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INVESTMENT AND FINANCIAL BEHAVIOR OF AMERICAN DIRECT INVESTORS IN MANUFACTURING

ALAN K. SEVERN · Federal Reserve Board

THIS paper integrates foreign direct investment and other activities of the American-owned, international firm. It deals with period-to-period variations in direct investment activity, rather than with the firms' average level of activity abroad. Thus, it examines the short-run impact of direct investment on selected items in the balance of payments of the United States.[1]

Since the use of parent-controlled funds is closely related to expenditures for plant and equipment abroad, an equation is estimated for such spending. Equations for two other uses of funds are also estimated; one for domestic spending for plant and equipment, and one for the parent company's dividend payments to stockholders. The immediate impact on the balance of payments of the United States is represented by capital outflows minus repatriated foreign profits (referred to here as net outflow).

The unit of observation is the firm. Within it the decision variables relate to the foreign sector, the domestic sector, or the firm as a whole. The firm has several groups of managers, whose desires are made consistent by top management. Thus, decisions of each group affect the other groups. For this reason, the equations are estimated simultaneously.

Data on the level of the individual firm show a wide range of ex-

NOTE: The author is Economist, Division of International Finance. Board of Governors of the Federal Reserve System. Opinions expressed are not necessarily those of the Board.

[1] The greatest impact of government direct-investment policy is in the short-run, since capital outflows in any given year are offset by income receipts and other balance-of-payments items in subsequent years. For a full discussion of these effects, see G. C. Hufbauer and F. M. Adler, *Overseas Manufacturing Investment and the Balance of Payments*, U.S. Treasury Department, Tax Policy Research Study Number One. Washington, U.S. Government Printing Office, 1968.

perience during a short period, allowing the researcher to ignore any institutional changes that affect all firms over a longer span.[2] At the same time, the results of this study should reflect direct investment in manufacturing in the aggregate, since the sixty-three firms in the sample account for about half of such activity by American firms.

Since the data cannot be broken down for specific foreign areas, a two-country model is required.[3] Furthermore, foreign sales include goods exported from the United States. Hence, the model is based on the theory of investment and financial behavior of the firm, rather than on the considerations of comparative advantage, tariffs, and so on, usually encountered in international economics.[4]

THE MODEL

FORMULATION of the investment equations follows the typical approach of balancing marginal efficiency against marginal cost of funds.[5] Shifts in the schedule of the marginal efficiency of investment (MEI) are determined by actual and expected increases in sales. Thus, an accelerator is used, modified by various factors affecting the cost of funds.[6] These include internal funds, competing uses of funds, debt position, and the interest rate.

[2] The difficulties of using aggregate time series are illustrated in R. E. Krainer, "Resource Endowment and the Structure of Foreign Investment." *Journal of Finance*, March, 1967, pp. 49–57. For further discussion see Alan K. Severn, "The Structure of Foreign Investment: Comment." *Journal of Finance*, December, 1967, pp. 653–654.

[3] This level of aggregation appears behaviorally appropriate in light of Stevens' findings. Basing his argument on plant and equipment equations at the subsidiary level, he rejects several variants of the subsidiary-independence hypothesis. See Guy V. G. Stevens, "Fixed Investment Expenditures of Foreign Manufacturing Affiliates of U.S. Firms: Theoretical Models and Empirical Evidence." *Yale Economic Essays*, Spring, 1969, pp. 137–198. Interview studies also suggest that authority for large capital expenditures is not delegated to the individual foreign affiliate. See A. W. Johnstone, *United States Direct Investment in France: An Investigation of the French Charges*. Cambridge, M.I.T. Press, 1965.

[4] The data used were assembled from corporate annual reports and from confidential reports to the U.S. Department of Commerce. The latter were made available to the author as an employee of the Department.

[5] See J. S. Duesenberry, *Business Cycles and Economic Growth*. New York, McGraw-Hill, Inc., 1958, Chapters 4 and 5.

[6] This form can be derived by assuming profit maximization, given demand conditions, input prices, and a production-function constraint.

The "pure" rate of interest affects the alternative cost of internal or external funds. It is the same for all firms in any given year and is controlled by time dummies; therefore, it does not enter the model explicitly.

Internal funds are income and depreciation in the domestic and foreign sectors of the firm. Although internal funds can generally be used anywhere in a firm, the decision process may be such that funds generated in a given part of the firm tend to be used in that part. In the large firm, there is usually at least one level of management between subsidiaries and top management. Authority for large capital expenditures is generally delegated to this level rather than to subsidiaries, especially if such investment can be made without borrowing or without additional funds from the parent organization. Consequently, foreign and domestic income are entered separately, current as well as lagged values being employed.[7] In the foreign-investment equation, net outflow is a cost-of-funds variable, representing the availability of parent-controlled funds for foreign investment.

Foreign and domestic income may affect investment diversely if changes in expected profits affect the marginal efficiency of investment. For example, an increase in the expected profitability of foreign investment will raise the foreign MEI schedule relative to the domestic one.

Depreciation allowances are an internal-funds variable but also represent the need for replacement investment. However, firms typically use methods of accelerated depreciation, which concentrate depreciation allowances in the early years of a capital good's service life, when replacement expenditures are least. For this reason, and because interfirm differences in durability are controlled by firm dummies, depreciation represents cost of funds, not marginal efficiency of (replacement) investment.

Investment in the rest of the firm and dividends are cost-of-funds variables, since both compete for funds with foreign investment. In the domestic-investment equation, net outflows are a substitute vari-

[7] In an annual model, income in a year may affect the realization of investment plans later in the same year. While investment can increase income and thereby bias its coefficient, this effect is offset by start-up costs, higher interest costs, and depreciation allowances (especially where accelerated depreciation is used).

able for foreign investment, since domestic investment competes with net outflow, which is, in turn, associated with foreign investment.

Leverage (outstanding debt in relation to assets) affects the cost of further debt. The effect of a given amount of leverage is peculiar to each firm, owing to differences in basic business risk, accounting definitions, and other institutional considerations.[8] These long-run factors are controlled by firm intercepts.

Marginal efficiency of investment is represented in part by changes in sales for the preceding two periods. The other marginal-efficiency variable is the firm's stock price as a proxy for expected growth of sales.[9,10] In this context, stock prices are proxies for management expectations of sales, as well as profits. Nerlove has found that ex post rates of return on investment in common stocks are associated with investment opportunities generated by growth of sales and financed by retention of earnings.[11] Since stock prices are determined directly by investors, not by management, it must be assumed that investors learn of management expectations via securities analysts and the financial press.

Stock prices are affected by extraneous factors. Still, any relation between stock prices and investment should reflect expectations of long-run increase in profits via increased sales, since income in the two succeeding years is explicitly included.[12] The usefulness of stock price as a proxy for expected sales is an empirical question: Does the

[8] Leverage is assumed to affect the firm's cost of capital, owing to institutional considerations such as margin requirements, unlimited liability, and higher cost of borrowing by individuals. These factors limit the compensating leverage by individuals, which is central to the familiar Modigliani-Miller propositions.

[9] Measured as the ratio of the price at the beginning of year $t - 1$ to average price over the sample period, adjusted for splits and stock dividends. Then a similar ratio of market averages is subtracted to control for general changes in market valuation.

