

National Saving and International Investment

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In 1981 a number of changes were made in federal tax law, partly with a view to stimulating private saving. For example, the reductions in personal income tax rates, the tax-exemption for interest on "All-Savers" certificates, and the liberalization of the use of Individual Retirement Accounts are measures that tend to raise the after-tax rate of return on capital invested by individuals. For business, tax changes designed to enhance profitability include liberalization of provisions relating to depreciation and the investment tax credit. Thus, according to the Council of Economic Advisers, "Much of the Administration's tax program is designed to increase the private saving of the Nation. As a consequence, both public and private borrowing will be accommodated more easily."¹

Aside from the issue of whether the nation's saving will rise in response to these measures, any such rise will fail to accommodate more domestic borrowing if the increased saving is invested abroad. What, then, does experience teach us about such international capital flows? If saving increases in one country, does the increase get invested primarily in that country, or is it dispersed abroad via integrated and efficient capital markets? On the other hand, if a country experiences a decline in saving, perhaps because of increased government deficits, is most of that decline offset by increased borrowing from abroad?

Questions such as these are the focus of this paper. The first section reviews the most relevant literature. Thereafter, some exploratory regression analysis for OECD countries is undertaken, and historical data for these countries are then considered. Finally, the analysis is extended in part to a much larger sample of countries.

The State of the Inquiry

For at least the past two decades—indeed, since the marked advance of convertibility in 1958—many scholars as well as practitioners have marvelled at the seeming mobility of capital throughout most of the industrialized world, a mobility manifested by the behavior of particular interest

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¹*Economic Report of the President Together with the Annual Report of the Council of Economic Advisers* (1982), p. 96.

rates as well as by actual capital movements. Among practitioners, none has experienced more convincing demonstrations of capital mobility than the monetary authorities who sought to maintain interest rates or foreign exchange rates at patently artificial levels. For example, on June 23, 1972, nearly \$900 million poured into the Deutsche Bundesbank within the first hour of foreign exchange trading, leading the Bank temporarily to abandon its effort to resist an appreciation of the mark; on March 1, 1973, the Bank absorbed another \$2.6 billion before again surrendering to market forces.² More recently, foreign officials have publicly protested against U.S. fiscal-monetary policy for putting upward pressure under foreign interest rates. In addition to such evidence on capital mobility from officialdom, numerous other indicators could be marshalled, including the fact that 26 percent of the total equity of Canadian corporations in 1980 was held by foreigners.³ The repeated references to the billions, or hundreds of billions, of dollars "sloshing around" in the Euromarkets and the close correlation of short-term interest rates (after adjustment for cost of forward cover) in Chart 1 also testify to the mobility of capital between the markets concerned.

Considerations such as these have led many to conclude that capital is highly mobile internationally, especially between the industrial countries. As Whitman has noted, "... much of the recent analytical work in international economics has moved away from closed-economy models to models based on the fundamental assumption of a highly integrated world economy."⁴ In the same paper this point is illustrated by her own analysis, wherein she maintains, "Finally, there is the fact that flexible exchange rates provide only limited insulation against foreign disturbances in a world of capital mobility."⁵ More recently, McKinnon (1981, p. 533) has argued, "The development of the eurocurrency market now enables both firms and governments to borrow (or lend) internationally, on a large scale, for long periods in a variety of convertible currencies. Clearly, the international integration of capital markets in the 1980s parallels that prevailing in world trade in goods and services, whereas in the late 1940s national capital markets were segmented by exchange controls and eurocurrency transacting did not yet exist."

In a recent pathbreaking article Martin Feldstein and Charles Horioka (1980) have reached a different conclusion; they have found capital to be so immobile in the long run that any new saving in an industrial country typically gets invested almost exclusively in that same country, with little or none being invested abroad! The seeming contrast between their results and the prevailing consensus provides the chief stimulus for this paper.

