y_t is earnings on direct investment abroad by United States residents after foreign taxes but before United States taxes), in per cent

$R_t =$ after-tax rate of return on net worth in American manufacturing, in per cent

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

$\sigma_R =$ same calculation as for σ_{R^*}

$\sigma_{R^*,R} = r \times \sigma_{R^*} \times \sigma_R$ where r is the correlation coefficient for the four observations of R^* and R

$B_{t-1} =$ United States balance of payments on liquidity basis in the previous year, billions of dollars

$D_t^* =$ stock of foreign direct investment in the United States, billions of dollars, end of period

$W_t^* =$ value of corporate stock in Canada and the United Kingdom, billions of dollars, end of period[5]

$P_t = Y_t^*/D_{t-1}^*$ (where Y_t^* is the earnings on foreign direct investment in the United States), in per cent

$P_t^* =$ simple average of after-tax rates of return on net worth in Canadian and United Kingdom manufacturing, in per cent

$\sigma_P =$ same calculation as for σ_{R^*}

$\sigma_{P^*} =$ same calculation as for σ_{R^*}

$\sigma_{P,P^*} = r \times \sigma_P \times \sigma_{P^*}$

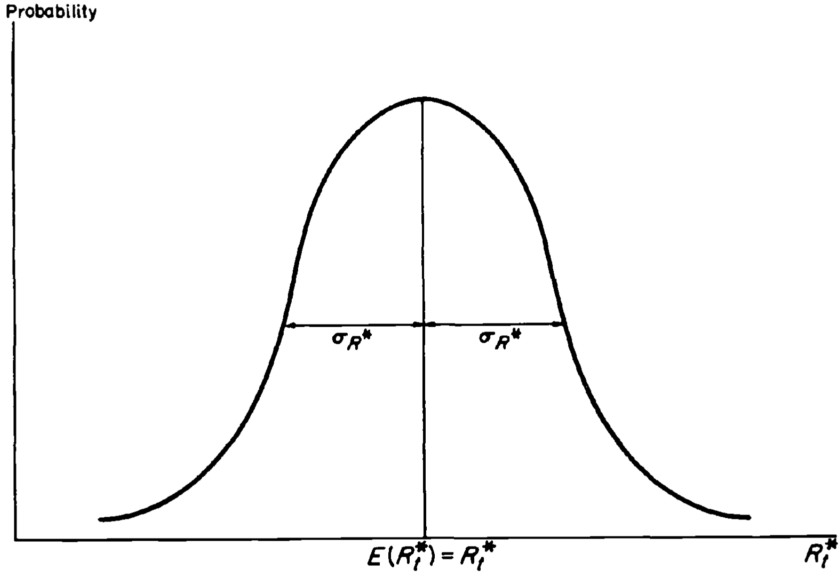
$u, v =$ disturbance terms

Before we proceed with the estimates of these equations, the form of the equation and the variables should 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

[5] 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. Canada and the United Kingdom are the largest holders of direct-investment assets in the United States. In 1967, Canada's proportion of the total was 26 per cent, and the United Kingdom owned 32 per cent. For other countries, the breakdown is as follows: Netherlands, 15 per cent; Switzerland, 11 per cent; other European countries, 13 per cent; and all other areas, 3 per cent.

FIGURE 1

Determination of Expected Rate of Return and Risk



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 examined.[6] 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 deciding how much 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 $E(R_t^*) = R_t^*$.

In determining the expected rate of return, the investor must make some projection. R_t^* cannot be known definitely until the end of the year, and yet he will be making investments on the basis of this information during the course of the year. Because of this uncertainty, and because the investor is aware of other outcomes (but all less likely to

[6] 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.

come to 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,[7] the variable for the expected rate of return is usually of the form

$$E(R_t^*) = \bar{R}^*, \tag{4}$$

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 on the present rate. One could define

$$E(R_t^*) = \bar{\bar{R}}^* = \frac{1}{\Sigma\lambda_i} \sum_{i=0}^{n} \lambda_i R_{t-i}^*, \tag{5}$$

where $\bar{\bar{R}}^*$ becomes a weighted average, with the weights decaying over time. Unfortunately, a standard deviation of such a weighted array is meaningless.[8]

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.[9,10]

[7] 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.

