# The Real Exchange Rate and Foreign Direct Investment in the United States: Relative Wealth vs. Relative Wage Effects

by Michael W. Klein and
Eric S. Rosengren

Federal Reserve Bank of Boston

Working Papers Series

No. 92-2 February 1992

# The Real Exchange Rate and Foreign Direct Investment in the United States: Relative Wealth vs. Relative Wage Effects

by Michael W. Klein and
Eric S. Rosengren

February 1992
Working Paper No. 92-2

Federal Reserve Bank of Boston

February 27, 1992

# The Real Exchange Rate and Foreign Direct Investment in the United States: Relative Wealth vs. Relative Wage Effects

Michael W. Klein

and

Eric Rosengren*

Abstract: There has been a significant correlation between inward foreign direct investment in the United States and the U.S. real exchange rate since the 1970s. Two alternative reasons for this relationship are that the real exchange rate affects the relative cost of production 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 1988. We find strong evidence that relative wealth significantly affects foreign direct investment in the United States. We find little evidence that relative wages have a significant impact on the determination of foreign direct investment in the United States. These results are robust to the choice of countries in our sample and when controlling for changes in tax codes.

*Professor of Economics, Fletcher School of Law and Diplomacy, Tufts University, and Vice President and Economist, Federal Reserve Bank of Boston, respectively. The analysis presented in this paper does not necessarily represent the view of the Federal Reserve Bank of Boston or that of the Federal Reserve System. The authors thank Jessica Laxman for able research assistance, and Ken Froot, Wayne Gray, Rachel McCulloch, Geoffrey Tootell, and members of the N.B.E.R. weekly international economics seminar for helpful omments. Any remaining errors are the responsibility of the authors.

The Real Exchange Rate and Foreign Direct Investment in the United States: Relative Wealth vs. Relative Effects

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] The recent embodiment of this phenomenon saw a threefold increase in foreign direct investment in the United States accompanying the 60 percent depreciation of the dollar between 1985 and 1988. This dramatic increase in the foreign ownership of U.S. 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. Currency movements alter relative wealth across countries. The role relative wealth plays in the determination of FDI has been demonstrated by Froot and Stein (1991) in a model in which informational imperfections limit the leverage of firms. A firm's relative wealth is thus an important determinant of its ability to successfully bid on assets. Currency movements affect FDI by altering relative wealth of firms across countries. Thus a weakening of the domestic currency favors foreign purchasers of domestic assets and an exchange rate

---

[1]This correlation is not due to a general growth in U.S. 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 1989).

depreciation is associated with an increase in inward foreign direct investment.

A possible alternative explanation for the link between the exchange rate and foreign direct investment concerns the manner in which currency movements affect relative production costs, especially relative labor costs. Underlying previous empirical investigations into the effect of relative labor costs on foreign direct investment is the concept that 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. Empirical research supporting this hypothesis includes Cushman's (1985; 1987) studies of outward U.S. 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 U.S. foreign direct investment through the relative wage effect or through the relative wealth effect. Evidence presented by Froot and Stein (1991) demonstrating a significant correlation between currency movements and inward foreign direct investment in the United States 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, because 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. For the same reason, it is possible 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 foreign direct investment in the United States from seven industrial countries between 1979 and 1988 and the respective bilateral dollar real exchange rates. We identify variables that enable us to distinguish between the cost of production and the relative wealth hypotheses, and we include these in regressions on a variety of types and measures of U.S. foreign direct investment. These empirical results support the relative wealth hypothesis but not the cost of production hypothesis. We demonstrate that these results are robust to the sample of countries and when controlling for changes in tax codes.[3]

---

[3]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 (1989) of color televisions, automobiles, and banking, pp. 40-43). A second strand of research on the determination of FDI focuses on the influence of macroeconomic variables. Empirical work concordant with this approach includes studies of the influence of taxes on FDI. (See, for example, Hartman 1984, Boskin and Gale 1986, Scholes and Wolfson 1988, Slemrod 1989, and Swenson 1989.) Other explanations include the tariff-jumping motivation for FDI (which we discuss further in footnote 8 below), and 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.