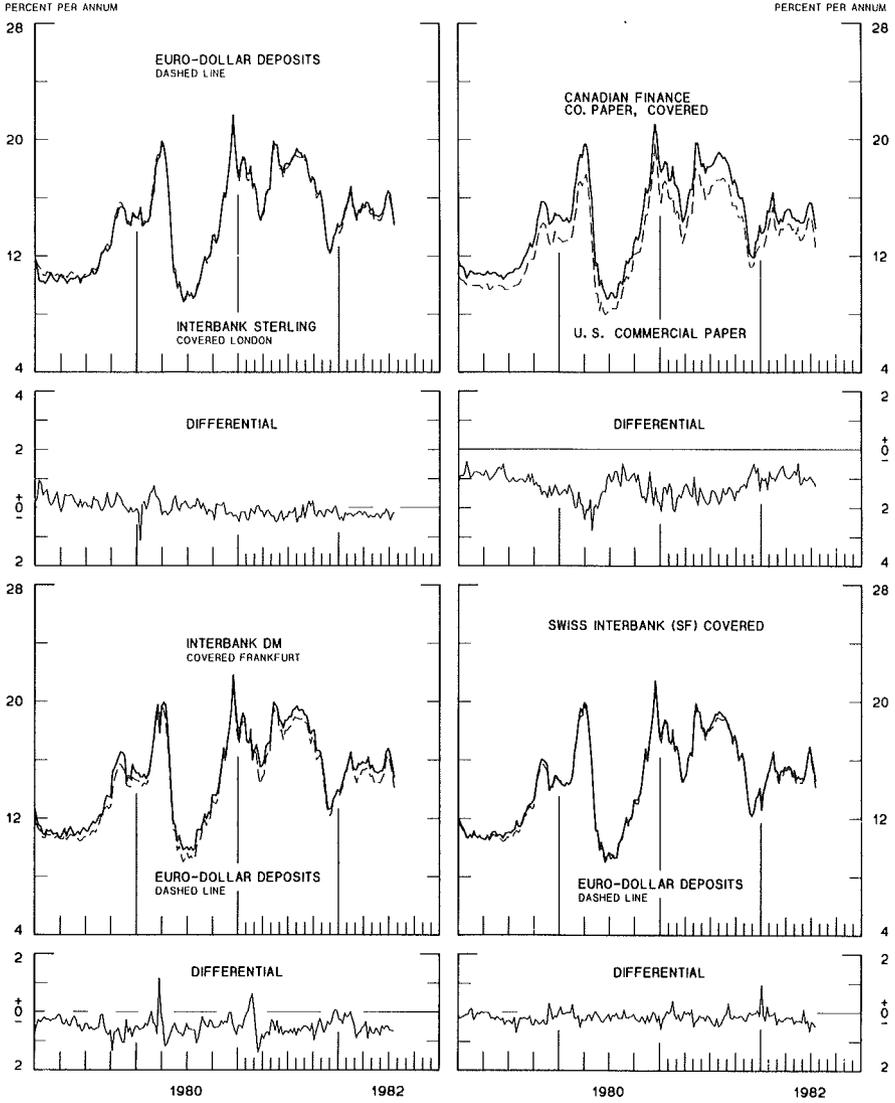
²*Federal Reserve Bulletin*, September 1972, p. 765, and March 1973, pp. 148-49.

³For 1975 the comparable figure was 35 percent. These data were supplied by staff of the Bank of Canada and are based on Statistics Canada, *Financial Flow Accounts*.

⁴Whitman (1976), p. 183.

⁵*Ibid.*, p. 207.

Chart 1
Interest Arbitrage: 3-Month Funds
Differential: Plus (+), Indicates Favor Dollar Assets
Averages for Week Ending Wednesday



1 Percent on Differential Scale = 2 Percent on Rate Scale

Source: U.S., Board of Governors of the Federal Reserve System, *Selected Interest and Exchange Rates*,

To launch the formal analysis, consider that

$$GNS = GNP - C + R,$$

where GNS is gross national saving, GNP is gross national product, C is all consumption, public and private, and R represents net remittance and other unilateral transfer receipts from abroad. Now,

$$GNP = C + GDI + X - M + D,$$

where GDI is gross domestic investment, X and M are exports and imports, respectively, of goods and services (excluding factor services), and D is dividend and other net receipts from factor services supplied other nations. Thus,

$$\begin{aligned} GNS &= GDI + X - M + D + R, \text{ or} \\ GNS &= GDI + NFI, \end{aligned}$$

where NFI is net foreign investment, or the addition to net claims on foreigners (or, essentially, the current account of the balance of payments); the gross saving of a nation can be invested at home or abroad.

To assess how an increment of saving within a nation gets divided between domestic and foreign investment, Feldstein and Horioka estimated the following equation:

$$(1) \quad (GDI/GDP)_i = \alpha + \beta(GNS/GDP)_i,$$

where GDP is gross domestic product, or $GNP - D$, and both $(GDI/GDP)_i$ and $(GNS/GDP)_i$ are average ratios for country i of the corresponding yearly ratios over long periods; one regression employed the average ratios for 1960–74, and others employed the average ratios for 1960–64, 1965–69, and 1970–74.⁶ Thus, the analysis sought to determine how sustained differences in saving rates from one country to the next influence the corresponding investment rates, and in this long-run context the observed variation in saving rates was assumed to be exogenous, reflecting basic structural differences among countries rather than short-run phenomena affecting saving and investment jointly. Equation (1) was estimated with data for 16 OECD countries, and a variant employed net saving and investment in place of gross saving and investment.

From this regression analysis Feldstein and Horioka found that the estimated value of β in equation (1) did not differ significantly from one, whether saving and investment were measured gross or net of depreciation allowances. The conclusion was that “nearly all of incremental saving re-

⁶Although Feldstein and Horioka presented their explanatory variable as (GDS/GDP) , where GDS is gross domestic saving, their measure of saving is called gross national saving in publications of the United Nations and the World Bank, and a different definition is given for gross domestic saving. The Feldstein-Horioka measure of saving is the one used in the United Nations System of National Accounts (S.N.A.), and this measure is characterized as “national saving” in the U.N. *Yearbook of National Accounts Statistics, 1979*, Volume 1, p. XXV. Gross national saving is defined as $GDI + X - M + D + R$, while gross domestic saving is $GDI + X - M$; see The World Bank, *World Tables*, 2d ed. (1980, p. 7) and *World Development Report 1981* (p. 185).

mains in the country of origin" (p. 317). A subsequent paper by Feldstein (1982) offers further support for this view.