[8] Assume, for instance, $R_{t-i}^* = 10$ $(i = 0, \ldots, 3)$. Then $\bar{R}^* = 10$ and $\sigma_{R^*} = 0$. But if we assign weights of, say, .10, .15, .25, and .50, then $\bar{\bar{R}}^* = 10$ but $\sigma_{R^*} = 1.78$. However, it is possible to define the standard deviation as follows: $\sigma'_{R^*} = \left(\sum_i \lambda_i(\bar{\bar{R}}^* - R_i^*)^2\right)^{1/2}$ where $\sum_i \lambda_i = 1$, so that with the given observations, $\sigma'_{R^*} = 0$.

[9] 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.

[10] Ratios of the rates of return and risk variables were used rather than differences.

Finally, B_{t-1} enters the equation as a proxy variable for "external risk."[11] Aside from the variability of the rates of return, foreign investment is subject to a number of risks with no comparable counterpart in 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 balance-of-payments position of the United States will capture some of these effects. An improvement in the balance of payments implies a strengthened reserve position for the United States and a weakened reserve position for other countries. Under these conditions, the United States is less likely to devalue or impose capital controls, and other countries are more likely to take these actions. Hence an investor (domestic or foreign) will shift his portfolio to larger holdings of assets in the United States and smaller holdings of assets abroad. A deterioration in the balance of payments of the United States will, of course, have the opposite effect. 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 American and foreign owners of direct-investment assets. But this influence is neither easy to define nor easy to measure.[13] In any case, it was decided to use a dummy variable, *CONV* (1959 onwards equals 1) in both equations.

The assumption underlying this procedure is that the elasticity of the dependent variable with respect to the numerator of any independent variable is equal to the elasticity with respect to the denominator, except for sign.

[11] The question arises whether the external-risk variable influences the dependent variable directly, or through the variables for rates of return or risk, or both. The answer depends on the type of anticipated risk. Restrictions on the repatriation of earnings, devaluation, and so forth, are likely to influence the optimum stock directly, whereas changes in taxes, profit-sharing agreements, and similar measures will influence the rate of return. Since most of the relevant risks are in the first category, a separate external-risk variable is used.

[12] For a similar discussion of the use of B_{t-1}, see Miller and Whitman [10, p. 181]. However, McKinnon has pointed out that the simultaneity problem is not resolved if there is autocorrelation in the B variable.

[13] For a fuller discussion of this point, see Prachowny [13, p. 73].

B. DATA, LAGS, AND ESTIMATING TECHNIQUES

The equations for direct-investment assets will be tested with annual data for 1953 to 1964. Although flow data are available on a quarterly basis, the stock data have been compiled only on an annual basis, and because of the volatility of "other adjustments," the interpolation of nonflow data would be a dangerous procedure. [All original data and their sources are available from the author upon request.]

Portfolio theory requires that stocks of assets, and thus the total portfolio, be defined as market values. For W_t and W_t^*, market values are used, but for stocks of direct-investment assets it is likely that the series more closely approaches book value than market value, mainly because these assets rarely enter the market, and their market price is difficult to establish. This lack of symmetry in the valuation of the numerator and denominator of the dependent variable is probably the most serious problem in estimating direct investment in a portfolio framework.[14]

The lag structure in the system seems quite complicated. For new investment in fixed assets, the sequence of events would appear to be: first, the appropriation; then, the expenditure; and finally, at the end of the accounting period in which the expenditure is completed, the adjustment of the stock of assets. The length of time covered by this sequence could be two to three years. For take-overs of existing foreign firms, the time lapse may be shorter. The precise nature of the difficulty can be seen as we attempt to relate the last step in the sequence, the change in assets, to the decision-making variables (rates of return, risk, and so on), when, in fact, the causal relationship should be between appropriations and the decision-making variables. One way to sidestep this difficulty is to assume that the lags in the sequence described above are constant through time, and then to incorporate a lag structure in equations (I) and (II). But, given the shortage of degrees of freedom, the experimentation with lag structures is severely limited, and hence only a Koyck-type lag will be introduced.

[14] Various ad hoc procedures involving stock price-indexes for converting the book value of direct investment to market value were attempted without success. The fact that the Department of Commerce has not yet reported any market-value series indicates the difficulty of such conversions.

Since the optimum stock of direct-investment assets fits into the much larger framework of the foreign sector of American economic activity, 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.[15] Hence, simultaneous estimating techniques are not appropriate, and both equations will be fitted with ordinary least squares.

