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# THE REAL EXCHANGE RATE AND FOREIGN DIRECT INVESTMENT IN THE UNITED STATES: RELATIVE WEALTH vs. RELATIVE WAGE EFFECTS

Michael W. Klein

Eric Rosengren

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## ABSTRACT

There has been a significant correlation between United States inward foreign direct investment and the United States real exchange rate since the 1970s. Two alternative reasons for this relationship are that the real exchange rate affects the relative cost of labor and that the real exchange rate alters relative wealth across countries. In this paper we explore these alternatives by examining the determinants of four measures of inward foreign direct investment to the United States from seven industrial countries over the period 1979 to 1991. We find strong evidence that relative wealth significantly affects U.S. inward foreign direct investment. We find no evidence that relative wages have a significant impact on the determination of U.S. foreign direct investment. These results are robust to the choice of countries in our sample and when controlling for changes in tax codes.

Michael W. Klein
The Fletcher School of Law
and Diplomacy
Tufts University
Medford, MA 02155
(617) 628-7010
and NBER

Eric Rosengren
Research Department
Federal Reserve Bank of Boston
Atlantic Avenue
Boston, MA 02067
(617) 973-3090

There has been a striking correlation between inward foreign direct investment (FDI) in the United States and the value of the dollar over the past dozen years. Foreign direct investment in the United States has tended to decrease with a strong dollar and increase with a weak dollar.[1] A recent manifestation of this phenomenon saw a threefold increase in United States foreign direct investment accompanying the 60 percent depreciation of the dollar between 1985 and 1988. This dramatic increase in the foreign ownership of United States land and capital has been a source of public concern and has fueled popular press reports of the "selling of America".[2]

Attention has naturally been drawn to the relationship between the exchange rate and foreign direct investment. There are several channels through which the exchange rate may affect FDI. Froot and Stein (1991) emphasize the effects of currency movements on relative wealth across countries and the consequences of this for FDI when there are capital market imperfections. In their model, a firm's wealth determines the amount it may bids on assets when there are informational imperfections which limit its leverage. In this case, currency movements affect FDI by altering the relative wealth of firms across countries. A real depreciation favors foreign purchasers of domestic assets and is associated with an increase in inward foreign direct investment, and conversely for a real appreciation.

An alternative and more traditional explanation for the link between the exchange rate and

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[1]This correlation is not due to a general growth in United States assets held abroad. Froot and Stein (1991) find that foreign direct investment is significantly correlated with the value of the dollar but foreign investment in U.S. Treasury bills, foreign portfolio investment in stocks and bonds, and foreign official asset holdings are not significantly correlated with the value of the dollar.

[2]A careful review of the data shows that the extent of foreign control of domestic assets in the United States, while increasing, is still below the level found in other industrial countries (Graham and Krugman 1991).

foreign direct investment focuses on the effect of currency movements on relative labor costs. In this framework, FDI represents capital seeking relatively cheap labor. Relative labor costs among industrial countries have been largely determined by currency movements during the floating exchange rate period. Thus, a depreciation of a country's currency is associated with an increase in its inward foreign direct investment and coversely an appreciation is associated with a decrease. Empirical research supporting this hypothesis includes Cushman's (1985, 1987) studies of outward United States FDI to five industrial countries and Culem's (1988) research on bilateral flows of direct investment among six industrial countries.

An open question is whether the exchange rate affects United States foreign direct investment through the relative wage effect or through the relative wealth effect.[3] Evidence presented by Froot and Stein (1991) demonstrating a significant correlation between currency movements and United States inward foreign direct investment suggests the important role played by the exchange rate in determining FDI. These correlations, however, provide only a weak confirmation of their hypothesis since they are also consistent with the role relative labor costs may play in determining FDI. Exchange rate movements have been largely responsible for both relative wage and relative wealth movements between the United States and other industrial countries over the floating exchange rate period. It also possible, therefore, that the wage variable used in other studies of FDI has served as a proxy for relative wealth.

In this paper we investigate the source of the relationship between United States foreign

[3]The focus of this paper is the effect of the *level* of the real exchange rate on foreign direct investment. Another possible channel is that the *variability* of the real exchange rate affects foreign direct investment. Cushman (1985) investigates this possibility for bilateral United States foreign direct investment to Canada, France Germany and the United Kingdom over the period 1963 to 1978.

direct investment from seven industrial countries between 1979 and 1991 and the respective bilateral dollar real exchange rates. We identify variables that enable us to distinguish between the cost-of-labor and the relative wealth hypotheses and include these in regressions on a variety of types and measures of United States foreign direct investment. These empirical results support the relative wealth hypothesis but not the cost-of-labor hypothesis. We demonstrate that these results are robust to the sample of countries and when controlling for changes in tax codes.[4]