This remarkable conclusion has significant implications for policy. First, policies to stimulate national saving may have more domestic appeal if it is likely that any increased saving will be invested at home; other things equal, a nation receives a higher return on its saving invested at home than on its saving invested abroad because foreign taxes are collected on earnings from investments abroad. Second, if saving—and more generally, capital—is unlikely to be invested abroad, that fact is relevant for tax policy, because a tax on income of capital will not induce a capital exodus and a corresponding shift of the tax burden to domestic labor. Finally, even though a current-account balance of payments deficit corresponds to a shortfall of national saving below domestic investment, there will be little reason to try to reduce such a deficit by enlarging national saving if virtually all of any increased saving is allocated to domestic investment. These deductions, like the regression analysis, apply to the long run; Feldstein and Horioka recognize the evidence that capital does flow across national boundaries in the short run in response to changing short-term covered-interest differentials, but they argue that in the long run capital is much less responsive to yield differentials because of the greater risk and controls to which long-term international investments are subjected.

While it may be appropriate, in this long-run context, to treat saving as exogenous, with investment following along, such treatment would seem more questionable in an intermediate or short-run context. Indeed, Sachs (1981) has argued that in the intermediate term changes in domestic investment rather than saving should be taken as the central exogenous variable for purposes of explaining international capital flows, and that at least for this time horizon changes in domestic investment tend to induce changes in the current account of the balance of payments.⁷ The present paper, in focusing on the role of exogenous changes in national saving, retains the longer run perspective adopted by Feldstein and Horioka.

Abstracting from the time horizon of the analysis, Harberger (1980) has argued that domestic investment is more likely to diverge widely from saving in a small (and poor) country than in a large (and wealthy) country, just as they are more likely to diverge widely in a city block than for an entire city. Since Feldstein and Horioka include in their analysis only OECD countries, which have relatively large incomes (both in total and per capita), their results may be biased, or unrepresentative of the wider world.

The Basic Model

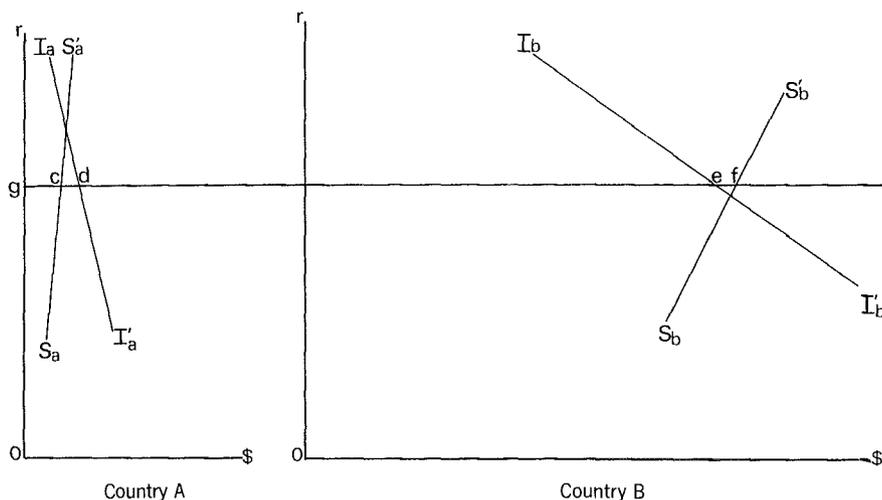
To provide a starting point for theorizing about the relationship between net foreign investment, national saving, and domestic investment, it may be helpful to employ some simple geometry. At the outset, assume a world of perfect competition without any market failures (i.e., without ex-

⁷For comment by Feldstein on Sachs's analysis, see Feldstein (1982, pp. 27–29).

ternalities). In Chart 2, r represents the rate of interest and the marginal efficiency of investment, SS' and II' represent national saving and domestic investment, respectively, and all variables are measured in real terms. In this two-country world, with perfect capital mobility, equilibrium is assumed to prevail at the interest rate $0g$, with country B making net foreign investment in country A in the amount of $ef=cd$.

Since capital is mobile, it seems reasonable to measure country size in terms of the stock of noncapital or internationally immobile factors which are present in each country. In this illustration, country B is assumed to be the "large" country, and because the quantity of other factors with which capital can work is much greater in B than in A, the investment schedule in B is markedly flatter than in A (but not necessarily more elastic at any given interest rate), provided technologies are similar in the two countries. In consequence, domestic investment in B greatly exceeds that in A. Now, if national saving, too, is correlated with country size, domestic investment will be observed to increase as national saving increases (from one country to the next) merely because of their common correlation with size, even with perfect capital mobility, so that a significant correlation between national saving and domestic investment would *not* be proof of capital immobility. Thus, any regression of domestic investment on national saving should allow for the probable correlation between national saving and national size; failure to do so would invite bias in the estimate of the coefficient for national saving.

Chart 2
 Saving, Investment, and Net Capital Flow
 between a Large and Small Country



To my knowledge, this problem has not been tackled explicitly by previous statistical analyses, although Feldstein and Horioka (1980), Feldstein (1982), Sachs (1981), and Harberger (1980) all express saving and investment as fractions of *GDP*. Such "normalization" fundamentally changes the nature of the analysis, however, as is illustrated by the following table.