[10] Share prices have frequently been used in similar contexts, for forecasting and because they may allow more reliable estimation of the effect of other variables. See, for example, R. W. Resek, "Investment by Manufacturing Firms: A Quarterly Time Series of Industry Data." *Review of Economics and Statistics*, August, 1966, pp. 322–333; Z. Griliches and N. Wallace, "The Determinants of Investment Revisited." *International Economic Review*, September, 1965, p. 325.

[11] M. Nerlove, "Factors Affecting Differences Among Rates of Return on Investments in Individual Common Stocks." *Review of Economics and Statistics*, August, 1968, pp. 312–331.

[12] Stock price should not affect investment via cost of funds, since equity financing was a small proportion of manufacturers' new financing in the sample period.

expectational component overcome the "noise" caused by extraneous elements?

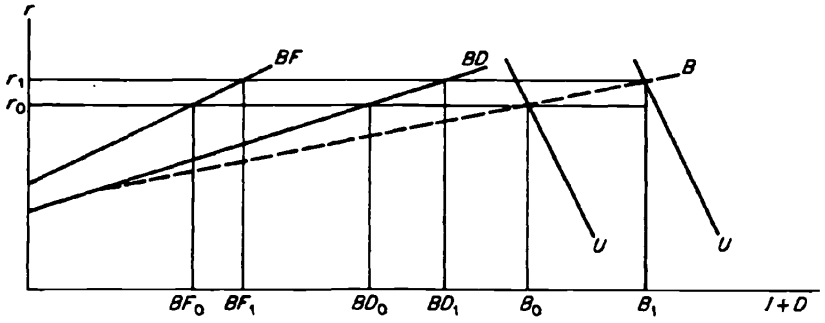
The dividend equation has the standard form of partial adjustment, in which desired dividends are a function of income and, perhaps, depreciation allowances. Current dividends depend on lagged dividends and desired dividends. In addition, debt position, domestic investment, and foreign investment, or net outflow, represent implicit cost to the firm of dividend payments. One modification completes the specification: dividends are assumed to adjust fully to expected changes in income and partially to the remaining "transitory" change.

The net-outflow variable reflects the impact of direct investment on the balance of payments of the United States. Its two components are combined, because both are determined by top management and the management of the international division. It is irrelevant to the over-all balance of payments whether capital outflows rise or repatriated profits fall. In addition, there are offsetting data errors in the two components.[13]

The net-outflow equation starts from the premise that net outflow is related primarily to fixed-asset expenditures of foreign affiliates. It is in the net-outflow equation that a direct substitution between domestic investment and an element of foreign investment is most likely. While investment in the United States is in the foreign-investment equation, these two variables are direct substitutes only insofar as (1) foreign investment is financed by a change in net outflow; (2) a given stage of production can be carried on at equal cost at home or abroad; or (3) the imputed cost of borrowing in one place is affected by the amount of borrowing elsewhere. Net outflow should have a stronger negative reaction to domestic investment than does foreign investment. This argument is based on the assumption that the firm borrows simultaneously in both domestic and foreign markets, owing to upward-sloping cost-of-borrowing schedules in both foreign and domestic capital markets. The situation is depicted in Figure 1, where the cost-of-borrowing schedules for foreign and domestic operations

[13] It must be noted that the net-outflow variable does not include all of the immediate balance-of-payments impact of direct-investment activity, let alone the cumulative effect during the years following such activity. For example, capital outflows may be matched by exports of machinery.

FIGURE 1



are shown separately as BF and BD, and their horizontal sum, B, is the cost-of-borrowing schedule for the entire firm.[14] The firm-wide cost-of-borrowing schedule is intersected at r_0 by the uses-of-funds curve U; the latter is equal to the sum of the MEI and desired-dividend schedules, less internally generated funds and decrease in cash assets. The firm then equates its marginal interest cost by borrowing amount BF_0 in the foreign market and BD_0 in the domestic market. These borrowings enter into the determination of net outflow as follows.

Assume a shift in either the domestic or foreign MEI schedule. The uses-of-funds curve shifts to U' and the firm borrows BF_1 and BD_1 in the appropriate markets, equating the imputed interest cost to r_1. Defining the difference between BF_1 and BF_0 as ΔBF, and so on, the additional amount borrowed in all markets is equal to the total change in investment:

$$\Delta B = \Delta BF + \Delta BD = \Delta I^f + \Delta I^d. \tag{1}$$

The change in net outflow can be defined either as outflow from the parent or inflow to the foreign sector:

$$\Delta F = -(\Delta I^d - \Delta BD) = +(\Delta I^f - \Delta BF). \tag{2}$$

Thus, net outflow consists of additional domestic borrowings not used

[14] For simplicity, these are represented as linear. At each level of the interest rate r, the imputed cost of foreign borrowing is determined by assuming domestic borrowing in the amount appropriate to the given level of the interest rate, and vice versa. Thus the two schedules are interdependent.

for domestic investment, or of additional foreign investment not financed by foreign borrowing.

If, for example, the domestic MEI schedule shifts rightward, domestic investment would increase and foreign investment might decrease. But net outflow would decrease by a larger amount than would foreign investment, because ΔBD is positive as the firm borrows more in both markets. Thus, the reaction of net outflow to domestic investment is the sum of the reaction of foreign investment and of borrowing. Therefore, net outflow should react more strongly to domestic investment than does foreign investment.[15]

In the net-outflow equation, only current foreign and domestic income are used, because financial decisions are assumed to be made with no appreciable lag. Finally, dividends are included as a use of parent-company funds which competes with net outflow.

The model consisting of the four equations discussed above is as follows (symbols are defined in Table 1).[16]

Foreign fixed asset expenditure:

$$I_t^f = a_0 + a_i + a_1 k\Delta S_{t-1}^f + a_2 k\Delta S_{t-2}^f + a_3 P_{t-1} + a_4 R_{t-1}^f + a_5 Y_t^f + a_6 Y_{t-1}^f + a_7 Y_{t-1}^d + a_8 I_t^d + a_9 D_t + a_{10} L_{t-1} + a_{11} F_t + b_t + u_t. \quad (3)$$

Domestic fixed asset expenditure:

$$I_t^d = a_0 + a_i + a_1 k\Delta S_{t-1}^d + a_2 k\Delta S_{t-2}^d + a_3 P_{t-1} + a_4 R_{t-1}^d + a_5 Y_t^d + a_6 Y_{t-1}^d + a_7 Y_{t-1}^f + a_8 F_t + a_9 D_t + a_{10} L_{t-1} + b_t + u_t. \quad (4)$$

Dividend policy:

$$D_t = a_0 + a_i + a_1 D_{t-1} + a_2 Y_t^d + a_3 Y_{t-1}^d + a_4 Y_t^f + a_5 Y_{t-1}^d + a_6 R_t^d + a_7 R_t^f + a_8 L_t + a_9 I_t^d + a_{10} F + b_t + u_t. \quad (5)$$

[15] The same conclusion is reached if the international division of the firm is sufficiently independent so that foreign and domestic borrowing rates are not equalized. In this case, foreign investment would be independent of domestic investment, except to the extent that it is financed by changes in net outflow. But this is an institutional argument which requires the discarding of the assumption of a profit-maximizing firm.