## I. An Overview of the Foreign Direct Investment Data

The central hypothesis that we study is whether relative wage costs and relative wealth have had a significant effect on U.S. inward foreign direct investment during the period 1979 to 1988. 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 U.S. inward foreign direct investment over our sample period.[4]

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 U. S. Department of Commerce. The ITA data provide a transactions roster of all investments and classify FDI into acquisitions, increases in equity, joint ventures, new plants and plant expansions, real property, and an "all other" category. 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 consist 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 that also includes retained earnings of foreign-controlled companies and lending to subsidiaries of foreign companies. The

---

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

BEA data series we use characterizes the concept of FDI discussed in policy debates better than the broader measure, since it does not include components such as retained earnings that are not directly related to the firm's decision on where to invest.

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.[5] The correlation between the BEA measure (which we call OUTLAYS) and the total ITA measure (which we call TOTAL) is 0.84. 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 the subset of that measure representing mergers and acquisitions is also 0.91. The correlation between the total ITA measure and its subset representing real estate purchases (LAND), at 0.08, is much lower. There is a negative correlation between both LAND and the ITA mergers and acquisitions variable (-0.12) and between real estate purchases and the BEA OUTLAYS variable (-0.01).

In light of the correlations presented in Table 1, it is not surprising to find that the preponderance of U.S. inward foreign direct investment represents mergers and acquisitions as opposed to de novo foreign direct

[5]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 United States.

Table 1
Correlations of Alternative FDI Measures
(measured in constant 1985 dollars)

| | OUTLAYS | TOTAL | M & A | LAND |
|---|---|---|---|---|
| OUTLAYS | 1.00 | | | |
| TOTAL | .84 | 1.00 | | |
| M & A | .91 | .91 | 1.00 | |
| LAND | -.01 | .08 | -.12 | 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 Investment
(BEA data: Inflows from all countries)

| Year | 1979 | 1980 | 1981 | 1982 | 1983 |
|---|---|---|---|---|---|
| ACQUISITIONS OVERALL FDI | .86 | .74 | .78 | .61 | .60 |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|
| ACQUISITIONS OVERALL FDI | .78 | .87 | .80 | .84 | .89 |

investment or real estate purchases. The large role played by acquisitions is confirmed by referring to BEA data on annual U.S. 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 1988.[6] 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 half the years between 1979 and 1988, the dollar value of acquisitions is at least 80 percent of the dollar value of overall foreign direct investment. For the 10-year period as a whole, acquisitions represent 81 percent of overall foreign direct investment.[7]

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 U.S. inward foreign direct investment are shown in Tables 3 and 4. Table 3 provides bilateral foreign direct investment summary statistics: the minimum, maximum, and average values of FDI over the period 1979 to 1988 for each country (measured in billions of 1985 dollars) using the OUTLAYS series from the BEA. Inspection shows that the United Kingdom is by far the largest investor in the United States, with an average investment

---

[6]The sum of acquisitions and establishments corresponds to the OUTLAYS measure discussed above, although the data in Table 2 represent the total amount of U.S. 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.

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

Table 3
Foreign Direct Investment Outlays by Country
(BEA data, 1979-1988, billions of 1985 dollars)

| | Average | Minimum | Maximum |
|---|---|---|---|
| Full Sample | 2.90 | .32 | 19.58 |
| Canada | 3.70 | 1.16 | 9.47 |
| France | 1.20 | .32 | 3.41 |
| Germany | 1.81 | .63 | 4.41 |
| Netherlands | 1.92 | .37 | 7.34 |
| United Kingdom | 7.40 | 2.56 | 19.58 |
| Switzerland | 1.25 | .38 | 3.88 |
| Japan | 3.08 | .38 | 12.89 |