Table 1
Illustration of Correlation between *GNS/GDP* and *GDI/GDP* in the
Absence of Correlation between *GNS* and *GDI*

(Dollar amounts in billions)

<u>Country</u>	<u>GNS</u>	<u>GDI</u>	<u>GDP</u>	<u>GNS/GDP</u>	<u>GDI/GDP</u>
A	\$12.0	\$14.0	\$100	0.120	0.140
B	13.0	14.0	90	0.144	0.156
C	14.0	14.0	80	0.175	0.175
D	15.0	14.0	70	0.214	0.200
E	16.0	14.0	60	0.267	0.233
Total	70.0	70.0			

In this example there is no correlation between gross national saving and gross domestic investment, but there is a perfect correlation of +1.0 between them after they are divided by gross domestic product.

More generally, if $(GDI/GDP)_i = \alpha + \beta(GNS/GDP)_i$,

$$\begin{aligned} \text{then } \beta &= \left(\frac{GDI_2}{GDP_2} - \frac{GDI_1}{GDP_1} \right) \bigg/ \left(\frac{GNS_2}{GDP_2} - \frac{GNS_1}{GDP_1} \right), \\ &= \frac{(GDP_1)(GDI_2) - (GDP_2)(GDI_1)}{(GDP_1)(GNS_2) - (GDP_2)(GNS_1)}, \end{aligned}$$

where the subscripts 1 and 2 refer to any two points on the regression line. This definition of β is not what is desired if the goal is to test for capital mobility; what is desired is

$$\beta = \frac{GDI_2 - GDI_1}{GNS_2 - GNS_1}.$$

Thus, equation (1) is less than ideal for purposes of testing whether capital is internationally mobile, or whether national saving gets invested only at home.

An alternative to equation (1) is the following:

$$(2) \quad GDI_i = \alpha + \beta_1 GNS_i + \beta_2 GDP_i,$$

where GDP_i represents the influence of country size. This formulation seems to flirt with other problems, including simultaneous equations bias, heteroscedasticity, and multicollinearity. As for the simultaneity bias, it is true that all variables in equation (2) are jointly determined at least in the short run, but in our regression analysis we shall follow the approach of

Feldstein and Horioka and employ average long-period values of these variables, on the assumption that in the long run the observed variation in saving and in domestic product is exogenous, corresponding to fundamental intercountry differences in resources, time preferences, and the like, rather than to transient disturbances jointly influencing saving, domestic investment, and domestic product. Thus, GDI_t , GNS_t , and GDP_t are each taken as an annual average of 1971–1978 (a period which neither begins nor ends with a business cycle peak or trough for any of the countries included). As will be indicated, neither heteroscedasticity nor multicollinearity seems to affect the regression results in a crucial way.

Regression Results for OECD Countries

For the variables in equation (2) it is desirable to have data expressed in a currency unit which has the same purchasing power from one country to the next, and it is well known that use of market-determined foreign exchange rates to convert units of one currency into another will generally fail to yield such data. Fortunately, the OECD has recently published purchasing power parities for a number of OECD countries, and we have used these PPPs in lieu of market exchange rates to derive data expressed in dollars of comparable purchasing power across countries; these data were then deflated by a price index for U.S. gross domestic product to obtain data of constant purchasing power over time.⁸ The desired data could be obtained for 13 OECD countries, including all of the “Big Seven” except Canada.⁹

The method of ordinary least squares was then used to estimate equation (2) as well as several variants. The results are presented in Table 2, where GDI and NDI refer to gross and net domestic investment, respectively, and GNS and NNS refer to gross and net national saving, respectively. Because of correlation between GDP and each of the savings variables, the coefficient for each explanatory variable is larger if it is used as the sole explanatory variable (aside from the intercept). However, when both GDP and saving are included as explanatory variables, the coefficients on both remain significant at the 0.01 level. This outcome suggests that collinearity does not invalidate the analysis; it is also consistent with the view that a measure of country size, such as GDP , should be included.

⁸The price index for GDP was used because the PPPs are for GDP , because the index is compatible with the S.N.A. (System of National Accounts), and because price indexes for the GDP components used in the regressions were not available in terms of the S.N.A.

⁹Countries were included only if data were available for them in terms of the “present System of National Accounts;” they are listed in the note to Table 2.

Table 2
Regression Equations for Domestic Investment Based on Average Annual Data in Constant Dollars for the Period 1971–1978 for 13 OECD Countries

Dependent variable	Coefficients of explanatory variables and t-ratios				\bar{R}^2
	<i>GNS</i>	<i>NNS</i>	<i>GDP</i>	Intercept	
<i>GDI</i>	0.925 (48.43)		0.017 (4.20)	0.236 (0.43)	1.00
<i>GDI</i>	1.002 (123.42)			-0.093 (-0.11)	1.00
<i>GDI</i>			0.200 (12.96)	8.159 (1.07)	0.93
<i>NDI</i>		0.914 (42.04)	0.009 (4.15)	0.456 (0.80)	1.00
<i>NDI</i>		0.992 (56.01)		0.313 (0.35)	1.00
<i>NDI</i>			0.082 (6.11)	9.717 (1.45)	0.75

Note: Countries included are Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Japan, Luxembourg, Netherlands, Spain, United Kingdom, and United States.

Source: Underlying data are from Organisation for Economic Cooperation and Development, *National Accounts, Volume 1, 1951–1980* (1982).