[4]The focus of this paper is more narrow than an attempt to distinguish among the broadly differing explanations concerning the determination of FDI. There are several strands in the theory of the determination of FDI. The industrial organization approach considers a wide range of reasons that a foreign firm may value domestic assets more highly than a domestic firm. These include managerial advantages, superior marketing abilities, or product and process technology advantages (see Caves 1971 for a summary of these arguments). Empirical work suggested by these theories includes industry-specific empirical studies (e.g. Gordon and Fowler 1983), studies using highly disaggregated firm data (e.g. Grubaugh 1987), or case studies (e.g. the discussion in Graham and Krugman (1991) of color televisions, automobiles and banking). The focus of the imperfect-capital-market theory of foreign direct investment is not whether foreign firms value domestic assets more highly than domestic firms, but rather which type of firm is better positioned to bid on an asset which both domestic and foreign firms value similarly. A second strand of research, on the effects of taxes on FDI, includes work such as that by Hartman (1984), Dunning (1985), Boskin and Gale (1987), Scholes and Wolfson (1988), Slemrod (1989) and Swenson (1989). In Section 3 we attempt to control for tax effects. Other explanations include the tariff-jumping motivation for FDI (which we discuss further in footnote 9 below), the concept that certain asset prices are sticky (which is actually a corollary of the imperfect-asset-market theory of Froot and Stein (1991)) and the view that FDI represents a fixed-proportion of the capital account.

*1. An Overview of the Foreign Direct Investment Data*

The central hypotheses that we study is whether relative wage costs and relative wealth have had a significant effect on United States inward foreign direct investment during the period 1979 to 1991. An evaluation of this hypothesis is best served by data on FDI disaggregated by source country. The source countries in our study include Canada, Germany, France, Japan, the Netherlands, Switzerland and the United Kingdom. These countries represent over 78 percent of all United States inward foreign direct investment over our sample period.[5]

In this paper we employ several measures of bilateral foreign direct investment, using data compiled by the International Trade Administration (ITA) and by the Bureau of Economic Analysis (BEA) of the Department of Commerce. The ITA data provides a transactions roster of all investments and classifies FDI into acquisitions, increases in equity, joint ventures, new plants and plant expansions, real property and an "all other" category. The available sample for these annual data is 1979 to 1990. We employ the total FDI series compiled by the ITA as well as two subsets, acquisitions and real property. The ITA data are not comprehensive, however, since they consists only of publicly available information. The BEA data are based upon a confidential survey and thus are more comprehensive than the ITA data. The BEA measure of foreign direct investment used in this paper includes foreign acquisitions of existing American-owned companies and the establishment of new companies by foreigners. This represents a subset of a broader BEA measure of FDI (the broader measure also includes retained earnings of foreign controlled companies and lending to subsidiaries of foreign companies). The BEA data series

[5]These countries were picked because their FDI series had complete data for the time period we study.

we use better characterizes the concept of FDI discussed in policy debates than the broader measure since it does not include components such as retained earnings that are not directly related to the firm's decision of where to invest. The available sample for the BEA series is 1979 to 1991.

Despite the differences in definition and collection, the correlations between the measures of direct foreign investment are quite high, with the exceptions of the correlations of the various series with the series on real estate purchases. In Table 1 we present correlations of various measures of FDI that we employ, each measured in constant 1985 U.S. dollars.[6] The correlation between the BEA measure (which we call OUTLAYS) and the total ITA measure (which we call TOTAL) is 0.86. The correlation between OUTLAYS and the subset of the TOTAL measure representing mergers and acquisitions (M & A) is even higher, with a correlation of 0.91. The correlation between the total ITA measure and its subset representing real estate purchases (LAND) is zero. There is a negative correlation between both LAND and the ITA mergers and acquisitions variable (-0.14) and between real estate purchases and the BEA OUTLAYS variable (-0.11).

In light of the high correlation between OUTLAYS, which is the most comprehensive FDI series we employ, and the ITA measure M & A, it is not surprising to find that the preponderance of United States inward foreign direct investment represents mergers and acquisitions as opposed to *de novo* foreign direct investment or real estate purchases. The large

[6]To avoid spurious correlation due to differences in country size, these correlations represent weighted averages of the correlation of the various measures of FDI for each country, with the weights reflecting each country's average level of FDI to the U.S. The correlations are calculated for data over the period 1979 to 1990.

**TABLE 1**
**Correlations of Alternative FDI Measures**
(measured in Constant 1985 dollars)

| | OUTLAYS | TOTAL | M & A | LAND |
|---|---|---|---|---|
| OUTLAYS | 1.00 | | | |
| TOTAL | .86 | 1.00 | | |
| M&A | .91 | .93 | 1.00 | |
| LAND | -.11 | .00 | -.14 | 1.00 |

OUTLAYS: BEA measure of foreign direct investment
TOTAL: ITA measure of foreign direct investment
M & A: ITA measure of mergers and acquisitions
LAND: ITA measure of real estate purchases