C. FINDINGS ON AMERICAN DIRECT INVESTMENT ABROAD

Table 1 summarizes the regression results for estimating the optimum stock of direct foreign investment by residents of the United States. First of all, it should be noted that 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 remains 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 stock of assets with the actual one.

The coefficient of the lag variable is not reported in Table 1, since in no case was it significant at the 10 per cent level. This seems to imply that in making decisions on foreign investment, the expected rates of return and other variables are projected into the future for the period in which the investment is expected to be completed. But,

[15] The interactions within the balance of payments and between the foreign and domestic sectors of the economy of the United States are more fully dealt with in Prachowny [13]. However, even within this single-equation model, it may not be quite appropriate to treat the independent variable as exogenous. For instance, an increase in direct-investment assets may reduce the rate of return. Also R^* and R are not independent, since increased foreign profits which are remitted to the parent firm also increase domestic profits.

TABLE 1

Regression Results for American Direct Investment Abroad, 1953–64

Equation	Coefficients and t-Ratios							
	Constant (1)	R_t^*/R_t (2)	σ_{R^*}/σ_R (3)	$\frac{R_t^*-\sigma_{R^*}}{R_t-\sigma_R}$ (4)	$\sigma_{R^*,R}$ (5)	B_{t-1} (6)	$\overline{R}^2$ (7)	DW (8)
I.1	.031	.032	.001		.001	.001	.13	1.19
	(1.50)	(1.69)	(.23)		(.33)	(.59)	(1.41)	
I.2	.036	.033	−.0001			.001	.23	1.27
	(1.55)	(1.93)	(.04)			(.53)	(2.07)	
I.3	.029	.037	−.0003				.29	1.31
	(1.56)	(2.51)	(.08)				(3.22)	
I.4	.036	.033				.001	.31	1.25
	(1.65)	(2.07)				(.51)	(3.49)	
I.5	.029	.037					.36	1.29
	(1.66)	(2.67)					(7.15)	
I.6	.043			.026		.001	.39	1.72
	(2.71)			(2.46)		(.36)	(4.54)	
I.7	.039			.027			.44	1.76
	(3.32)			(3.13)			(9.80)	

NOTE: Columns (1) through (6), t-ratios in parentheses. Column (7), f-ratios in parentheses. Column (8) lists Durbin-Watson statistics.

since only a Koyck lag was used, the question of lagged reactions has not been satisfactorily resolved.

Equation I.1, then, is the estimate based on the previous discussion. Since the coefficient of $\sigma_{R^*,R}$ is the least significant, it was dropped in equation I.2. Equations I.3 to I.5 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. Equations I.6 and I.7 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^*}.[16] By

[16] $R_t^* - \sigma_{R^*}$ should not be construed as a confidence limit. It will be remembered that

TABLE 2

Optimum and Actual American Direct Investment Abroad, 1965–67 [a]

Year	$\hat{k}_t$ (1)	$\hat{D}_t$ (2)	D_t (3)	$\Delta\hat{D}_t - C_t$ (4)	$\Delta D_t - C_t$ (5)	$\Delta\hat{D}_t - C_t - S_t$ (6)	$Q_t - L_t$ (7)
1965	6.65	49.40	49.42	3.37	5.01	1.83	3.34
1966	6.29	41.91	54.71	−7.42	5.36	−9.16	2.79
1967	6.38	53.90	59.27	12.03	4.60	10.45	2.62

NOTE: Billions of dollars, except column (1) which is in percentages.

DEFINITIONS OF VARIABLES: $\hat{k}_t = \widehat{D_t/W_t}$; $\hat{D}_t = \hat{k}W_t$; L_t = direct investment by American corporations financed from foreign sources. See *Survey of Current Business*, Vol. 48, No. 3 (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).

[a] Estimated values are based on the parameters of equation I.7 in Table 1.

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 adjudged superior to those of the previous equations. Equation I.7, which leaves out the external-risk variable, will be used as the final and best estimate.[17]

Having estimated the optimum stock of direct foreign-investment assets held by U.S. residents for the homogeneous period 1953–64, we are able 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 American-owned 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 all 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

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.

[17] The convertibility variable was not significant in any of the equations.