Table 4
Cross-Country Correlations of Foreign Direct Investment
(BEA data; Constant 1985 Dollars)

| | Canada | France | Germany | Japan | Netherlands | Switzerland | United Kingdom |
|---|---|---|---|---|---|---|---|
| Canada | 1.00 | | | | | | |
| France | .75 | 1.00 | | | | | |
| Germany | -.27 | .10 | 1.00 | | | | |
| Japan | .63 | .94 | .11 | 1.00 | | | |
| Netherlands | .10 | .07 | .35 | -.02 | 1.00 | | |
| Switzerland | -.08 | .13 | .42 | .19 | -.15 | 1.00 | |
| United Kingdom | .63 | .91 | .28 | .95 | -.11 | .33 | 1.00 |

twice that of the next largest source country, Canada. The Japanese presence in the United States has increased dramatically over the sample period, with its minimum value the second smallest of the seven countries, but with its maximum value, representing the 1988 observation, the second largest of the seven. 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 United Kingdom, Japan and France, and the United Kingdom and France. There are negative correlations between the Netherlands and Switzerland, the Netherlands and the United Kingdom, and the Netherlands and Japan, as well as between Canada and Germany and Canada and Switzerland. 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).

## II. The Effects of Exchange Rates, Wages, and Wealth on Foreign Direct Investment in the United States

The theories that bear most closely on the relationship between the real exchange rate and foreign direct investment are the cost of production theory and the imperfect capital markets theory. We begin this section with a short description of these theories. A hypothesis consistent with both theories is that a weaker real exchange rate leads to an inflow of foreign direct

investment, and conversely, a stronger real exchange rate diminishes FDI inflows. We first demonstrate that this relationship holds for inward foreign direct investment in the United States from the seven industrial countries in our sample for the period between 1979 and 1988. The source of this relationship differs across the cost of production and imperfect capital markets theories, with the former focusing on the effect of the real exchange rate on relative production costs (primarily labor costs) and the latter stressing the role of the real exchange rate in altering relative wealth. These differences enable us to run regressions that test hypotheses consistent with one theory against those consistent with the other.[8]

The cost of production theory focuses on the effect of currency movements on relative factor prices across countries.[9] Relative labor costs across major industrial countries have been largely determined by currency movements during the floating exchange rate period. A depreciation of a country's exchange rate serves to reduce its labor costs in terms of other currencies. This attracts capital inflows. Foreign direct investment, in this framework, represents capital moving in to combine with relatively cheap labor. A hypothesis consistent with this theory is that a decrease in a country's relative labor costs, because of either a fall in its relative wages or a real exchange rate depreciation, increases foreign direct investment.

---

[8]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.

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

Some prima facie evidence difficult to reconcile with the cost of production theory is the fact that mergers and acquisitions represent a large proportion of foreign direct investment; cheap labor may be a reason for de novo investment, but it is not clear why it should lead to a change in ownership. This preponderance of mergers and acquisitions in foreign direct investment is consistent, however, with the imperfect capital markets theory of foreign direct investment. This theory focuses on the role currency movements play in altering relative wealth across countries.[10] Relative wealth is an important determinant of foreign direct investment in this framework because informational imperfections in capital markets cause external financing to be more expensive than internal financing. A currency depreciation serves to lower the relative wealth of domestic as opposed to foreign firms. Thus, a depreciation is associated with an increase in foreign acquisitions of domestic assets.

The correlation between foreign direct investment and the real exchange rate predicted by both the cost of production and the imperfect capital markets approaches is found in the data for U.S. inward foreign direct investment from the seven countries in our sample over the period 1979 to 1988. Regressions testing this relationship are presented in Table 5. The regressands in this table are the logarithms of the annual series on bilateral U.S. inward foreign direct investment discussed in the previous section (TOTAL and its subsets M & A and LAND, as well as OUTLAYS) divided by U.S. GNP.[11]

---

[10]Froot and Stein (1991) develop this model and contrast its predictions with a variety of other approaches to the determination of FDI.