**TABLE 2**
Foreign Acquisitions Relative to Overall Foreign Direct Investments
(BEA data: Inflows from all countries)

| Year | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|
| ACQUISITIONS / OVERALL FDI | 0.86 | 0.74 | 0.78 | 0.61 | 0.60 | 0.78 | 0.87 |

| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|
| ACQUISITIONS / OVERALL FDI | 0.80 | 0.84 | 0.89 | 0.84 | 0.84 | 0.74 |

role played by acquisitions is confirmed by referring to BEA data on annual United States inward foreign direct investment. In Table 2 we present the ratio of the BEA measure of FDI acquisitions to the BEA measure of overall foreign direct investment between 1979 and 1991.[7] The difference between overall FDI and acquisitions is "establishments" which represents both *de novo* foreign direct investment and real estate purchases. The data in Table 2 show that the dollar value of acquisitions is always at least 60 percent of the dollar value of overall foreign direct investment by foreign firms. In more than half of the years between 1979 and 1991, the dollar value of acquisitions is at least 80 percent of the dollar value of overall foreign direct investment. For the thirteen year period as a whole, acquisitions represent 78 percent of overall foreign direct investment.[8]

The empirical analysis we conduct uses FDI data disaggregated by source country as well as by category of direct investment. Source-country-specific characteristics of United States inward foreign direct investment are provided in Tables 3 and 4. Tables 3 provides bilateral foreign direct investment summary statistics. We present in this table the minimum, maximum and average values of FDI over the period 1979 to 1991 for each country (measured in billions of 1985 dollars) using the OUTLAYS series from the BEA. Inspection shows that the United Kingdom is the largest investor during the period as a whole. Japan, the second largest investor,

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[7]The sum of acquisitions and establishments corresponds to the OUTLAYS measure discussed above, although the data in Table 2 represents the total amount of United States inward FDI, not just the amount of FDI coming from the seven source countries discussed elsewhere in our paper. Separate BEA data on acquisitions and establishments disaggregated by source country are not available in order to respect the confidentiality of the BEA survey.

[8]Overall FDI (measured in constant dollars) was higher in those years in which acquisitions represented a greater share of overall foreign direct investment.

had the most dramatic increase in FDI over the sample period. Japanese direct investment in the United States rose from $320 million in 1979 to $1,642 million in 1990, before falling to $400 million in 1991 (these amounts are measured in constant 1985 dollars). The range of values for foreign direct investment from different countries leads us to allow for different intercepts for each country in the regression analyses presented below.

Table 4 presents cross-country correlations of FDI (using the BEA OUTLAYS data series, measured in constant 1985 dollars). No clear pattern emerges from this table. Countries within Europe do not seem to have a higher correlation with each other than they do with Canada or Japan. Indeed, the highest correlations are between Japan and the U.K. and Japan and France. There are negative correlations between Switzerland and the Netherlands, Switzerland and Canada, and Canada and Germany. The range of correlations in this table illustrates the importance of disaggregating FDI flows by country rather than by region (e.g. Europe, Canada and Japan).

*2. The Effects of Exchange Rates, Wages and Wealth on United States FDI*

The theories that bear most closely on the relationship between the real exchange rate and foreign direct investment are the relative-labor-cost theory and the imperfect-capital-markets theory. A hypothesis consistent with both theories is that a weaker real exchange rate leads to an increase in the inflow of foreign direct investment and conversely a stronger real exchange rate diminishes FDI inflows.[9] The source of this relationship differs across the two theories. An

[9]Another possible source of the relationship between the real exchange rate and foreign direct investment is that FDI represents tariff-jumping and that the threat of protectionism rises with a stronger currency. This predicts, however, that we would observe a *decrease* in the amount of inward direct investment in the face of a weaker real exchange rate, which is at odds with our results.

**TABLE 3**
**Foreign Direct Investment Outlays by Country**
(BEA data, 1979 - 1991, billions of 1985 dollars)

| | Average | Minimum | Maximum |
|---|---|---|---|
| Canada | 3.71 | 1.16 | 10.34 |
| France | 1.98 | .32 | 8.42 |
| Germany | 1.90 | .63 | 4.41 |
| Netherlands | 2.03 | .37 | 7.34 |
| United Kingdom | 8.81 | 2.56 | 20.53 |
| Switzerland | 1.67 | .38 | 4.27 |
| Japan | 5.35 | .38 | 16.42 |

**TABLE 4**
**Cross-Country Correlations of FDI**
(BEA data; Constant 1985 Dollars)

| | Canada | France | Germany | Japan | Neth. | Switz. | U.K. |
|---|---|---|---|---|---|---|---|
| Canada | 1.00 | | | | | | |
| France | .26 | 1.00 | | | | | |
| Germany | -.15 | .11 | 1.00 | | | | |
| Japan | .39 | .86 | .18 | 1.00 | | | |
| Neth. | .12 | .05 | .36 | .08 | 1.00 | | |
| Switz. | -.07 | .48 | .36 | .61 | -.01 | 1.00 | |
| U.K. | .54 | .55 | .35 | .86 | .03 | .57 | 1.00 |

explanation of the link between FDI and exchange rates based on the relative-labor-cost theory draws from the fact that relative labor costs across major industrial countries have been largely determined by currency movements during the floating exchange rate period.[10] A depreciation of a country's exchange rate reduces its relative labor costs and therefore attracts foreign direct investment. In contrast, the reason for the link between the real exchange rate and FDI according to the imperfect-capital-markets theory is that the wealth of firms relative to their foreign counterparts rises with a currency appreciation. Changes in relative wealth affect the bids these firms make when the purchase of an assets requires the provision of some internally-generated funds.[11] As with the relative-labor-cost theory, currency depreciation increases inward foreign direct investment. In this case, however, depreciation affects FDI by putting domestic investors at a disadvantage compared to foreign investors by reducing their relative wealth.[12]

The correlation between foreign direct investment and the real exchange rate predicted by both the relative-labor-cost and the imperfect-capital-markets theories is found in the data for United States inward foreign direct investment from the seven countries in our sample. This is demonstrated by the regression results in Table 5. The regressands in this table are the logarithms of the annual bilateral United States inward foreign direct investment series discussed

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[10]Studies citing this channel include Cushman (1985, 1987) and Culem (1988).