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 with the actual stock in column (3). In 1966 and 1967, the actual stock was higher than the optimum. However, comparing stocks may not be the relevant comparison, since VRP was concerned with reducing flows in the balance of payments. Thus, in column (4), the desired change in 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 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.7. Although reducing the stock of real assets through a method other than depreciation is difficult, in the case of direct-investment assets this reduction 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.[18] In addition, 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. Hence, we may compare the estimated capital outflow without VRP in column (6) with the actual *net* outflow, allowing for the foreign financing engendered by VRP in column (7).[19] The results are not 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 create firm confidence in the effect of VRP; and, in 1967, one can conclude that

[18] This is corroborated by the Department of Commerce data published on VRP. See *Survey of Current Business* (March, 1968), p. 20, Table D, although the December, 1965 statement by Secretary Connor says, "For this purpose, direct investment is defined to include the net outflow of funds from the United States plus the undistributed profits of affiliates abroad."

[19] 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.

VRP appeared to be successful in achieving its aims. But, in 1966, the prediction is for a sizable inflow, when, in fact, a net outflow of $2.8 billion took place. This result can be explained by this reasoning: the introduction of VRP caused American 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 increased them in anticipation of a higher optimum stock in future years than could be gained from the maximum allowable flows of direct investment during these later years. For the period as a whole, the "overinvestment" amounted to $5.6 billion and it may take some time and very tight constraints before firms are in a position where VRP places a burden on them.[20] 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. FINDINGS ON FOREIGN DIRECT INVESTMENT IN THE UNITED STATES

The results for the regression equations for foreign direct investment in the United States are shown in Table 3.[21] As was the case with foreign investment by United States residents, the coefficient of the lag variable was not significant, the separate risk variable in equation II.1 does not meet a priori expectations, but $\sigma_{P,P*}$ is significant. In addition, P_t/P_t^*, B_{t-1} and the convertibility variable ($CONV$) have a

[20] Since this study deals with aggregate data, one can say nothing about the burden on individual firms.

[21] The equation was tested for the period 1953–64, the cutoff being dictated by the lack of data on the Canadian component of W^* and P^* after 1964 on a basis comparable to that for earlier years.

TABLE 3

Regression Results for Foreign Direct Investment in the United States, 1953–64

	Coefficients and t-Ratios									
Equation	Constant (1)	P_t/P_t^* (2)	σ_P/σ_{P^*} (3)	$\frac{P_t - \sigma_P}{P_t^* - \sigma_{P^*}}$ (4)	σ_{P,P^*} (5)	B_{t-1} (6)	$CONV$ (7)	t (8)	$\overline{R}^2$ (9)	DW (10)
II.1	.334	−.118	−.022		.044	−.005	−.083		.94	2.18
	(5.82)	(1.58)	(1.11)		(5.41)	(.62)	(3.53)		(35.83)	
II.2	.296	.059	.011		.015	.019	.054	−.021	.98	1.62
	(8.95)	(.95)	(.81)		(1.69)	(2.59)	(1.44)	(3.87)	(101.85)	
II.3	.263	.152	.022			.026	.099	−.029	.98	2.26
	(8.62)	(4.91)	(1.59)			(4.01)	(3.19)	(9.15)	(93.06)	
II.4	.258	.162				.023	.078	−.027	.97	2.41
	(7.70)	(4.86)				(3.35)	(2.52)	(8.66)	(95.01)	
II.5	.291			.107		.023	.074	−.025	.95	1.89
	(7.47)			(3.33)		(2.52)	(1.81)	(6.19)	(55.47)	

NOTE: Columns (1) through (8), t-ratios in parentheses. Column (9), f-ratios in parentheses. Column (10) lists Durbin-Watson statistics.

sign opposite to the expected one. Because of a suspected upward bias in the time-trend of W^*, a time-variable, t, was introduced in equation II.2. This produced somewhat better results. Equations II.3 and II.4 represent other equations with the risk variables dropped one at a time. Equation II.5 combines the rate of return and risk variables, as was done in equation I.6. It is not clear, however, that equation II.5 is better than equation II.4. 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.5 is put forward as the best result.

4 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 decisions, it cannot be said that VRP has improved the balance of payments in relation to what it would have been in the absence of VRP. In order for VRP to improve the balance of payments in each period, 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 acting directly on the holdings of direct-investment assets and indirectly on the balance of payments? In a Mundellian framework [11, 12] 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 Mundell's analysis has serious limitations once it is applied to a portfolio model in a static framework. 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 continuing higher inflow (or reduced outflow). However, when wealth constraints and risk considerations enter the portfolio manager's decision, this assumption can no longer be true. At best, such a policy will result in a short-term improvement in the balance of payments; once portfolios are adjusted, the higher interest rates will have no further effect.