[11]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 U.S. economy. We also ran all regressions reported in this paper using as the dependent

Table 5
Regression of Bilateral Real Exchange Rates on U.S. Inward Foreign Direct Investment

| Dependent Variable | Ln of Real Exchange Rate | Trend | $R^2$ |
|---|---|---|---|
| Ln (OUTLAYS/$GNP_{US}$) | -1.97*<br>(.54) | | .18 |
| Ln (OUTLAYS/$GNP_{US}$) | -2.26*<br>(.50) | .11*<br>(.03) | .33 |
| Ln (TOTAL/$GNP_{US}$) | -1.58<br>(.53) | | .12 |
| Ln (TOTAL/$GNP_{US}$) | -1.82*<br>(.51) | .09*<br>(.03) | .24 |
| Ln (M & A/$GNP_{US}$) | -2.66*<br>(.81) | | .15 |
| Ln (M & A/$GNP_{US}$) | -3.17*<br>(.71) | .19*<br>(.04) | .36 |
| Ln (LAND/$GNP_{US}$)[a] | -.38<br>(.68) | | .003 |
| Ln (LAND/$GNP_{US}$)[a] | -.07<br>(.78) | -.17*<br>(.05) | .17 |

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

variable FDI divided by the U.S. capital stock. The capital stock data are from the Federal Reserve Flow of Funds Accounts and represent the estimated replacement value of the total assets of the nonfinancial corporate business sector. Our results were virtually identical using either GNP or the capital stock as a deflator.

The bilateral real exchange rate series represents the ratio of the U.S. 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 cover the period 1979 to 1988, and represent inflows to the United States from Canada, France, Germany, Japan, the Netherlands, Switzerland and the United Kingdom. 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.[12]

The results in Table 5 confirm the predicted relationship between the real exchange rate and foreign direct investment in the United States. 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 the regressions are run without a trend term, a 1 percent dollar depreciation is associated with an increase of overall foreign direct investment relative to U.S. GNP of 1.58 percent (by the TOTAL measure of FDI) and of 1.97 percent (using the OUTLAYS measure). The response of mergers and acquisitions to movements in the real exchange rate is more pronounced, with a 1 percent depreciation being associated with a 2.66 percent increase in foreign acquisitions of U.S. companies relative to U.S. GNP. The effects of the logarithm of the real exchange rate on the logarithm of the ratios of OUTLAYS, TOTAL and M&A to U.S.

---

[12]As is well known, the constant term does not appear in a fixed-effects regression.

GNP are larger (in absolute value) and more significant with the introduction of a trend term in the regressions.

Although both the cost of production model and the imperfect capital markets model predict a correlation between the real exchange rate and foreign direct investment, the source of this correlation differs across these two models. The cost of production model predicts this correlation because of the role of the exchange rate in affecting relative labor costs, while the imperfect capital markets model predicts this relationship because currency movements alter relative wealth across countries. We distinguish between these two hypotheses in our cross-section time series study by regressing U.S. inward foreign direct investment on terms representing relative wealth and relative labor costs, as well as the real exchange rate.

An equation that nests both the imperfect capital markets and the cost of production hypotheses is presented in [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 1988). This specification allows us to distinguish effects of both relative wealth and relative labor cost on foreign direct investment from other potential effects associated with the real exchange rate. The hypothesis that $\beta_1$ and $\beta_2$ are negative is consistent with a relationship between foreign direct investment and factor 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 markets theory.