Tests and experiments relating to heteroscedasticity suggest that it is of little consequence. Taking equation (2)—along with the usual disturbance term—as the basic model, we plotted the regression residuals against *GNS* and then against *GDP*. We discerned a slight tendency for the absolute values of the residuals to rise with each of these variables. Application of the Goldfeld-Quandt procedure to test for proportionality between the variance of the disturbance and, first, GNS^2 , and, second, GDP^2 , yielded in each case an F-statistic barely significant at the 0.05 level, suggesting the presence of some such proportionality. Because of high correlation between *GNS* and *GDP*, it seemed sufficient to focus on only one of these variables in transforming equation (2) so as to attain homoscedasticity, and we selected *GNS*. Dividing through equation (2) by *GNS* produced an equation whose regression residuals also were heteroscedastic, according to the Goldfeld-Quandt test; indeed, the F-statistic was easily significant at the 0.05 level. Consequently, on the assumption that the variance of the disturbance term for equation (2) was proportional to *GNS* rather than GNS^2 , we divided equation (2) by \sqrt{GNS} and then obtained the following estimated equation, with residuals homoscedastic according to the Goldfeld-Quandt test:

$$(GDI/\sqrt{GNS})_i = -0.071(1/\sqrt{GNS}_i) + 0.912\sqrt{GNS}_i + 0.021(GDP/\sqrt{GNS})_i$$

(-0.33)
(20.27)
(2.06)

Note that this kind of transformation is not the same as the "normalization" represented by equation (1), which retains the traditional intercept. Because the relevant coefficients in this transformation of equation (2) are significant at the 0.05 level (under the one-tail test appropriate) and are virtually identical to the corresponding coefficients reported for equation (2) in Table 2, we conclude that heteroscedasticity is probably of little consequence.¹⁰

For the two regression equations in Table 2 that include *GDP* along with either *GNS* or *NNS*, the coefficients of both *GNS* and *NNS* not only differ significantly from zero, as shown by the customary t-statistics in the table, but they also differ from one at the 0.01 level of significance. Consequently, unlike Feldstein and Horioka, we can reject the hypothesis that capital is completely "immobile" internationally over the long term.

Nonetheless, for a country represented in these regressions, it seems that roughly \$0.92 of each extra "dollar" saved gets invested at home in the long run. Moreover, it does not necessarily follow that the remaining \$0.08 is estimated to be invested abroad. For one thing, the fine detail of the System of National Accounts shows that the difference between gross national saving and gross domestic investment consists not only of net foreign investment but also of international "capital transfers," such as international grants (including receipts of special drawing rights issued by the International Monetary Fund), as well as the statistical discrepancy. As for the discrepancy, there seems no more reason to pretend that it is foreign investment than to pretend that it is national saving, as a general rule; this matter is not inconsequential, for the magnitude of the discrepancy sometimes dwarfs that of net foreign investment.¹¹ For these reasons, it is better to estimate directly the share of national saving invested abroad than simply to assume that this share is equivalent to one minus the fraction of national saving estimated to be invested domestically.

Such direct estimates are reported in Table 3, where the variables are defined as in Table 2. For the countries included, over the long run about \$0.07 of each \$1.00 increase in national saving is estimated to be invested abroad, whether saving is measured gross or net of capital consumption. In each equation the coefficients for both *GDP* and the savings variable are significant at the 0.05 level, and the sign of the coefficient for *GDP*, as should be expected, is negative, indicating that for a given level of saving the amount of foreign investment declines as country size increases. Because the coefficients of determination are not so high for these equations as for those in Table 2, we tested for nonlinear relationships by reestimating the first equation in Table 3 after adding squared values of the explanatory variables; the coefficients of these added variables were not significant at the 0.10 level, so nonlinearity does not seem to be present. In addition, the

¹⁰I am indebted to Stanley Black for urging an investigation of this matter. For an illustration of the Goldfeld-Quandt procedure, see Kane.

¹¹For example, in 1971 net foreign investment by the United States was -\$726 million, while the statistical discrepancy was \$4.1 billion.

Goldfeld-Quandt procedure was used to test for proportionality between GNS^2 and the disturbance variance in this first equation; the F-statistic was not significant at the 0.05 level.

Table 3
Regression Equations for Net Foreign Investment Based on
Average Annual Data in Constant Dollars for the Period 1971–1978
for 13 OECD Countries

Coefficients of explanatory variables and t-ratios				
<i>GNS</i>	<i>NNS</i>	<i>GDP</i>	Intercept	\bar{R}^2
0.065 (3.50)		-0.012 (-3.13)	-0.575 (-1.07)	0.48
	0.072 (3.31)	-0.005 (-2.38)	-0.744 (-1.30)	0.45

Note: For source and countries included, see notes to Table 2.

Thus, in spite of the statistical discrepancy, Tables 2 and 3 tell a consistent story for the 13 OECD countries included. While capital is not completely immobile internationally over the long run, it does seem to be so immobile that more than 90 percent of an increase in a nation's saving will be invested in that same nation.¹²

What explains this seeming immobility of capital? One possible explanation is the existence of governmental controls over international capital flows, for it is well known that such barriers can have a substantial impact. One current and noteworthy illustration is afforded by the Canadian Government's measures to reduce the share of foreign ownership in Canada's oil and gas industry from the current level of about 65 percent to less than 50 percent by 1990. As another recent example, in March 1982 the French Government prohibited transfers of funds abroad by French companies for foreign investments in excess of one million francs. The list of such restrictions goes on and on, as can be seen from the International Monetary Fund's latest *Annual Report on Exchange Arrangements and Exchange Restrictions*.