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 United States 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 United States and decrease the optimum stock of American-owned direct-investment assets abroad.[22] 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.

Lowering corporate taxes, for instance, increases the after-tax rate of return in the United States and thereby encourages investors to shift assets from abroad to the United States.[23] But, again, it should be emphasized that this change in the balance of payments is temporary. 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 optimum stocks or the balance of payments.[24]

On the other hand, monetary policy may not have even 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-

[22] Assume now that the adjustments to these changes in the optimum stocks are entered in the balance of payments instead of taking place through nonentries.

[23] 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 argument makes the standard deviation a less suitable measure of risk, since it cannot distinguish between predictable and unpredictable variations in the rate of return.

[24] 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.

TABLE 4

Simple Correlation Coefficients Among Interest Rates and Rates of Return

	i_{us}	r_{us}	R_t
r_{us}	.96		
R_t	.54	.35	
P_t	.35	.29	.53

NOTE: i_{us} is the annual average of Treasury bill yields; r_{us} is the annual average of interest rates on long-term U.S. government bonds.

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, as discussed here, requires a more sophisticated analysis than is now available.[25] In addition, there is little empirical evidence that all of the relevant rates of return move together. A simple correlation matrix in Table 4 indicates this.

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 flows of direct-investment capital is at best ambiguous.

No attempt has been made in this study to analyze the effects of direct investment on the balance of payments in a dynamic framework. It is obvious, however, that if the net worth of American corporations is growing faster than that of foreign corporations (assuming an equal base), then the outflows of direct-investment capital will be larger than

[25] See Harkness [3] for a discussion of the effect of monetary policy on bond prices and the supply price of capital, and of the ambiguity of the effects of monetary policy on the balance of payments.

the inflows, leading to a deficit in the balance of payments.[26] Any other dynamic changes in the independent variables will also have effects on the balance of payments. For instance, increasing the interest rate (or all relevant rates of return) can lead to higher permanent inflows of capital in the balance of payments.[27] Since elementary observation of balance-of-payments data indicates that there has been no tendency toward 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.

To conclude this paper, a word of caution is in order. It is quite evident that the data requirements for portfolio models are often not fulfilled, and thus a number of compromises with the theory have been made. There are at least two major gaps in our data requirements: (1) While flow data for the balance of payments for the United States and other countries have improved both in extent and sophistication, much more needs to be done on stock data, such as foreign assets and liabilities of American corporations, and particularly on the components that cause a change in these stocks from one period to the next. (2) Data for rates of return on capital both in the United States and abroad, derived mainly from taxation statistics, require a firmer

[26] The same result would occur if the growth rates were equal but the U.S. net worth started from a larger base.

[27] Assume a growth path of W so that $W_t = W_{t-1} + J$ ($t = 1, \ldots, m$) where J is a constant. This simple relation is used so that in the absence of a policy change the flow in the balance of payments as measured by ΔA_t will be constant. If the proportion of the portfolio assigned to an asset is k, then in any time period

$$\Delta A_t = k \cdot J. \tag{a}$$

Now, in the next time period, assume a policy instrument is applied so that there is a once-for-all increase in k to k'. Then,

$$\Delta A_{t+1} = k \cdot J + \Delta k \cdot W_t + \Delta k \cdot J, \tag{b}$$

where $\Delta k = k' - k > 0$. The first term is the same as in (a) and thus stems from growth in assets; the last two terms represent temporary increases in the flow brought about by the stock adjustment to a change in k. Assuming this adjustment to be completed, the flow in the next period is

$$\Delta A_{t+2} = k'J. \tag{c}$$

It can readily be seen that $\Delta A_{t+2} > \Delta A_t$. Hence an increase in interest rates (or any other policy change that influences k) can have a permanent effect on the level of capital flows in the balance of payments.

grounding in economic theory and greater comparability than is the case at present. In view of these deficiencies, the estimated equations are rather fragile and can best be described as first approximations of the intended structural model. As more and better data are accumulated, not only will these estimates become more robust and reliable, but also more elaborate models will become testable.[28]

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