[16] All variables refer to firm i, but the firm subscript has been dropped to simplify the expression, except on the firm intercept (a_i) where it has been retained for emphasis.

Net outflow:

$$F_t = a_0 + a_i + a_1 I_t^f + a_2 I_t^d + a_4 Y_t^f + a_5 Y_t^d + b_t + u_t. \qquad (6)$$

These equations involve different portions of the firm. Consequently, to use cross-sectional data in estimating this model, one must control two elements of scale: size of the over-all firm, and relative foreign involvement.

The size of the firm must be controlled in order to eliminate heteroscedasticity introduced by wide variations in size. Therefore, each

TABLE 1

List of Variables

Jointly Determined

I_t^f = expenditures (gross) on fixed assets abroad
I_t^d = domestic expenditures (gross) on fixed assets
D_t = dividends paid to stockholders
F_t = net outflow (capital outflow less repatriated profits)

Exogenous

ΔS_{t-1}^f = change in foreign sales in the preceding year $(S_{t-1}^f - S_{t-2}^f)$
ΔS_{t-2}^f = change in foreign sales lagged two periods $(S_{t-2}^f - S_{t-3}^f)$
ΔS_{t-1}^d = change in domestic sales in the preceding year $(S_{t-1}^d - S_{t-2}^d)$
ΔS_{t-2}^d = change in domestic sales lagged two periods $(S_{t-2}^d - S_{t-3}^d)$
R_{t-1}^f = foreign depreciation allowances in the preceding year
R_{t-1}^d = domestic depreciation allowances in the preceding year
P_{t-1} = price of the firm's stock at the beginning of year $t-1$, as a ratio of average price during the sample period
Y_t^f = foreign income during the current period
Y_{t-1}^f = foreign income during the preceding period
Y_t^d = domestic income during the current period
Y_{t-1}^d = domestic income during the preceding period
Y_t^t = income of the entire firm during the current period
Y_{t-1}^t = income of the entire firm during the preceding period
K^f = gross fixed assets abroad at the beginning of year t
K^d = domestic gross fixed assets at the beginning of year t
K^t = total gross fixed assets at the beginning of year t
L_t = debt-equity ratio
k = ratio of gross fixed assets to sales

equation will be normalized by the appropriate capital stock, K_{t-1}; i.e., all dollar magnitudes in an equation will be divided by the capital stock of the sector to which the dependent variable refers.[17] Capital stock is used as a normalizing variable, because it is the best available measure of activity in each firm and sector. A sales variable has been used for this purpose in a similar model,[18] but sales include intermediate goods purchased from other firms or from other sectors within a given firm. Value added would be a suitable criterion, but such data are not available. The capital-output ratio, k, appears in the sales terms of the model specified above, but not in the normalized model below, because its numerator and the normalizing variable cancel out. The capital-output ratio of the foreign or domestic sector of any firm is assumed constant and equal to K_{t-1}/S_{t-1}, where capital stock and sales refer to the sector of the firm in question.[19] Therefore, the normalized sales terms are simply $\Delta S_{t-i}/S_{t-1}$, $i = 1, 2$.

The other scale problem is making the jointly determined variables mutually compatible within each firm.[20] This must be done because the proportions of domestic and foreign involvement differ among the firms in the sample. It imparts random "noise" to variables relating to other sectors of the firm, and would therefore bias their coefficients toward zero if an adjustment were not made.[21] Therefore, each jointly determined explanatory variable will be scaled by the size of the sector to which the dependent variable refers as a ratio of the size of the sector of the explanatory variable.

This scaling is justified as follows. A rightward shift in any of the desired-expenditure curves (e.g., the MEI in the investment equations)

[17] Capital stock is defined as estimated gross fixed assets at the end of the preceding year. Gross, rather than net, assets are used, owing to the vagaries of depreciation-accounting, and the dichotomy between physical decay and economic obsolescence.

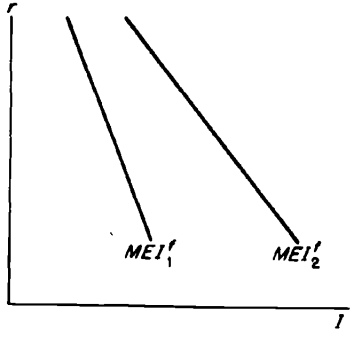
[18] Dennis C. Mueller, "The Firm Decision Process: An Econometric Investigation." *Quarterly Journal of Economics*, February, 1967, pp. 58–87.

[19] Capital-output ratios of manufacturing establishments have been observed to be remarkably stable over periods considerably longer than the six-year period used here. The inventory-sales ratio for any firm is assumed to be constant or to change in an orderly way over time.

[20] These remarks also apply to the use of income generated in the other portion of the firm as explanatory variables in the investment equations.

[21] Firm intercepts help to adjust for this "random" element, but the larger the sector to which an endogenous variable refers, the larger should be the deviations around the mean level represented by the firm dummy.

FIGURE 2



will cause all categories of expenditure to be reduced as the imputed cost of funds rises. The larger the sector in which the shift occurs, the greater will be the proportion of adjustment occurring in that sector, with a correspondingly smaller proportion falling in the others. The absolute amount of the reduction in each category depends upon the slope of the desired-expenditure curve. But the slope of such curves should be less, the larger the sector concerned.[22] In Figure 2, MEI_1^f refers to the foreign sector of Firm 1, which has foreign operations which are twice as large as those of Firm 2 (represented by MEI_2^f). If the domestic operations of the two firms are of equal size, the foreign investment of Firm 1 would be expected, on the average, to respond more strongly than that of Firm 2 to a change in the imputed cost of funds caused by a given shift in their respective domestic MEI curves. Failure to adjust for this difference would bias the coefficient of domestic investment in the first equation above (a_8) toward zero. Therefore, all firms must be adjusted to a comparable basis, regardless of the existing division of their operations between foreign and domestic activities.

The adjustment can be rationalized by assuming that the elasticity with respect to the imputed cost of funds of any desired-expenditure curve (MEI^f, MEI^d, desired dividends, or desired net outflow) is identical for all firms.[23] The coefficient of I^d in the foreign-investment equa-

[22] This is so because the MEI curve for any sector of the firm is equal to a rightward summation of the MEI curves for any of the individual establishments within the sector (after adjustment for any interdependence).

[23] Note that it is not assumed that each of the four curves has the same elasticity within

tion is equal to $\partial I^f/\partial I^d$. However, this reaction varies with the size of the foreign sector relative to the domestic, while the elasticity of foreign investment with respect to any factor causing a change in the imputed cost of funds does not. Therefore, the coefficient of I^d is converted into an elasticity by multiplying it by the relative size of the foreign and domestic sectors (K^f/K^d):

$$a_s(K^f/K^d)I^d = (\partial I^f/\partial I^d)(K^f/K^d)I^d. \tag{7}$$

Other jointly determined variables will be handled in an analogous way.

Since each equation is to be normalized (i.e., divided through) by the capital-stock variable relevant to the dependent variable, a variable relevant to another sector is simply divided by the capital stock of the sector to which it refers. That is, the capital stock relevant to the dependent variable appears in both numerator and denominator on the right-hand side of the equation, and is, accordingly, canceled out. For example, the domestic-income variable in the normalized foreign-investment equation is Y^d_{t-1}/K^d.