Moreover, there are countries between which long-term capital might not readily transfer even if there were no governmental restrictions. As I have argued elsewhere, "Foreign investment is aptly named, not only because it is investment in other countries, but because the word 'foreign' connotes that which is different from one's experience, that which is strange. The strangeness of foreign stocks and bonds, the difficulty and expense of acquiring information about them, surely constitutes a major, if not the major, obstacle to their purchase by the typical investor. The language barrier alone is a significant hurdle. In addition to the difficulty of acquiring information on particular securities, the potential foreign investor should con-

¹²This finding tends to render more relevant the traditional models of international trade which assume factors of production to be immobile internationally.

sider the risk of devaluation of the foreign currency as well as varied political risks, such as the relatively great uncertainty of recovering defaulted foreign obligations through legal proceedings."¹³ These factors lower the expected net return from foreign securities and raise the variance of that return, thereby rendering such securities less competitive with domestic securities (other things equal) in the portfolio deliberations of the representative investor.¹⁴

Governmental controls and, more generally, the extra costs and risks often associated with foreign securities may serve partially to explain the apparent long-run international immobility of capital, but even in the absence of these factors the long-run magnitude of net capital flows might be constrained by balance of payments considerations. Some evidence relevant to this issue is examined in the next section.

OECD Country Experience in Historical Perspective

The preceding analysis suggests that at the margin only a small fraction of national saving in an OECD country gets allocated to net foreign investment, or to improving the current account of the country's balance of payments, in the long run. This finding raises questions about the broader historical experience of the OECD countries. How large have the current-account balances of these countries been in relation to gross national saving or gross domestic product? Has there been a tendency for these balances to increase or to diminish in a relative importance over the years?

In order to address such questions, we have compiled time series of relevant data for two groups of OECD countries. For 14 countries data could be gathered on the current-account balance, gross domestic product, and national saving beginning with 1952, the first year for which national savings data were readily available for major countries. For nine countries the data on current-account balances and gross domestic product were readily available back to 1948. To gain perspective on the average experience of these countries, we have computed for each country the ratio of the (absolute) current-account balance to *GDP*, and to saving if possible, and then taken the average of these country ratios for each year. The resulting percentages for the two groups of countries are presented in Tables 4 and 5. Table 4 shows that in 1976, following the oil shock, current-account balances in relation to national saving were, on average, nearly 14 percent, an historical high for the 14 countries for the 29 years under scrutiny. It is difficult to discern long-term trends in either table, but the percentages have been relatively high in most years since 1973.

Table 6 provides selected statistics on the experience of the 14 countries individually. Columns 4 and 8, which present the average yearly ratio of net lending (positive) or borrowing (negative) to gross national saving or *GDP*, show that Ireland has experienced by far the largest average net capi-

¹³Fieleke (1971), pp. 18–19; also see Kenen (1976), pp. 24–31.

¹⁴The investor may still acquire foreign securities, of course, partly for diversification; the point is that he would acquire even more were it not for the factors mentioned.

Table 4
Current-Account Balances as Percentages of Gross National Saving and of Gross Domestic Product: Averages of Absolute Values of the Percentages for 14 OECD Countries, 1952–1980¹

Year	Average percentage		Year	Average percentage	
	Of gross national saving	Of gross domestic product		Of gross national saving	Of gross domestic product
1952	9.22	1.94	1967	5.02	1.20
1953	11.16	2.51	1968	5.24	1.29
1954	8.05	1.80	1969	6.49	1.58
1955	10.52	2.08	1970	6.36	1.50
1956	6.61	1.36	1971	6.78	1.66
1957	5.36	1.24	1972	4.38	1.13
1958	8.49	1.87	1973	6.38	1.63
1959	6.84	1.54	1974	13.13	3.03
1960	5.62	1.35	1975	10.22	2.42
1961	4.96	1.21	1976	13.80	3.22
1962	8.37	1.95	1977	13.76	3.10
1963	5.53	1.26	1978	9.39	2.20
1964	6.41	1.43	1979	10.19	2.27
1965	7.07	1.64	1980	11.60	2.45
1966	6.36	1.53			

¹The countries included are Austria, Canada, Denmark, Finland, Germany, Ireland, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, United Kingdom, and United States.

Source: International Monetary Fund: *Balance of Payments Statistics Yearbook*, various issues; *International Financial Statistics Yearbook, 1981*, and *Supplement on Exchange Rates, 1981*. Organisation for Economic Cooperation and Development, *National Accounts, 1951–1980*, Volume 1.

tal transfer (an inflow), relative to saving or *GDP*, among the 14 countries represented. Ireland again tops the list—followed by Norway—when the same ratios are averaged without regard to algebraic sign (columns 5 and 9); these absolute percentages, of course, measure the importance of net international capital flows (in relation to national saving or *GDP*) regardless of the direction of the flow.¹⁵ The smaller the country, the larger tends to be its current-account balance relative to its size; if the countries are ranked according to the percentages in column 9 and then according to the average of their current-dollar *GDP* for 1952 and 1980, the correlation (Spearman's) between the two rankings is -0.70 , with a *t*-statistic of -3.36 . This correlation accords with intuition, for the smaller the country, the larger is the rest of the world with which it can transact.