[11]Froot and Stein (1991) distinguish between assets in which there is an informational asymmetry about the asset's payoff (which includes direct investment) and assets in which the payoff is clearly known (such as a portfolio investment). The source of the informational asymmetry in their model is costly state verification.

[12]Some initial *prima facie* evidence for United States inward foreign direct investment that is consistent with the imperfect-capital-markets theory but is difficult to reconcile with the relative-labor-cost theory is the large proportion of mergers and acquisitions in FDI (see Table 2). While cheap labor may be a reason for *de novo* investment, it is not clear why it should lead to a change in ownership.

TABLE 5
Regression of Bilateral Real Exchange Rates on United States Inward FDI

| Dependent Variable | Ln of Real Exchange Rate | Trend | $R^2$ |
|---|---|---|---|
| Ln (OUTLAYS/$GNP_{US}$) | -2.27* | | .19 |
| | (0.52) | | |
| Ln (OUTLAYS/$GNP_{US}$) | -2.00* | 0.07* | .29 |
| | (0.50) | (0.02) | |
| Ln (TOTAL/$GNP_{US}$) | -1.89* | | .14 |
| | (0.54) | | |
| Ln (TOTAL/$GNP_{US}$) | -1.78* | 0.08* | .25 |
| | (0.54) | (0.02) | |
| Ln (M & A/$GNP_{US}$) | -3.31* | | .19 |
| | (0.79) | | |
| Ln (M & A/$GNP_{US}$) | -3.06* | 0.18* | .42 |
| | (0.75) | (0.03) | |
| Ln (LAND/$GNP_{US}$)# | -0.16 | | .005 |
| | (0.65) | | |
| Ln (LAND/$GNP_{US}$)# | -0.07 | -0.18* | .21 |
| | (0.80) | (0.04) | |

Fixed-effects regressions. Numbers in parentheses are standard errors. * indicates significant at 5% level.
# White (1980) test indicates heteroskedasticity at 5% significance level; standard errors corrected for heteroskedasticity using White (1980) correction.

in the previous section (TOTAL and its subsets M & A and LAND, as well as OUTLAYS) divided by United States GNP.[13] The bilateral real exchange rate series represents the ratio of the United States CPI to the dollar value of the source country CPI (thus an increase is a real dollar appreciation). Regressions are run with and without trend terms. The data series OUTLAYS covers the period 1979 to 1991 while the samples for the data series TOTAL, M&A and LAND are each 1979 to 1990. These data represent inflows to the United States from Canada, France, Germany, Japan, the Netherlands, Switzerland and the United Kingdom.[14]

The results in Table 5 confirm the predicted relationship between the real exchange rate and United States foreign direct investment. A depreciation (appreciation) of the bilateral real exchange rate is correlated with an increase (decrease) in the inflow of FDI into the United States. This relationship is significant at the 5 percent level for three of the four measures of foreign direct investment we employ. The significance of the real exchange rate coefficients for these three measures of FDI occurs whether or not a trend is introduced as a regressor. When

[13]We scale foreign direct investment each year by the nominal GNP of the United States that year. Using nominal GNP as a deflator controls for both changes in the price level and changes in the size of the United States economy. We also ran all regressions reported in this paper using as the dependent variable the logarithm of FDI divided by the United States capital stock. The capital stock data are from the Federal Reserve Flow of Funds Account and represent the estimated replacement value of the total assets of the nonfinancial corporate business sector, excluding farms. Our results were virtually identical using either GNP or the capital stock as a deflator.

[14]In these, and in all other regressions presented in this paper, estimates employ a fixed-effects framework and all variables are therefore measured as deviations from country-specific means. As is well known, the constant term does not appear in a fixed-effects regression. We have tested for the presence of heteroskedasticity in all regressions in this paper using the White (1980) test. We note those regression where we could not reject the hypothesis of heteroskedasticity and we report the corrected standard error estimate. There was no evidence in any of the regressions in this paper of serially-correlated error terms.

the regressions are run without a trend term, a one percent dollar depreciation is associated with an increase of overall foreign direct investment relative to United States GNP of 2.27 percent (using the OUTLAYS measure) and of 1.89 percent (by the TOTAL measure of FDI) . The response of mergers and acquisitions to a movements in the real exchange rate is more pronounced, with a 1 percent depreciation being associated with a 3.31 percent increase in foreign acquisitions of United States companies relative to United States GNP. The coefficients on the logarithm of the real exchange rate remain significant at the 5 percent level when a trend term is introduced in the regressions but they decrease in absolute value.