The real exchange rate term, $\frac{P_t^{US}}{E_t^i \cdot P_t^i}$, represents the ratio of the price level in the United States 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 U.S. dollar. The relative wage term, $\frac{W_t^{US}}{W_t^i}$, represents an index of U.S. wage costs relative to wage costs in country i (denominated in that country's currency) in year t.[13] The relative wealth term, $\frac{Stock_t^{US}}{Stock_t^i}$, represents an index of the value of the U.S. stock market to an index of the value of the stock market of country i in year t.[14] We report results from regressions that include a time trend and from regressions without a time trend.[15]

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 U.S. FDI over the period 1979 to 1988. The coefficient on the relative stock market values (wealth) enters with the correct sign and is significant at the 5 percent level in all of the

---

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

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

[15]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 U.S. Inward Foreign Direct Investment

| Dependent Variable | Ln of Real Exchange Rate | Ln of Relative Labor Costs | Ln of Relative Wealth | Trend | $R^2$ |
|---|---|---|---|---|---|
| Ln (OUTLAYS/$GNP_{US}$) | -.93<br>(1.06) | -1.22<br>(.93) | -1.69*<br>(.51) | | .33 |
| Ln (OUTLAYS/$GNP_{US}$) | -3.06*<br>(1.31) | .67<br>(1.15) | -1.21*<br>(.52) | .10*<br>(.04) | .40 |
| Ln (TOTAL/$GNP_{US}$) | .28<br>(1.02) | -2.05*<br>(.89) | -1.72*<br>(.49) | | .33 |
| Ln (TOTAL $GNP_{US}$) | -.46<br>(1.31) | -1.38<br>(1.15) | -1.55*<br>(.52) | .03<br>(.04) | .34 |
| Ln (M & A/$GNP_{US}$) | 1.49<br>(1.52) | -4.36*<br>(1.33) | -2.15*<br>(.73) | | .37 |
| Ln M & A/$GNP_{US}$) | -1.13<br>(1.90) | -2.02<br>(1.67) | -1.56*<br>(.75) | .13*<br>(.06) | .41 |
| Ln (LAND/$GNP_{US}$)[a] | -6.52*<br>(1.14) | 5.96*<br>(1.21) | -.95<br>(.76) | | .23 |
| Ln (LAND/$GNP_{US}$)[a] | -3.84**<br>(2.02) | 3.56**<br>(1.84) | -1.56**<br>(.76) | -.13**<br>(.07) | .28 |
| Ln (LAND/$GNP_{US}$) | -.07<br>(.79) | | -1.86*<br>(.83) | -.21*<br>(.05) | .24 |

Fixed-effects regressions. Numbers in parentheses are standard errors. Standard errors corrected for heteroskedasticity using White (1980) correction.
*Significant at 5% level.
**Significant at 10% level.
[a]White (1980) test indicates heteroskedasticity at 5% significance level.

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 relative labor costs are not included in the regression, and significant at the 10 percent level when relative labor costs are included in the regression. Except for the regression on LAND, the effects of the relative wealth term are robust to the inclusion of a trend. This is not the case for the effects of relative wages (labor costs) on FDI. In the regressions with our comprehensive measure, OUTLAYS, the coefficients on relative wages are not significant, and in the regression with the time trend this coefficient is of the incorrect sign. The two cases in which the coefficient on relative wages is significant and of the correct sign occur in regressions that do not include a trend term. In no regression with a trend term is the coefficient on relative wages significant and of the correct sign. The real exchange rate enters with a significant coefficient of the expected sign in the regression on OUTLAYS when the time trend is included.[16]

The lack of a significant effect of relative wages in the regressions in Table 6 casts doubt on the effect of relatively cheap U.S. labor in attracting an inflow of foreign investment. Instead, this table demonstrates a consistent finding that foreign direct investment is correlated with relative wealth. Theories that predict such a relationship, such as the imperfect capital markets theory, focus on the relative ability of firms to bid successfully for assets. We present further evidence consistent with the relative wealth hypothesis in Table 7. This table presents a set of

---

[16]In all regressions in this paper we have tested for the presence of heteroskedasticity using the White (1980) test. We note those regressions where we could not reject the hypothesis of heteroskedasticity and we report the corrected standard error estimate. There was no evidence in any of our regressions of serially correlated error terms.