¹⁵The more detailed statistics show that for the countries and years covered by Table 6 the largest absolute current-account balance in relation to saving or *GDP* in a single year was recorded by Norway in 1977, when rapidly rising domestic demand and prices, partly associated with North Sea oil development, helped to boost the country's current-account deficit to 63 percent of gross national saving and 14 percent of *GDP*.

Table 5
Current-Account Balances as Percentages of Gross Domestic Product¹: Averages of Absolute Values of Percentages for Nine OECD Countries, 1948–1980.²

Year	Percent	Year	Percent
1948	1.86	1964	1.29
1949	2.49	1965	1.14
1950	1.54	1966	1.34
1951	1.93	1967	1.86
1952	1.87	1968	1.72
1953	1.90	1969	0.80
1954	1.24	1970	1.28
1955	1.82	1971	1.93
1956	1.63	1972	1.18
1957	1.48	1973	1.68
1958	1.89	1974	3.13
1959	1.59	1975	3.07
1960	1.88	1976	2.39
1961	1.36	1977	2.07
1962	1.62	1978	1.34
1963	0.64	1979	1.65
		1980	2.38

¹Data on *GDP* could not be obtained for all years for Iceland and the Netherlands, so *GNP* data were used for them.

²The countries included are Austria, Canada, Denmark, Finland, Iceland, Netherlands, Sweden, United Kingdom and United States.

Source: International Monetary Fund: *Balance of Payments Statistics Yearbook*, various issues; *International Financial Statistics Yearbook*, various issues; and *Supplement on Exchange Rates, 1981*. Organisation for Economic Cooperation and Development, *National Accounts*, various issues.

For most countries there has been considerable variation over the years in the current-account balance relative to saving or *GDP*, as indicated by the standard deviations and coefficients of variation shown in columns 6, 7, 10, and 11. With all this variability, is there a tendency for the current-account balance to net out to zero for the typical country over the years? It might seem reasonable to expect some such balance of payments constraint, on the grounds that in the long run capital-importing countries will repay their debts, either because of natural shifts in schedules such as those in Chart 2 or because the governments concerned will adopt policies to limit the accumulation of positive or negative current-account balances.¹⁶

¹⁶In fact, of course, a country's net indebtedness varies not only with its current-account deficits but also with "valuation and other adjustments," such as changes in the value of foreign holdings of stock in the country's corporations; see, for example, *Survey of Current Business*, August 1981, pp. 52–57.

Table 6
Selected Statistics on Current-Account Balances for 14 OECD Countries, by Country, for 1952–1980

Country	Cumulative current- account balance (in billions of U.S. dollars) (1)	Col.(1) divided by 1980 gross national saving (2)	Col.(1) divided by largest annual balance ¹ (3)	Current-account balance as percent of gross national saving, yearly				Current-account balance as percent of gross domestic product, yearly			
				Average		Standard deviation (6)	Coefficient of variation (7)	Average		Standard deviation (10)	Coefficient of variation (11)
				Algebraic (4)	Absolute (5)			Algebraic (8)	Absolute (9)		
Austria	-13.2	-0.6	3.7	-3.7	5.8	7.7	2.1	-1.0	1.5	1.9	1.9
Canada	-41.4	-0.8	8.9	-9.6	10.4	8.4	0.9	-2.0	2.2	1.7	0.8
Denmark	-15.4	-1.6	5.2	-8.2	10.5	9.8	1.2	-1.6	2.0	1.8	1.1
Finland	-7.5	-0.6	3.4	-4.9	7.5	8.5	1.7	-1.2	1.9	2.2	1.8
Germany	30.0	0.2	1.9	3.9	5.2	4.8	1.2	1.0	1.3	1.2	1.2
Ireland	-6.5	-1.6	4.4	-19.4	20.0	14.1	0.7	-3.7	3.8	2.6	0.7
Italy	8.5	0.1	0.9	2.2	7.5	8.8	4.0	0.6	1.7	2.0	3.3
Japan	24.9	0.1	1.4	0.8	3.0	3.5	4.4	0.3	1.0	1.2	4.2
Nether- lands	-5.3	0.2	1.9	4.6	8.3	10.5	2.3	1.3	2.2	2.7	2.1
Norway	-16.1	-0.9	3.2	-8.1	13.2	18.1	2.2	-2.1	3.4	4.4	2.1
Sweden	-11.7	-0.6	2.2	-2.4	4.4	6.7	2.8	-0.4	0.9	1.3	2.9
Switzer- land	18.4	0.7	4.2	5.9	9.0	10.1	1.7	1.5	2.4	2.7	1.8
United Kingdom	-5.8	-0.1	0.7	*	5.6	7.2	361.0	0.0	1.0	1.2	∞
United States	41.9	0.1	2.3	1.2	2.3	2.6	2.1	0.2	0.4	0.5	2.1

¹Absolute value.

*Less than 0.05 in absolute value.

Source: See notes to Table 4.