Several variables, namely leverage, stock price, and the intercept terms, were not expressed in dollar terms in the original single-firm equations above. If the model were estimated without normalization in cross section, these variables would be weighted by the size of the firm and sector concerned. For example, a given rise in a firm's stock price should affect domestic investment in proportion to the size of that firm's domestic sector. Here, the normalizing variable in the denominator cancels out the identical weighting variable in the numerator.

The normalized and scaled model to be estimated is as follows.

Foreign fixed asset expenditure:

$$\frac{I^f_t}{K^f} = a_0 + a_i + \frac{a_1\Delta S^f_{t-1}}{S_{t-1}} + \frac{a_2\Delta S^f_{t-2}}{S_{t-1}} + a_3P_{t-1} + \frac{a_4R^f_{t-1}}{K^f} + \frac{a_5Y^f_t}{K^f}$$
$$+ \frac{a_6Y^f_{t-1}}{K^f} + \frac{a_7Y^d_{t-1}}{K^d} + \frac{a_8I^d_t}{K^d} + \frac{a_9D_t}{K^t} + a_{10}L_{t-1} + \frac{a_{11}F_t}{K^f} + b_t + u_t. \tag{8}$$

a firm. Furthermore, the variables used to represent any of the four curves primarily determine the position of the given curve, rather than its shape. Only as cost-of-funds variables change independently of the other variables can one deduce anything about the shape of the desired-expenditure curves from empirical data.

Domestic fixed asset expenditure:

$$\frac{I_t^d}{K^d} = a_0 + a_i + \frac{a_1 \Delta S_{t-1}^d}{S_{t-1}^d} + \frac{a_2 \Delta S_{t-2}^d}{S_{t-1}^d} + a_3 P_{t-1} + \frac{a_4 R_{t-1}^d}{K^d} + \frac{a_5 Y_t^d}{K^d}$$
$$+ \frac{a_6 Y_{t-1}^d}{K^d} + \frac{a_7 Y_{t-1}^f}{K^f} + \frac{a_8 F_t}{K^f} + \frac{a_9 D_t}{K^t} + a_{10} L_{t-1} + b_t + u_t. \quad (9)$$

Dividend policy:

$$\frac{D_t}{K^t} = a_0 + a_i + \frac{a_1 D_{t-1}}{K^t} + \frac{a_2 Y_t^d}{K^d} + \frac{a_3 Y_{t-1}^d}{K^d} + \frac{a_4 Y_t^f}{K^f} + \frac{a_5 Y_{t-1}^f}{K^f}$$
$$+ \frac{a_6 R_t^d}{K^f} + a_8 L_t^- + \frac{a_9 I_t^d}{K^d} + \frac{a_{10} F_t}{K^f} + b_t + u. \quad (10)$$

Net outflow:

$$\frac{F_t}{K^t} = a_0 + a_i + \frac{a_1 I_t^f}{K^f} + \frac{a_2 I^d}{K^d} + \frac{a_3 D_t}{K^t} + \frac{a_4 Y_t^f}{K^f} + \frac{a_5 Y_t^d}{K^d} + b_t + u. \quad (11)$$

An intercept dummy for each firm (with a_0 constrained to zero) could have been employed as an alternative to the use of deviations around firm means. The two methods are equivalent, and both give results which represent short-run behavior.[24] Observation effects are common in various types of behavior, and the data used here show similar effects in the exogenous variables.[25] The legitimacy of pooling data from several cross sections depends upon whether the response of jointly dependent variables to the predetermined variables is sufficiently similar between the various years so that they can reasonably be regarded as being from the same universe.[26] An approximate covariance-test showed that such pooling was acceptable and that separate year intercepts were unnecessary. Similarly, pooling data from firms having a wide range in size was acceptable, when firm intercepts were used. Therefore, the sample was pooled across firms and years,

[24] See Lewis Schipper, *Consumer Discretionary Behavior.* Amsterdam, 1964, pp. xiii–xix.

[25] While outside the scope of this paper, the full effect of sales growth, income, and similar factors, on investment behavior could be studied by relating average investment to average levels of the exogenous variables.

[26] See A. M. Mood and F. A. Graybill, *Introduction to the Theory of Statistics* (2nd ed.). New York, McGraw-Hill, Inc., 1963, pp. 352–356.

without year intercepts.[27] Estimates were made for the period 1961–66, with a combination of publicly reported annual data and confidential OBE annual data.

Preliminary simultaneous estimation provided evidence about the effect of changes in sales on investment. Positive changes lagged one period had the expected effect on investment, while negative changes had virtually no effect; in addition, changes in sales lagged two periods had no noticeable effect. Thus, it appears that negative changes in sales were regarded as transitory. It would, therefore, be wrong to assume that investment responds positively to an increase in sales which merely offsets all or part of a preceding decline. In other words, a firm which experiences a one-period drop in sales, offset in the following period, should have the same induced investment in the subsequent period as it would have had if sales had remained constant during the two preceding periods. The absence of a reaction to negative changes in sales during one period does not imply, however, that the firm's investment will not decline if the lower level of sales persists over two or more periods.[28]

For these reasons, a revised sales-change variable was constructed. If the change in sales in the preceding period is negative, its effect on investment is constrained to zero. If positive, any decrease in the second preceding period is offset against the increase, up to the full amount of the increase in the immediately preceding period.

After normalization, the size of residuals did not appear to be associated with the size of the firm or with any of the explanatory variables.[29]

In preliminary estimates, current depreciation was not significant in the dividend and net-outflow equations, and was dropped from the model. It was already excluded from the investment equations, be-

[27] These tests were based on two-stage least-squares results. The dummy for 1966 was retained in the net-outflow equation, however, because the voluntary balance-of-payments program for that year had specific targets for the corporations covered.

[28] Given a protracted loss in sales, the firm makes an appropriate long-run adjustment in its investment behavior. This long-run adjustment is accounted for by the firm intercept.

[29] S. M. Goldfeld and R. E. Quandt, "Some Tests for Homoscedasticity." *Journal of the American Statistical Association*, June, 1965, pp. 539–541.

cause investment leads to higher depreciation allowances in the same year.

The firm's debt-asset position indicates the availability, cost, and imputed risk associated with external funds. Various forms of this leverage variable were tested, the most useful being the ratio of the book value of debt to the book value of equity (assets less debt). Owing to decision lags, the leverage variable used in the investment equations is the debt-equity ratio at the beginning of the preceding year. It is the balance-sheet position of the firm at the time when investment decisions are assumed to be made. In contrast, leverage at the beginning of the given year was used in the dividend equation, since dividend decisions can be carried out with little lag. To test this specification, the alternative variable was used in each equation, both in addition to the existing leverage variable and as a substitute for it. In all cases, the alternative was statistically less significant. Preliminary estimates also showed similar reactions of dividends to foreign and domestic income, so these variables were combined to reduce multicollinearity.

With the changes noted, the model was reestimated in two-stage least-squares, as presented in Tables 2–5.