Table 7
Regression on Foreign Mergers and Acquisitions of U.S. Assets Relative to All Mergers and Acquisitions of U.S. Assets

| Dependent Variable | Ln of Real Exchange Rate | Ln of Relative Wealth | Trend | $R^2$ |
|---|---|---|---|---|
| $\text{Ln} \frac{M \& A_{foreign}}{M \& A_{all\ US}}$ | -3.18* | | | .27 |
| | (.67) | | | |
| $\text{Ln} \frac{M \& A_{foreign}}{M \& A_{all\ US}}$ | -3.35* | -1.45* | | .32 |
| | (.66) | (.67) | | |
| $\text{Ln} \frac{M \& A_{foreign}}{M \& A_{all\ US}}$ | -3.45* | -1.19** | .05 | .33 |
| | (.66) | (.70) | (.04) | |

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

regressions in which the dependent variable is the logarithm of the 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.[17] 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 cost of production 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 the 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 cost of production hypothesis.[18]

## III. Robustness to Countries in Sample and Tax Effects

The above results demonstrate that the significance of the relative wealth effect on FDI is robust to the specification of the regression equation

---

[17]The annual total value of mergers and acquisitions is taken from Mergerstat Review. This series represents publicly announced formal transfers of ownership of at least 10 percent 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. These data compare closely to the ITA measure M & A used elsewhere in this paper.

[18]Coefficients on relative wage variables were not significant when included in these regressions. The coefficients on relative wealth variables were basically unaffected by the inclusion of relative wage variables.

while the significance of the relative labor cost is not. In this section we first demonstrate that the significance of the coefficient on the relative wealth variable also remains robust to the choice of the countries included in the sample, while the significance of the coefficient on the relative labor cost variable is sensitive to the countries included. We conclude this section by showing that the results are also robust to the inclusion of dummy variables that proxy for changes in the tax code over our sample period.

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 $\ln(\text{OUTLAYS}/\text{GNP}_{US})$ as the dependent variable, show that the regression results are not significantly affected by dropping any one country from the sample except for the Netherlands.

The consequence of dropping the Netherlands from the sample is shown in Table 9. In panel A of Table 9 we present regressions in which we exclude all the Dutch observations from the sample. If we compare these results with the results for the full sample, we find that the coefficient on the relative wealth variable is larger (in absolute value) for OUTLAYS and M & A and is more significant for all three measures of FDI when the Netherlands is omitted. The coefficient on the relative wage variable remains insignificant when the Netherlands is omitted.[19]

---

[19]We do not report the regressions on LAND here since the wage variable does not enter with the correct sign even in the full sample regressions. In the subsamples discussed here, relative wages enter the LAND regression with positive coefficients that are significant and relative wealth enters the regressions with negative coefficients that are significant.

Table 8
Tests of Equality of Slope Coefficients When Countries Are Omitted from the Sample

| Omitted Country: | Canada | France | Germany | United Kingdom | Swizerland | Japan | Netherlands |
|---|---|---|---|---|---|---|---|
| $X^2(4,55)$Statistic: | .03 | 1.03 | .90 | .07 | 1.62 | .34 | 4.22* |

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.

Table 9

A. Regressions Omitting All Netherlands Data from the Sample

| Dependent Variable | Ln of Real Exchange Rate | Ln of Relative Labor Costs | Ln of Relative1 Wealth | Trend | $R^2$ |
|---|---|---|---|---|---|
| Ln (OUTLAYS/$GNP_{us}$) | -2.51* | .48 | -1.51* | .12* | .51 |
| | (1.16) | (1.01) | (.48) | (.04) | |
| Ln (TOTAL/$GNP_{us}$ | -.50 | -1.45 | -1.50* | .06** | .46 |
| | (1.20) | (1.03) | (.50) | (.036) | |
| Ln (M & A/$GNP_{us}$) | -.96 | -2.02 | -1.78* | .15* | .46 |
| | (1.92) | (1.66) | (.80) | (.06) | |