Although both the relative-labor-cost model and the imperfect-capital-market model predict a correlation between the real exchange rate and foreign direct investment, the source of this correlation differs across these two models. To test for statistically significant relationships consistent with each of these two hypotheses in our cross-section time-series study we regress United States inward foreign direct investment on terms representing relative wealth and relative-labor-costs, as well as the real exchange rate and a trend term, as shown in equation [1].

$$[1] \qquad \ln\frac{FDI_t^i}{GNP_t^{US}} = \beta_1 \ln\frac{P_t^{US}}{E_t^i \cdot P_t^i} + \beta_2 \ln\frac{W_t^{US}}{W_t^i} + \beta_3 \ln\frac{Stock_t^{US}}{Stock_t^i} + Trend_t^i + \epsilon_t^i$$

where superscripts refers to the country (i = Canada, France, Germany, Netherlands, United Kingdom, Switzerland and Japan) and subscripts refer to the time period (t = 1979 to 1991 for OUTLAYS and t=1979 to 1990 for TOTAL, M&A and LAND). This specification allows us to distinguish among the effects of relative wealth, relative-labor-costs and other potential effects associated with the real exchange rate on foreign direct investment. The hypothesis that $\beta_1$ and

$\beta_2$ are negative is consistent with a relationship between foreign direct investment and relative labor costs. The hypothesis that $\beta_1$ and $\beta_3$ are negative is consistent with theories that predict a relationship between foreign direct investment and relative wealth, such as the imperfect-capital-market theory.

The real exchange rate term $\frac{P_t^{US}}{E_t^i \cdot P_t^i}$, represents the ratio of United States price level in year $t$ to the product of the price level in country $i$ in that year, $P_t^i$, and the exchange rate in that year, $E_t^i$, which represents the amount of foreign currency of country $i$ required to purchase one United States dollar. The relative wage term, $\frac{W_t^{US}}{W_t^i}$, represents an index of United States wage costs relative to wage costs in country $i$ (denominated in that country's currency) in year $t$.[15] The relative wealth term, $\frac{Stock_t^{US}}{Stock_t^i}$, represents an index of the value of the United States stock

[15]The wage, price and exchange rate data are from the International Monetary Fund's International Financial Statistics tape.

market to an index of the value of the stock market of country $i$ in year $t$.[16] We report results from regressions that include a time trend and from regressions without a time trend.[17]

Regression results are presented in Table 6. These results provide strong support for the hypothesis that relative wealth is a significant determinant of all measures of United States FDI over the sample period. The coefficient on the relative stock market values enters with the correct sign and is significant at the 5 percent level in all of the regressions in which the regressands are OUTLAYS, TOTAL or M & A. In the regressions on LAND, the relative wealth term is significant and of the correct sign at the 5 percent level when the trend term is included in the regression. The real exchange rate enters with a significant coefficient of the expected sign in the regressions that employ the FDI measures OUTLAYS, TOTAL and M&A, but not in the regressions using LAND. In contrast, the relative wage term is not significantly different from zero in any of the regressions. The lack of a significant effect of relative wages in the regressions in Table 6 casts doubt on the effect of relatively cheap United States labor attracting an inflow of foreign investment. Instead, these results demonstrate a consistent finding that foreign direct investment is correlated with relative wealth.

We present further evidence consistent with the relative wealth hypothesis in Table 7. In this table we present a set of regressions in which the dependent variable is the logarithm of the

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[16]The stock market data are from the Morgan Stanley Capital International Perspective. The Morgan Stanley data are a weighted index representing approximately 60% of each country's market capitalization. These data do not include non-publicly traded businesses. Ideally, we would use a measure of wealth that includes publicly and non-publicly traded businesses, the market value of corporate bonds, land and household-sector wealth. There is no such data series available for all the countries in our sample.

[17]The time trend allows us to control for the increasing presence of foreign ownership in the United States.

**TABLE 6**
**Regression of Real Exchange Rates, Relative Wealth, Relative Wages and Trend on United States Inward FDI**

| Dependent Variable | Ln of Real Exchange Rate | Ln of Relative Labor Costs | Ln of Relative Wealth | Trend | $R^2$ |
|---|---|---|---|---|---|
| Ln (OUTLAYS/$GNP_{US}$) | -2.53* | -0.07 | -1.76* | | .32 |
| | (0.49) | (0.37) | (0.45) | | |
| Ln (OUTLAYS/$GNP_{US}$) | -2.29* | 0.03 | -1.56* | 0.07* | .40 |
| | (0.47) | (0.35) | (0.43) | (0.02) | |
| Ln (TOTAL/$GNP_{US}$) | -2.05* | -0.06 | -1.84* | | .28 |
| | (0.50) | (0.37) | (0.48) | | |
| Ln (TOTAL/$GNP_{US}$) | -1.94* | -0.04 | -1.54* | 0.06* | .34 |
| | (0.49) | (0.36) | (0.48) | (0.02) | |
| Ln (M & A/$GNP_{US}$) | -3.51* | -0.04 | -2.26* | | .29 |
| | (0.76) | (0.55) | (0.71) | | |
| Ln (M & A/$GNP_{US}$) | -3.22* | 0.002 | -1.45* | 0.16* | .46 |
| | (0.67) | (0.48) | (0.65) | (0.03) | |
| Ln (LAND/$GNP_{US}$)* | -0.29 | 0.16 | -1.08 | | .03 |
| | (0.61) | (0.70) | (0.79) | | |
| Ln (LAND/$GNP_{US}$) | -0.28 | 0.14 | -2.21* | -0.21* | .31 |
| | (0.77) | (0.55) | (0.76) | (0.04) | |