EMPIRICAL RESULTS

FIRM dummies control the stable element of firm behavior. Their effect can be seen by comparing $\bar{R}^2$'s before and after their adoption. Only in the dividend equation do variables other than firm dummies account for more than half of the total "explained" variation in the dependent variable. Eisner describes this type of regression as "firm time-series." He argues that firms react less strongly to the transitory component of sales change, income, and so forth.[30] For example, sales-change coefficients of .25, and .18 (in the equations for foreign and domestic investment, respectively) are compatible with full adjustment to a rate of growth of sales regarded as permanent. But a time-

[30] R. Eisner, "A Permanent Income Theory for Investment: Some Empirical Explorations." *American Economic Review*, June, 1967, pp. 363–390.

series model is more appropriate to short-run balance-of-payments policy, so firm dummies are retained here. Because of the transitory nature of deviations from six-year means, the respective effects of the independent variables are more difficult to discern than they would be in pure cross-section. Therefore, any variable is retained in the model if its t-value exceeds unity and if its sign is appropriate.

Tables 2–5 each present a basic equation for one jointly determined variable, followed by alternative versions. A discussion of these four tables follows.

The basic foreign-investment equation (Version 1) includes four variables which together determine appropriations, and one variable (F) relevant to their modification. All five coefficients take the expected sign. This version is preferable to Version 4, which uses current foreign income as a modifications variable. While the availability of funds for net outflow, as represented by the endogenous variable F, is not statistically significant, it does make a small contribution to the over-all explanation of foreign investment.

The stock-price variable also makes a small contribution to this equation. This is all that can be expected. Even if the stock price is a good index of expectations, it represents those of the firm as a whole, rather than its foreign operations alone. Attempts to weight this variable by the foreign proportion of the firm's total capital stock were unsuccessful.

The debt-equity ratio lagged one period is superior to its value at the beginning of the current year, as indicated by Versions 2 and 3. This is to be expected, since the cost of funds should be more germane to capital appropriations than to realizations. The foreign-depreciation variable proved useless (Version 5), perhaps because of poor data.

Jointly determined explanatory variables other than net outflow, i.e., domestic investment and dividends, took the wrong sign (Versions 6 and 7). Thus, there is no evidence in this model that foreign and domestic investment were substitutes during the 1961–66 sample period. However, domestic investment and the use of American-controlled funds to finance foreign investment may be.

The basic domestic-investment equation (Table 3, Version 1) also has five explanatory variables. As in the foreign-investment equation, there are three cost-of-funds variables. The marginal cost of funds

TABLE 2

Coefficients for Foreign-Investment Equation[a]

Version	ΔSf_{-1}	Yf_{-1}	L_{t-1}	P	F	Additional Variable	$\bar{R}^2$ with Dummies	$\bar{R}^2$ After Dummies
1	.254	.146	−.136	.179	.122		.461	.103
	(4.699)	(1.613)	(−2.961)	(1.572)	(1.113)			
2	.273	.154		.189	.202	L_t : −.097	.457	.096
	(5.056)	(1.693)		(1.653)	(1.968)	(−2.454)		
3	.259	.139	−.108	.191	.113	L_t : −.060	.462	.105
	(4.775)	(1.526)	(−2.148)	(1.678)	(1.028)	(−1.380)		
4	.249	.099	−.158	.168		Yf_t : −.014	.459	.100
	(4.589)	(1.176)	(−3.835)	(1.481)		(−.203)		
5	.253	.147	−.133	.180	.127	Rf_{t-1} : .073	.460	.101
	(4.650)	(1.616)	(−2.869)	(1.582)	(1.145)	(.300)		
6	.246	.093	−.138	.031	.093	I_t^d : .288	.464	.108
	(4.541)	(.969)	(−3.018)	(.218)	(.841)	(1.760)		
7	.252	.104	−.137	.103	.085	D_t : .267	.462	.104
	(4.661)	(1.073)	(−2.982)	(.801)	(.751)	(1.224)		

NOTE: The column labeled "$\bar{R}^2$ After Dummies" in Tables 2 through 5 indicates the proportion explained of variation remaining after adjustment for interfirm differences. The "$\bar{R}^2$ with Dummies" column is the proportion explained of the original variation, adjusted for number of firms and explanatory variables other than dummies.

[a] With implicit firm dummies; t-values in parentheses.

TABLE 3

Coefficients for Domestic-Investment Equation [a]

Version	ΔS^d_{t-1}	P	Y^d_{t-1}	Y^f_{t-1}	Y^d_t	Additional Variable	$\bar{R}^2$ with Dummies	$\bar{R}^2$ After Dummies
1	.177	.188	.129	.115	.204		.603	.304
	(3.990)	(2.365)	(1.621)	(2.498)	(3.496)			
2	.178	.190	.127	.117	.204	L_{t-1} : −.008	.602	.302
	(3.997)	(2.382)	(1.588)	(2.513)	(3.499)	(−.312)		
3	.178	.189	.127	.115	.204	L_t : −.002	.602	.302
	(3.875)	(2.350)	(1.562)	(2.497)	(3.489)	(−.100)		
4	.173	.167	.124	.111	.215	R^d_{t-1} : −.416	.605	.307
	(3.912)	(2.086)	(1.558)	(2.404)	(3.671)	(−1.682)		
5	.171	.184	.132	.112	.199	I^f_t : .034	.602	.302
	(3.678)	(2.301)	(1.653)	(2.393)	(3.358)	(.396)		
6	.169	.174	.122	.138	.225	F_t : −.053	.602	.303
	(3.689)	(2.145)	(1.527)	(2.760)	(3.472)	(−.745)		
7	.153	.201	.196	.086	.256	D_t : −.325	.603	.304
	(3.147)	(2.508)	(2.005)	(1.438)	(3.496)	(−1.179)		

NOTE: See note to Table 2 for definitions.

[a] With implicit firm dummies; t-values in parentheses.

(to the firm as a whole) should be a more important determinant of investment when the marginal efficiency of investment is relatively elastic. In the domestic-investment equation, the three cost-of-funds variables all represent income, i.e., internally generated funds, while leverage has no discernible effect. This suggests that domestic marginal efficiency was more elastic at the lower imputed cost of funds represented by internally generated funds than at the higher marginal cost represented by reliance on external funds. Neither of the internal-funds variables (F_t and Y^f_{t-1}) in the basic foreign-investment equation was statistically significant, while leverage was highly significant. Thus, the opposite pattern of elasticity appears to hold for foreign investment. The fact that domestic income did not affect foreign investment, although foreign income affected domestic investment, can be explained by a foreign MEI curve which was less elastic than its domestic counterpart in the lower range of expected return on investment.

The positive effect of foreign income on domestic investment[31] also tends to refute the "gambler's winnings" hypothesis of Barlow and Wender.[32] Funds available throughout the corporation are balanced against requirements of the firm as a whole.

In general, the foreign MEI appears to be less elastic than the domestic MEI. For the sample, the mean change in annual sales was 9.7 per cent for foreign operations and 5.4 per cent for domestic. This difference is reflected in a larger sales-change coefficient in the foreign-investment equation. A larger proportion of domestic investment than of foreign investment appears to have been motivated by factors other than increasing demand. If one assumes that there was a lower imputed rate of return on such investment, the result is a short-run function for domestic MEI of the hypothesized shape: more elastic at low levels of expected return.[33]

[31] Foreign income could be a proxy for foreign sales; and foreign sales affect the demand for parts, components, and finished goods supplied by the parent. Therefore foreign income could be a proxy for a domestic demand variable. Such was not the case, however, since lagged foreign-sales change was clearly insignificant when added to the basic U.S. investment equation, while lagged foreign income retained its significance.