B. Regressions Omitting Netherlands Data for 1979 and 1986 from the Sample

| Dependent Variable | Ln of Real Exchange Rate | Ln of Relative Labor Costs | Ln of Relative Wealth | Trend | $R^2$ |
|---|---|---|---|---|---|
| Ln (OUTLAY/$GNP_{us}$) | -2.81* | .68 | -1.26* | .11* | .43 |
| | (1.21) | (1.07) | (.48) | (.037) | |
| Ln (TOTAL/$GNP_{us}$) | -.35 | -1.31 | -1.67* | .05 | .37 |
| | (1.28) | (1.12) | (.51) | (.04) | |
| Ln (M & A/$GNP_{us}$) | -.91 | -1.95 | -1.68* | .14* | .44 |
| | (1.86) | (1.63) | (.74) | (.04) | |

Fixed-effects regressions. Standard errors in parentheses.
*Significant at 5% level.
**Significant at 10% level.

One possible reason that the inclusion of the Netherlands alters the regression results is that the Dutch data are "lumpy." Specifically, Dutch purchases of U.S. assets are marked by two large transactions: the 1979 purchase of Belridge Oil Co. by Royal Dutch Shell for $3.65 billion, and the 1987 purchase of Chesebrough-Ponds Inc. by Unilever for $3.1 billion, each of which represented roughly 70 percent of total Dutch OUTLAYS in its respective year. We investigate the importance of these two data points by presenting, in panel B of Table 9, regression results with only the Dutch observations for 1979 and 1986 omitted. Again, relative wealth enters the regression with a negative and significant coefficient when these two observations are dropped from the full sample.

Another test for the robustness of our results considers whether controlling for changes in tax laws affects the significance of relative wealth or relative labor costs.[20] In Table 10 we 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 two sets of countries, one for countries that have a territorial tax system (Canada,

[20]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 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.

Table 10
Controlling for Tax Effects on U.S. Inward Foreign Direct Investment

| Independent Variables | Dependent Variable OUTLAY | TOTAL | M & A | LAND |
|---|---|---|---|---|
| Ln (Real Exchange Rate) | -3.20* | -.54 | -1.05 | -3.84** |
| | (1.36) | (1.41) | (2.04) | (2.17) |
| Ln (Relative Wages) | .36 | -1.75 | -2.95 | 2.00 |
| | (1.25) | (1.30) | (1.88) | (2.00) |
| Ln (Relative Wealth) | -1.18* | -1.68* | -1.80* | -1.86* |
| | (.53) | (.55) | (.79) | (.85) |
| Trend | .12* | .02 | .10 | -.17* |
| | (.04) | (.04) | (.06) | (.07) |
| TAX-81-86-T | .20 | .24 | .51 | 1.07* |
| | (.31) | (.32) | (.46) | (.49) |
| TAX-81-86-W | -.06 | .34 | .34 | .36 |
| | (.42) | (.44) | (.63) | (.67) |
| TAX-87-T | -.06 | .10 | -.01 | .62 |
| | (.38) | (.39) | (.57) | (.60) |
| TAX-87-W | -1.18 | .62 | .54 | -.27 |
| | (.57) | (.59) | (.86) | (.92) |
| $R^2$ | .45 | .36 | .43 | .34 |

Fixed effects regressions.
*Significant at 5% level.
**Significant at 10% level.

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).[21] 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 is meant to capture the effects of the repeal 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.

The results of regressions run with the tax dummy variables presented in Table 10 are very similar in the significance and value of the coefficients to the corresponding results presented in Table 6. The values of the coefficients on relative wealth in this table also are close to the

---

[21]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 United States 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.)

corresponding values of the coefficients presented in Table 6. All the relative wealth coefficients in Table 10 are negative and significant at the 5 percent level. The value of the real exchange rate terms in this table are close to those obtained when the tax dummy variables are not included. The pattern of significance of the real exchange rate terms is unchanged by the tax dummy variables. The values and the pattern of significance of the relative wage variables are also little affected by the inclusion of tax dummy variables. None of the relative wage terms enter the regressions in Table 10 with a significant sign.