Fixed-effects regressions. Numbers in parentheses are standard errors.
* White (1980) test indicates heteroskedasticity at 5% significance level. Standard errors corrected for heteroskedasticity using White (1980) correction.
* significant at 5% level.

ratio of publicly-announced foreign-financed mergers and acquisitions (our M & A variable) scaled by the total amount of publicly-announced mergers and acquisitions in the United States.[18] The imperfect-capital-markets hypothesis suggests that the real exchange rate and relative wealth should be negatively correlated with the ratio of the value of mergers and acquisitions by foreigners relative to the value of all mergers and acquisitions. The relative-labor-cost hypothesis makes no prediction concerning the ratio of the value of mergers and acquisitions undertaken by foreign as opposed to domestic investors. The results in Table 7 demonstrate that relative amount of mergers and acquisitions undertaken by foreign as opposed to domestic investors is significantly correlated with relative wealth and the real exchange rate. These results reinforce the conclusion drawn from the results presented in Table 6 that support the imperfect-capital-markets hypothesis of the determination of foreign direct investment against the alternative of the relative-labor-cost hypothesis.[19]

[18]The annual total value of mergers and acquisitions are from Mergerstat Review. This series represents publicly announced formal transfers of ownership of at least 10% of a company's equity where the purchase price is at least one million dollars and where one of the parties is a U.S. company. This data compares closely to the ITA measure M & A used elsewhere in this paper.

[19]Coefficients on relative wage variables were not significant when included in these regressions. The coefficients on relative wealth, the real exchange rate and trend were basically unaffected by the inclusion of relative wage variables.

TABLE 7

**Regression on Foreign Mergers and Acquisitions of United States Assets Relative to all Mergers and Acquisitions of United States Assets**

| Dependent Variable | Ln of Real Exchange Rate | Ln of Relative Wealth | Trend | $R^2$ |
|---|---|---|---|---|
| Ln $\frac{M \& A_{foreign}}{M \& A_{all\ US}}$ | -3.85* | | | .30 |
| | (0.67) | | | |
| Ln $\frac{M \& A_{foreign}}{M \& A_{all\ US}}$ | -3.99* | -1.53* | | .35 |
| | (0.65) | (0.62) | | |
| Ln $\frac{M \& A_{foreign}}{M \& A_{all\ US}}$ | -3.82* | -1.08** | 0.09* | .42 |
| | (0.63) | (0.61) | (0.03) | |

Fixed-effects regressions. Numbers in parentheses are standard errors.
* significant at 5% level. ** significant at 10% level

### 3. *Robustness to Countries in Sample and Tax Effects*

The above results demonstrate the statistical significance of the relative wealth effect on FDI and the lack of a statistically significant effect of relative labor costs on FDI. In this section we first demonstrate that these results are robust to the choice of the countries included in the sample. We then show that these results are also robust to the inclusion of dummy variables which proxy for changes in the tax code over our sample period.[20]

The results presented in Table 8 demonstrate the sensitivity of our results to the choice of countries. In this table we report F-tests for the equality of the slope coefficients between the full sample and samples in which one country is omitted. These tests, which are run for regressions using $\ln(OUTLAYS/GNP_{US})$ as the dependent variable, show that the regression results are significantly affected at the 5 percent level when the Netherlands is not included in the sample. At the 10 percent level the regression results are significantly affected when either the United Kingdom and Switzerland are not included in the sample. The chi-square statistic for Japan is significant at the 12 percent level.

One possible reason for the finding in Table 8 that the inclusion of the Netherlands significantly alters the regression results is that the Dutch data are "lumpy." Specifically, Dutch purchases of United States assets are marked by two large transactions. In 1979 Royal Dutch Shell purchased Belridge Oil Company for $3.65 billion. In 1986 Unilever paid $3.1 billion for Chesebrough-Ponds Incorporated. Each of these transactions represented roughly 70 percent of

[20]The regressions reported in this section all include a trend term. The pattern of significance of the coefficients on the real exchange rate, relative labor costs, and relative wealth does not change when the trend is omitted from the regressions.