[32] E. R. Barlow and I. T. Wender, *Foreign Investment and Taxation.* Cambridge, Harvard Law School International Program in Taxation, 1955, p. 161.

[33] This assumption results from the firm's flexibility in the timing of such investment. Ultimately, all investment is made to reduce costs, but the added cost of postponing the replacement of obsolete or worn-out capital goods should be less than the cost of foregoing additional sales.

In contrast, most of the foreign MEI curve appears to reflect investment induced by changes in sales, with the greater elasticity at high rates of return reflecting expansion to take advantage of increased demand.[34] If the foreign affiliates of American firms tend to specialize in technologically advanced products and to operate in oligopolistic markets, as Vernon and Hymer, respectively, have claimed,[35] then cost-reducing investment should be relatively less important for foreign investment.

Thus it appears that as a low firm-wide marginal cost of funds rose, owing to an upward shift in the cost-of-funds schedule, the largest proportional reduction of investment expenditures occurred in the domestic sector. As it continued to shift upward, the cuts were more nearly equal; during the sample period, domestic reductions may still have been proportionately larger, owing to the greater elasticity of the domestic MEI schedule, in general. Finally, as the cost of funds rose to the highest observed levels, the foreign sector incurred the larger proportional reductions in investment.

The stock-price variable, representing expected sales, was significant in all versions of the domestic-investment equation. Omitting this variable (not shown) raised the coefficient of the lagged (but not current) income terms, owing to collinearity between stock price at the beginning of year $t - 1$ and income during that year. Stock price appears partially to reflect expectations of short-run changes in income. But its significance in the presence of lagged income variables suggests that it also reflects longer-term sales expectations.

The depreciation variable takes an unexpectedly negative sign (Version 4). This result probably stems from depreciation accounting practices and from firm dummies which control interfirm differences in such practices. Since the depreciation variable represents deviations around firm means, the effect of consistently high depreciation allowances (i.e., of high replacement requirements) is reflected in the firm

[34] Take-overs of existing firms are excluded from the data; hence they are not reflected in the implied MEI curves.

[35] R. Vernon, "International Investment and International Trade and the Product Cycle." *Quarterly Journal of Economics*, May, 1966, pp. 190–207; S. Hymer and R. Rowthorn, "Multinational Corporations and International Oligopoly: The Non-American Challenge," in C. P. Kindleberger, ed., *The International Corporation*. Cambridge, M.I.T. Press, 1970, pp. 57–91.

TABLE 4

Regression Coefficients for Dividend Equation [a]

Version	L_t	D_{t-1}	Y_t^f	Y_{t-1}^f	I_t^d	F_t	Additional Variable	$\bar{R}^2$ with Dummies	$\bar{R}^2$ After Dummies
1	−.013	.674	.189	.100	−.034	−.016		.987	.845
	(−2.477)	(18.499)	(10.961)	(4.082)	(−1.191)	(−1.503)			
2	−.014	.674	.188	.099	−.032	−.013	L_{t-1} : .004	.987	.845
	(−2.500)	(18.487)	(10.877)	(4.029)	(−1.105)	(−1.105)	(.595)		
3	−.016	.679	.187	.096	−.005		I_t^f : −.045	.988	.846
	(−2.952)	(18.678)	(11.138)	(3.934)	(−.177)		(−2.415)		

NOTE: See note to Table 2 for definitions.

[a] Including implicit firm dummies; t-values in parentheses.

TABLE 5

Regression Coefficients for Net-Outflow Equation [a]

Version	Y_t^f	Y_t^d	I_t^f	I_t^d	D_t	1966 Dummy	$\bar{R}^2$ with Dummies	$\bar{R}^2$ After Dummies
1	−.494	.948	.453	−1.608	−.559	.230	.403	.080
	(−3.788)	(3.714)	(1.704)	(−3.259)	(−.823)	(1.168)		
2	−.513	.918	.441	−1.281	−.766		.403	.079
	(−3.963)	(3.612)	(1.660)	(−3.150)	(−1.168)			

NOTE: See note to Table 2 for definitions.

[a] Including implicit firm dummies; t-values in parentheses.

intercepts. Reestimation without firm intercepts showed that this was true in both investment equations. The depreciation coefficients were close to unity and highly significant statistically. At the same time, many of the sample firms used accelerated depreciation accounting, whereby a large portion of the price of a capital good is allocated to cost during the early years of its expected service life.[36] Thus higher-than-average depreciation allowances reflect higher-than-average investment in prior years. Therefore, the depreciation variable used may reflect investment in previous periods, taking the negative sign which one would expect.

The coefficient of foreign investment is insignificantly positive (Version 5), with little effect on the coefficients of other variables. This result supports the conclusion that there is no evidence that foreign and domestic investment were substitutes during the sample period. The apparent lack of substitution may result from high cash flow and relatively low interest rates during this period, combined with the relatively slow growth of domestic demand noted above. A different set of domestic circumstances during this time might well have resulted in a noticeably negative relationship between foreign and domestic investment.

While the coefficient of foreign investment is nonsignificant and positive, the outflow variable at least takes the right sign, although it is not significant (Version 6). Nor is the dividends variable significant, though, again, the sign is as expected (Version 7).

The dividend equation is generally consistent with the results obtained by other authors.[37] The point estimates of Version 1 (Table 4) imply a reaction speed of .326, a desired payout ratio of .580, and a coefficient of expected change of income of .256. These estimates appear reasonable, except for the implied coefficient of the expected change of income. The firms in the sample experienced an average

[36] This bunching of depreciation allowances in the United States was furthered by the shorter service-lives allowed from 1962 on.

[37] For example, Fama and Babiak used unpooled annual firm time-series, 1946–64, to estimate Version 1, less leverage and the endogenous variables. Their median coefficients were .598 for lagged dividends, .150 for current income, and .043 for lagged income. They also found small and erratic coefficients for a depreciation variable. See E. F. Fama and H. Babiak, "Dividend Policy: An Empirical Analysis." *Journal of the American Statistical Association*, December, 1968, pp. 1139–1140.

increase in income of 12.7 per cent per year, about half as large as the expected increase implied by the estimates of Table 4. Since the expected-income-increase coefficient is derived from the coefficients of Y_t, Y_{t-1}, and D_{t-1}, its sampling error is large enough to include the rate experienced.[38] As a test for the effect of data and sampling error, it would be desirable to estimate 1967 dividends for comparison with realized dividends, or to estimate the model with an entirely new set of firms. Both of these approaches are ruled out by lack of suitable data.

Leverage at the beginning of the current year also helped to explain dividends, while lagged leverage did not (Version 2). Domestic investment and outflow take the expected negative sign but are not statistically significant.

This equation thus supports the finding by Fama and Babiak that dividend policy is based more on permanent, than on transitory, changes in income;[39] in addition, balance-sheet position is a useful, but secondary, determinant of dividends.[40] The dividend equation also suggests (inconclusively) that expansion of foreign operations may inhibit dividend payments.