## IV. 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 that attributed a significant effect on foreign direct investment to real wage movements may instead have been 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 of imperfect capital markets, as in the theoretical model of Froot and Stein (1991). Our finding that relative wealth matters is also consistent, however, 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 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 outpaced those in the United States between 1989 and 1991.[22] Real exchange rates between these countries and the United States were fairly stable during this period. The stock market indices of both Japan and Canada fell relative to that of the United States in this period, with the Toronto index falling 8 percent from 1989 to 1990 and the Tokyo stock price index falling almost 30 percent between July and September of 1990, while the Dow Jones Industrial Average increased 20 percent from its 1989 average to its value in September 1991.[23] Foreign direct investment into the United States from Canada declined 57 percent from 1989 to 1990 (BEA data). Foreign direct investment into the United States from Japan, which doubled between 1987 and 1988, rose only 20 percent between 1989 and 1990 and fell in 1991 (based upon 1991 Flow of Funds data). This recent fall in foreign direct investment from Japan, observed in the face of continued Japanese relative productivity growth, is consistent with the imperfect capital markets theory of foreign direct investment and complements the evidence presented in this paper. It suggests that the important role played by relative wealth in the determination of foreign direct investment occurs through imperfections in the capital market.

---

[22]See International Monetary Fund, World Economic Outlook, October 1991, Table A 10, p. 95.

[23]These data are taken from The Nikko Chartroom, November 1991.

References

Boskin, Michael and William Gale, "New Results on the Effects of Tax Policy on the International Location of Investment," in M. Feldstein, ed., The Effects of Taxation on Capital Accumulation, Chicago, Illinois: The University of Chicago Press, c. 1987.

Caves, Richard, "International Corporations: The Industrial Economics of Foreign Investment," Economica, February 1971, pp. 1-27.

Culem, Claudy G. "The Locational Determinants of Direct Investments Among Industrialized Countries," European Economic Review, vol. 32, 1988, pp. 885-904.

Cushman, David O., "Real Exchange Rate Risk, Expectations, and the Level of Direct Investment," Review of Economics and Statistics, May 1985, pp. 297-308.

_____. "The Effect of Real Wages and Labor Productivity on Foreign Direct Investment," Southern Economic Journal, July 1987, pp. 174-185.

Froot, Kenneth A. and Jeremy C. Stein, "Exchange Rates and Foreign Direct Investment: An Imperfect Capital Markets Approach," Quarterly Journal of Economics, vol. 106, no. 4, November 1991, pp. 1191-1217.

Gordon, Myron A. and David J. Fowler, "Performance of the Multinational Drug Industry in Home and Host Countries: A Canadian Case Study," in C.P. Kindleberger and D.B. Audretsch, eds., The Multinational Corporation in the 1980s, The MIT Press: Cambridge, Massachusetts, c. 1983.

Graham, Edward M. and Paul R. Krugman, Foreign Direct Investment in the United States, Institute for International Economics: Washington, D.C., 1989.

Grubaugh, Stephen, "The Process of Foreign Direct Investment," Southern Economic Journal, October 1987, pp. 351-360.

Hartman, David G. "Tax Policy and Foreign Direct Investment in the United States," National Tax Journal, vol. 37, no. 4, December 1984, pp. 475-488.

Scholes, Myron and Mark Wolfson, "The Effects of Changes in Tax Laws on Corporate Reorganization Activity," mimeo, Stanford University, 1988.

Slemrod, Joel, "Tax Effects on Foreign Direct Investment in the U.S.: Evidence From a Cross-Country Comparison," NBER working paper no. 3042, July 1989.

Swenson, Deborah L., "The Impact of U.S. Tax Reform on Foreign Investment in the United States," mimeo, M.I.T., November 1989.

White, Halbert, "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity," Econometrica, vol. 48, 1980, pp. 817-838.