TABLE 8
Tests of Equality of Slope Coefficients
When Countries are Omitted from the Sample

| Omitted Country: | Canada | France | Germany | United Kingdom | Switzerland | Japan | Netherlands |
|---|---|---|---|---|---|---|---|
| $\chi^2(4,76)$Statistic: | 0.33 | 0.68 | 0.30 | 2.39** | 2.15** | 1.89 | 2.94* |

Dependent variable is ln(OUTLAYS/$GNP_{US}$). Regressors include real exchange rate, relative labor costs, relative stock market values and trend. Fixed-effects regression. * significant at 5% level. ** significant at 10% level.

TABLE 9
Regressions Omitting Selected Observations from the Sample
Dependent variable in all regressions is ln(OUTLAYS/$GNP_{US}$)

| Omitted Country or Observations | Ln of Real Exchange Rate | Ln of Relative Labor Costs | Ln of Relative Wealth | Trend | $R^2$ |
|---|---|---|---|---|---|
| Netherlands | -1.88* | 0.04 | -1.79* | 0.09* | .51 |
| | (0.48) | (0.32) | (0.42) | (0.02) | |
| Switzerland | -2.64* | -0.04 | -1.90* | 0.05* | .46 |
| | (0.49) | (0.33) | (0.45) | (0.02) | |
| United Kingdom | -2.47* | -1.05 | -1.61* | 0.07* | .46 |
| | (0.49) | (1.09) | (0.44) | (0.02) | |
| Japan | -1.92* | 0.08 | -1.21* | 0.05* | .51 |
| | (0.54) | (0.35) | (0.49) | (0.02) | |
| Netherlands, 1979 | -2.03* | 0.01 | -1.60* | 0.08* | .51 |
| and 1986 observations | (0.41) | (0.18) | (0.31) | (0.02) | |

Fixed effects regressions. Standard errors in parentheses. * significant at 5% level.

total Dutch foreign direct investment in the United States (as measured by OUTLAYS) in those respective years.

In order to investigate whether any one country or subset of observations is driving our results, we present in Table 9 estimates with the indicated country or observations excluded from the sample. The sub-samples we use in this table exclude, in turn, observations for the Netherlands, Switzerland, the United Kingdom, Japan, and the 1979 and 1986 Dutch observations. The dependent variable in each of these regressions is ln(OUTLAYS/GNP) and the sample period is 1979 to 1991. In each case, the pattern of significance of the coefficients is the same as in the full sample, with the coefficients on relative wealth, the real exchange rate and the trend term significant and the coefficient on relative labor costs insignificant. Also, the estimated coefficients on the real exchange rate, relative wealth and the trend in all the sub-samples are within one standard deviation of their values in the full sample.[21]

Another test for the robustness of our results is to consider whether controlling for changes in tax laws affects the significance of relative wealth or relative labor costs.[22] In Table 10 we

[21]We also ran a similar series of tests for the stability of coefficient values across sub-samples using the three ITA measures of FDI. With TOTAL as the dependent variable, the exclusion of Switzerland and the Netherlands gave chi-square statistics which were significant at the 5 percent level but excluding either country did not markedly change the values or the significance of the coefficients when compared with the full sample. None of the chi-square statistics were significant when the M&A measure of FDI was used. The only case where one particular country seemed to matter was when Japan was excluded from the sample in the regressions on LAND. The chi-square statistic in this case was 9.68. In the sub-sample excluding Japan the relative wealth term was no longer significant.

[22]Our goal here is more modest than achieving a full understanding of the link between changes in tax laws and foreign direct investment, which is the focus of research by Hartman (1984), Boskin and Gale (1987), Swenson (1989) and Slemrod (1989). These studies regress measures of effective tax rates on FDI, with Hartman and Boskin and Gale studying multilateral FDI flows, Swenson focusing on industry-level multilateral flows, and Slemrod analyzing both

present the coefficients of the real exchange rate, relative wealth and relative labor costs from regressions in which we include dummy variables that capture the effects of the 1981 tax cut and the 1986 tax reform act. There are four dummy variables; one set corresponding to those countries which have a territorial tax system (Canada, France, Germany, the Netherlands and Switzerland) and one for those countries with a worldwide approach towards taxing the income of foreign subsidiaries of domestic corporations (Japan and the United Kingdom).[23] For each set of countries, there are two dummy variables. One set of dummy variables is meant to capture the effects of accelerated depreciation during the 1981 to 1986 period. These two dummy variables, TAX-81-86-T and TAX-81-86-W, take the value 1 for the years 1981 to 1986, while the accelerated depreciation allowances were in effect, and 0 otherwise, for the countries with territorial and worldwide tax systems, respectively. The other set of dummy variables are meant to capture the effects of the repealing of the General Utilities Rule in 1987. These dummy variables, TAX-87-T and TAX-87-W, take the value 1 in 1987 and 0 otherwise, for the countries with territorial and worldwide tax systems, respectively.

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multilateral and bilateral data. While the studies using multilateral data find significant effects of effective tax rates on FDI, Slemrod fails to find a significant correlation in the bilateral data.