In the net-outflow equation (Table 5), all coefficients but one have the expected sign, although the explanatory power of the equation is low. As in the foreign-investment equation, most of the total variation accounted for is attributable to the firm intercepts. Thus, a large proportion of corporate behavior with respect to foreign operations reflects the influence of long-run factors peculiar to each firm; such behavior is only marginally influenced by macroeconomic policy as it impinges on the firm in the short run.

The two income coefficients together suggest that at the margin, in the absence of capital controls, corporations allocate funds without regard to origin. The coefficient of domestic income implies that in-

[38] This result might also be due to a more complicated lag structure, which would require additional lagged values of income and/or dividends to estimate. Such data are not available, so no such model was formulated here.

[39] Fama and Babiak, *op. cit.*, pp. 1139–1140.

[40] Brittain found that liquidity (cash plus government securities) and realized investment were useful in explaining target payout over time. Since liquidity is an offset to debt, leverage and liquidity both represent ability to make dividend payments without incurring further debt. See J. Brittain, *Corporate Dividend Policy*. Washington, The Brookings Institution, 1966, p. 186 and *passim*.

creases in domestic income are allocated in approximately equal proportion to foreign operations, with the remainder being divided between domestic operations and dividends. Thus, changes in current income were allocated to foreign operations in an amount more than proportionate to their size. This allocation of funds reflects the fast growth of the foreign sector relative to the domestic sector; it represents a shift in the relative share of financing from foreign external funds (or retained earnings) to domestic internal funds (since foreign income is included separately in the equation). The reaction of net outflow to current domestic income represents primarily a shift in financing, not a modification of foreign investment plans. This follows from the finding that when current domestic income is added to the basic foreign-investment equation, its coefficient is a nonsignificant .096.

On the other hand, the elasticity of net outflow with respect to current foreign income is −.494. Thus, foreign affiliates were allowed to retain just over half of every additional dollar of income earned abroad. Since the short-run reaction of dividends to income is only .189, this implies that .317 of changes in foreign income were used for general corporate purposes other than dividends.

The dummy variable for 1966, representing the "voluntary balance-of-payments program for direct investment," takes an unexpectedly positive sign. Most of the firms in the sample were in the program. Apart from sampling or data error (the coefficient is not significant), this result must be attributed either to accelerated outflows in anticipation of tighter controls and/or to outflows not reported. A newspaper article suggested that part of the errors and omissions item in the balance of payments represented capital outflow: "Monetary specialists suspect that some companies not only don't report all their investments abroad but actually go to some length to conceal them—so as not to advertise their unwillingness to comply with the Administration's guidelines for restraint."[41] Since most of the net-outflow data used here are derived from annual reports, rather than from data submitted to program authorities, such "hidden" outflows are likely to be included.

[41] "Missing Dollars," *Wall Street Journal*, May 4, 1967, pp. 1, 22.

Domestic investment has a more-than-proportionate negative effect on net outflow. In contrast, domestic investment took a positive sign in the foreign-investment equation. Thus the relationship of substitution of net outflow with domestic investment expenditures is stronger than that between investment expenditures abroad and at home. The fact that the coefficient for domestic investment exceeds unity in the outflow equation, while there is no negative reaction between foreign and domestic investment, suggests that foreign borrowing rises more than in proportion as domestic investment rises.

The reaction of net outflow to foreign investment is a near-significant .453, indicating that, at the margin, about 55 per cent of foreign expenditures for plant and equipment are financed from sources other than capital outflows and/or reduction in repatriated earnings. Since such expenditures were far too large in the sample period to be financed by liquid assets abroad, and since virtually no equity financing was used there, this result suggests that foreign debt financing was quite important. For all foreign direct investment in manufacturing (of which the sample accounts for about half), the mean ratio of capital outflow to foreign expenditures for plant and equipment during the 1962–65 period was .357. Since profit repatriation undoubtedly responds at the margin to foreign investment, the average and marginal reactions of net outflow to foreign investment appear to be of the same order of magnitude. When the same equation is estimated with no allowance for individual-firm intercepts, the reaction of net outflow to foreign investment is .575; thus firms which are expanding abroad rapidly tend to finance a larger proportion of this expansion with funds from domestic sources.

The reaction of net outflow to dividends was negative but not statistically significant. However, the relationship is slightly stronger when the 1966 dummy is omitted (Version 2, Table 5). Apart from its statistical significance, this fact hints that, in 1966, in the context of tighter money and capital markets, firms increased capital outflows at the expense of dividends.

SIMULATIONS

GIVEN the model as discussed above,[42] its implications for balance-of-payments policy of the United States are now explored by simulations based on two sets of assumptions about domestic macroeconomic policy.

Several qualifications must be made about any simulation. First, the model is one of short-run reaction to developments at the level of the individual firm. The policies simulated must be those which are likely to be perceived as transitory by management, and macroeconomic policy leads to interactions among firms that may strengthen or weaken its effect on the jointly determined variables. For example, Eisner demonstrates that changes in demand which affect an entire industry have a stronger effect on investment than do changes which affect only one firm.[43] On the other hand, changes in the desired investment of an entire industry or economy lead to supply constraints in the capital-goods industry, thereby offsetting all, or part, of additional investment planned. For lack of further information, such interactions are assumed to have a zero net effect on the jointly determined variables. Second, policy changes which affect the manufacturing sector in the United States also affect the rest of the domestic economy, as well as the world economy. For example, changes in foreign investment affect the level of economic activity abroad through foreign demand for capital goods; in addition, changes in domestic demand affect imports, thereby affecting indirectly foreign demand for the products of American affiliates abroad, as well as for exports from the United States. Third, any defects in the model used clearly affect the simulation results. Arbitrary choices had to be made about data, specification, and estimation. In particular, capital movements were relatively free during the 1961–66 period, and foreign investments of American firms grew rapidly, partly because of the establishment of the European Common Market. For these reasons, the results pre-

[42] The order condition for identification did not indicate that the structure of the model was inappropriate to the jointly determined variables under consideration. See J. Johnston, *Econometric Methods*. New York, McGraw-Hill, Inc., 1963, pp. 240–264.

[43] R. Eisner, *op. cit.*

sented below must be regarded merely as indicative of orders of magnitude.

As a control solution for comparison, the model consisting of Version 1 of each equation (Tables 2–5) was simulated on the basis of mean values of all predetermined variables. Since these variables are ratios, it was not necessary to adjust for growth within the sample period.

The first policy assumption is that the economy of the United States was allowed to go into a brief recession comparable to that of 1960–61, except that full recovery is assumed to have taken place by the end of the year. Simulations were made for the recession year and the following year, since some of the predetermined variables are lagged. Sample means for 1961 were used in place of over-all means for current or lagged values, as appropriate. For example, ΔS^d_{t-1} went from its mean of .054 to a recession value of .022, and Y^d_t went from .160 to .140.[44]

The resulting effect on net outflow is small (Table 6). Based on capital stock at the beginning of 1961, the net effect is about $2.4 million for all foreign direct investment in manufacturing. In comparison, the balance-of-payments deficit of the United States (liquidity basis) for 1961 was $2.4 *billion*. The effect of the simulated recession on net outflow is a combination of a large decrease in net outflows during the recession year, followed by a larger increase in the following year. Outflows decrease with income during the recession year; this offset outweighs the positive effect of current declines in dividends and domestic investment. But outflows rise in the following year as a result of the lagged decrease in investment and dividends. Thus, this model does not suggest that the level of economic activity in the United States has a strong effect on the balance of payments by means of direct investment outflows and repatriated profits.