[23]Under a worldwide tax system, as is found in Japan and the United Kingdom, income from foreign subsidiaries is taxed by the home government but tax credits are given for taxes paid to host-country governments. Conversely, corporate profits arising from foreign subsidiaries are not taxed by the home-country government of multinationals under the territorial system found in Canada and the continental European countries in the sample. The benefits of a U.S. tax cut and the resulting lower tax liabilities to the U.S. government for a foreign firm with headquarters in a country with a worldwide tax system are offset by lower tax credits from that firm's home government. Indeed, since a tax cut in the United States would benefit domestic firms, but not firms headquartered in a country with a worldwide tax system, a tax cut may actually decrease the amount of direct investment in the U.S. from countries with a worldwide tax system. A firm headquartered in a country with a territorial tax system, however, would benefit from a tax cut on the operations of its subsidiaries in the United States. (see Scholes and Wolfson 1988).

The results of regressions run with the tax dummy variables are presented in Table 10. The value of the coefficients on the real exchange rate, relative labor costs, relative wealth and trend in these regressions, and their respective levels of significance, are very similar to those in Table 6. The coefficients on the real exchange rate are larger (in absolute value) when tax-dummy variables are included and are always significant. The coefficients on relative wealth in Table 10 are very close to their respective values in Table 6. As in the earlier regressions, these coefficients are always significant. Also corresponding to the results in the regressions without the tax dummy variables, relative wages are not significant using any of the four measures of foreign direct investment.[24]

*4. Conclusions*

In this paper we consider the reason for the link between the real exchange rate of the dollar and the flow of foreign direct investment into the United States. We distinguish between relative wealth and relative labor cost hypotheses. The data consistently support the significance of the relative wealth channel and fail to support the relative labor cost channel. This analysis demonstrates that previous studies which attributed a significant effect of real wage movements on foreign direct investment may have been instead picking up relative wealth effects.

The evidence presented here on the significant link between foreign direct investment and relative wealth does not, by itself, support a particular theory of the manner in which relative wealth determines foreign direct investment. Relative wealth may matter because of the presence

[24]The results presented in Table 10 that our (albeit crude) variables representing tax effects on FDI are not significant in bilateral regressions is consistent with the results found by Slemrod (1989).

**TABLE 10**
**Controlling for Tax Effects on United States Inward FDI**

| *Independent Variables* | *Dependent Variable* OUTLAY | TOTAL | M & A | LAND |
|---|---|---|---|---|
| ln (Real Exchange Rate) | -2.71* | -2.12* | -3.63* | -2.61* |
| | (0.76) | (0.80) | (1.09) | (1.18) |
| ln (Relative Wages) | -0.11 | -0.08 | -0.09 | -0.28 |
| | (0.36) | (0.38) | (0.51) | (0.55) |
| ln (Relative Wealth | -1.58* | -1.55* | -1.51* | -2.40* |
| | (0.44) | (0.49) | (0.67) | (0.74) |
| Trend | 0.08* | 0.06* | 0.16* | -0.18* |
| | (0.02) | (0.03) | (0.04) | (0.04) |
| TAX-81-86-T | 0.26 | 0.09 | 0.25 | 1.29* |
| | (0.29) | (0.30) | (0.41) | (0.44) |
| TAX-81-86-W | -0.06 | 0.14 | 0.13 | 0.61 |
| | (0.38) | (0.41) | (0.56) | (0.62) |
| TAX-87-T | 0.07 | 0.10 | 0.06 | 0.39 |
| | (0.35) | (0.37) | (0.51) | (0.55) |
| TAX-87-W | -1.00 | 0.44 | 0.42 | -0.28 |
| | (0.55) | (0.58) | (0.79) | (0.88) |
| $R^2$ | 0.43 | 0.35 | 0.46 | 0.39 |

Fixed Effects regressions. Sample is 1979 to 1991 for OUTLAY and 1979 to 1990 for TOTAL, M&A and LAND.

* significant at 5% level

of imperfect capital markets, as in the theoretical model of Froot and Stein (1991). Our finding that relative wealth matters is also consistent with an explanation in which country-specific productivity shocks affect both the relative wealth of a country and the amount of foreign direct investment undertaken by its investors. Recent events, however, tend to support the imperfect-capital markets explanation for the link between relative wealth and foreign direct investment as opposed to an explanation based upon country-specific productivity shocks.

Productivity increases in both Japan and Canada out-paced those in the United States between 1989 and 1991.[25] Real exchange rates between these countries and the United States were fairly stable during this period. Between 1989 and 1991 the stock market index for Japan relative to the United States declined 45 percent and the stock market index of Canada relative to the United States fell 21 percent. Foreign direct investment into the United States from Canada declined 44 percent from 1989 to 1991 (BEA data). Foreign direct investment into the United States from Japan, which doubled between 1987 and 1988 (when the Japanese relative stock market index rose 16 percent), fell 73 percent between 1989 and 1991 (BEA data). These observations of declining foreign direct investment in the face of continued relative productivity growth are consistent with the imperfect-capital-market theory of foreign direct investment. This evidence, which complements the results presented in this paper, suggests that the important role played by relative wealth in the determination of foreign direct investment is through imperfections in the capital market.

[25]The productivity numbers are from the International Monetary Fund's *World Economic Outlook*, October 1991, Table A 10, p. 95. These productivity data are not comprehensive enough to include in the regressions in this paper.

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