The second set of policy assumptions involves a one-year surcharge on the corporate income tax. It is assumed that a 10 per cent surtax was imposed early in the given year, retroactive to the beginning of the year, in order to allow added government expenditures without raising prices or interest rates. Additional government pur-

[44] These numbers are small because they are expressed as normalized ratios (of sales level or capital stock, as appropriate).

TABLE 6

Policy Simulations
(*ratios of dollar values to the appropriate capital stock*)

Variable	Control Solution	Current Reaction	Lagged Reaction	Average Reaction	Average Reaction Less Control Solution
			1. Brief Recession		
I^d	.1074	.1033	.0998	.1016	−.0058
I^f	.1268	.1257	.1283	.1270	.0002
D	.0875	.0797	.0834	.0816	−.0059
F	−.0367	−.0452	−.0215	−.0384	−.0017
			2. One-Year Corporation Income Tax Surcharge[a]		
I^d	.1074	.1038	.1056	.1047	−.0027
I^f	.1268	.1254	.1276	.1265	−.0003
D	.0875	.0819	.0814	.0816	−.0059
F	−.0367	−.0430	−.0300	−.0365	.0002

[a] Partially offset.

chases are assumed to offset the decline in sales of investment goods. These policies should increase outflows in other capital accounts in the balance of payments, in comparison with a reliance on tighter monetary policy. But there is no effect on the capital outflows and repatriated profits of manufacturing firms. The decline in internally generated funds is offset, in both years, by lower dividends and domestic investment than would otherwise have occurred. Since these compete with net outflow for available funds, a larger proportion of such funds is available for foreign affiliates.

Thus, within the qualifications discussed above, there is little apparent impact of domestic economic policy on the United States balance of payments via direct investment in manufacturing.

This negative result occurs despite the positive coefficient of domestic income in the net-outflow equation. This contrast occurs because domestic policy affects net outflow both directly, through the

domestic income variable; and indirectly, through other jointly determined variables (domestic investment and dividends).

One must recall, however, that the model was estimated for a period in which foreign economic activity was growing rapidly. The accelerator influence was stronger in the foreign-investment equation than in its domestic counterpart, suggesting that American firms gave high priority to foreign capital requirements while cutting back, if necessary, on domestic uses of funds. Clearly, the short-run reaction to economic policy might have been different if foreign demand had been rising less strongly relative to domestic demand.

Also relevant is the fact that the model deals with short-run reactions. For example, a fiscal stimulus expected to be permanent, such as a tax cut carried out in two or more annual instalments, should have a negative impact (via dividends and domestic investment) on net outflow which outweighs the positive effect via domestic income.

For these reasons, and also because of interactions among firms and the indirect effects of investment activity, the finding of negligible impact of domestic economic policy on direct investment outflows must be regarded as a highly tentative conclusion, limited to the institutional and economic circumstances prevailing in the early 1960's.

CONCLUSIONS

THE following conclusions can be drawn about the corporate decision process as it bears on foreign investment and other corporate actions:

1. Only a small portion of the variation in investment and financial behavior of firms can be attributed to year-to-year variation in financial variables at the firm level. About twice as much of the variation in foreign investment and net outflow can be explained by the levels of such financial variables, as opposed to their year-to-year changes. For dividends and domestic investment, however, year-to-year variations explained nearly as much as did levels. Thus, the distinction between "permanent" and "transitory" elements of income,

sales increase, and other factors, was even more important for foreign operations than for over-all investment or dividends. But separate tests, not shown above, indicate that firm dummies account for more than differences in the average levels of the variables.

2. Little substitution is evident between foreign and domestic investment. Both variables take a positive sign but are not statistically significant in the corresponding equations. It is interesting to note, however, that firm intercepts control various factors common to both foreign and domestic investment (e.g., rate of technological progress). Without them, the investment coefficients become positive and significant in the investment equations.

3. There is considerable flexibility in financial behavior, with respect both to shifting of funds across national boundaries and to utilization of external sources of funds when justified by prospective return of investment.

Several strands of evidence support this conclusion. First, the sum of the reaction of net outflow to foreign investment and that of foreign investment to lagged foreign income is only .6, leaving the remainder to be accounted for by current, retained foreign earnings, foreign external funds, and reduction of liquidity abroad. Second, foreign and domestic investment do not appear to be substitutes, yet net outflow has a strong negative reaction to domestic investment. This combination of results suggests that when total investment exceeds internally generated funds less dividends, firms reduce net outflows and compensate by increased use of foreign external funds or by reducing cash balances abroad. Finally, foreign income affects domestic investment, and domestic income affects net outflow; these results confirm the expectation that, in the absence of controls, firms allocate funds without regard to national origin.

4. At the same time, however, changes in the domestic economic circumstances of individual firms appear to have little direct impact on the balance of payments of the United States, since domestic liquidity offsets the substitution between net outflow and domestic investment plus dividends.

5. The performance of the chosen proxy for sales expectations (stock prices) is striking. Its coefficients are quite similar in the two

investment equations, and its statistical significance in the domestic investment equation undoubtedly results from the fact that domestic operations are usually larger than foreign.

6. The relative performance of internal funds, external funds, and marginal efficiency as variables in the two investment equations confirms previous theoretical and empirical work on the subject.[45] Given the rising demand experienced by direct-investment enterprises, only lagged foreign income and net outflow (a proxy for current availability of funds) contributed to the foreign-investment equation, and neither was statistically significant. On the other hand, all income variables, except current foreign income, were useful in explaining domestic investment.

In contrast, the imputed cost of external funds was useful only in the foreign-investment equation, where the reaction to increases in sales was also stronger than in the domestic-investment equation.

7. Domestic investment appears to affect dividend payments, but the converse appears to be true only to a smaller extent. The reason apparently lies in the greater lag in decision-making about investment than in dividend policy. As each quarterly dividend decision is made, the firm considers competing claims on available resources, including previously planned investment projects. As these projects are in the process of completion, there is little flexibility, since the firm has contractual commitments to make specified payments. But as investment appropriations are made, there is no immediate impact on dividend payments, except to the extent that the firms set aside financial resources pending completion of such projects.

In summary, this study shows that methods of investigation typically applied to domestic investment also apply to foreign investment, although the latter varies even more widely among firms. Foreign and domestic investment are interrelated primarily through the financing mechanisms used, whereby top management allocates internally generated funds in such a way as to maximize profit; thus, in the absence of controls, the multinational firm freely allocates funds across national borders.

[45] For example, J. S. Duesenberry, *Business Cycles and National Income*, New York, McGraw-Hill, Inc., 1958, Chapters 4 and 5. J. R. Meyer and E. Kuh, *The Investment Decision*, Cambridge, Harvard University Press, 1957. J. P. Bennett, "Cyclical Determinants of Capital Expenditures," *Southern Economic Journal*, January, 1966, p. 340.