This expectation is supported by the relatively small cumulative current-account balances reported in column 2 of Table 6. To shed some additional light on this issue, we have calculated the number of years that would be required for each country to reverse or offset its aggregate current-account deficit or surplus accumulated over the period 1952–1980 if the country were to run an annual surplus or deficit equivalent to its largest absolute annual balance during this period. The results, presented in column 3, reveal that by this measure most countries could repay or collect their accumulated deficits or surpluses within a few years; by far the longest “reversal period,” nearly nine years, would be required by Canada. Even if this approach substantially underestimates the reversal periods that would actually be required, those periods would still be short for most countries.

Although the cumulative balances shown in Table 6 are small, occasionally a country does record a very large current-account balance in relation to gross national saving, as suggested by the measures of dispersion in columns 6 and 7. This combination of circumstances is consistent with the view that capital is very mobile between countries but that balance of payments-related considerations set fairly tight limits on *cumulative* net capital flows for most countries. In particular, governments concerned about the consequences for employment or inflation of continuing sizable current-account deficits or surpluses may adopt not merely controls but monetary and fiscal policies designed partially to eliminate or reverse those deficits or surpluses, influencing relative marginal efficiencies of investment in the process.¹⁷

The Wider World

The regression results presented in Tables 2 and 3 suggest that for the 13 OECD countries more than 90 percent of an increase in a nation's saving gets invested in that same nation over the long run. However, the world is not confined to these 13 countries, whose experience may be unrepresentative, so extension of the analysis to a much larger sample of countries is highly desirable. Such an extended application of equation (2) might not be fruitful for want of sufficiently precise purchasing power parity data; but an equation such as (1) can be estimated using data for 87 countries compiled by the World Bank, and the results compared with those obtained by Feldstein and Horioka from their much smaller sample of countries.¹⁸ One suspects that the data for the non-OECD countries included in these 87 may be generally less accurate than the OECD-country statistics, which themselves present formidable problems. By way of illustration for the OECD countries, the data on gross saving for the United States published

¹⁷In a discussion of external policy targets of major industrial countries, Black (1978, p. 619) argues that “large [current-account] deficits or surpluses would not be sustainable over a long period of time, though moderate ones could represent a stable pattern of capital flows.” Insofar as the difference between GNS_t and GDI_t is controlled by government policy, the models specified in equations (1) and (2) will not detect the “market” relationship between the two variables.

¹⁸As we have pointed out, equations (1) and (2) are not equivalent.

by the OECD in 1981 contain revisions (of the data published in the prior year) of between 8 and 11 percent for each of the years 1973 through 1978. But even though enlarging the sample might multiply the measurement error, the enlargement seems justified by the need to transcend a small and perhaps unrepresentative sample.

The basic equation estimated was

$$(3) \quad (GDI/GNP)_i = \alpha + \beta_o (GNS/GNP)_i,$$

where $(GDI/GNP)_i$ and $(GNS/GNP)_i$ are average ratios for country i of the corresponding yearly ratios for 1968 through 1977, the latest year for which the underlying data have been published by the World Bank. Ordinary least squares regression results are exhibited in Table 7 for the 87 countries as well as for selected subsets of the 87. Each coefficient of GNS/GNP is significant at the 0.01 level.

According to these estimates, over the long term 89 percent of an increase in the saving rate in an industrial country goes to enhance the investment rate in that country, a finding which is consistent with that of Feldstein and Horioka and also with the estimates for 13 OECD countries presented in Table 2. On the other hand, the comparable figure for both the 69 nonindustrial countries and the full sample of 87 countries is only 65 or 66 percent. Examination of the residuals for the regressions involving the 87 countries and the 69 countries disclosed that one "capital-surplus oil-exporting country," Saudi Arabia, accounted in each regression for by far the largest absolute residual, whose size and negative sign indicated that the country's actual average domestic investment rate was well below that estimated by the regression equations.¹⁹ Chart 3 depicts this outcome for the first regression reported in Table 7.

The temptation was irresistible to reestimate without Saudi Arabia, on the grounds that this "outlier" is in some way *sui generis*. The results of these reestimations are reported in Table 7 for "all [countries] but Saudi Arabia" and for "nonindustrial [countries] less Saudi Arabia." These results indicate that the gross domestic investment rate in an included country rises by about four-fifths of an increase in the national saving rate, an estimate more closely compatible with that for the 18 industrial countries. Even after the exclusion of Saudi Arabia, however, the estimated coefficient of the saving rate is somewhat lower for the nonindustrial countries than for the 18 industrial countries, suggesting that capital is less mobile internationally for the industrial countries than for the nonindustrial countries!²⁰

¹⁹"Capital-surplus oil-exporting countries," a classification employed by the World Bank, included six countries. The available data permitted only two, Libya and Saudi Arabia, to be included in the regression analysis.

²⁰Any such inference must be very tentative, partly because β_o in equation (3) should not be interpreted as equivalent to β_1 in equation (2); see the discussion accompanying Table 1.

Table 7
Regression Equations for (*GDI/GNP*) for 1968–1977 for Selected Groups of Countries

Countries included	Coefficients of explanatory variables and t-ratios		\bar{R}^2
	<i>GNS/GNP</i>	Intercept	
All 87	0.662 (11.03)	9.374 (7.21)	0.58
18 industrial	0.890 (7.78)	3.347 (1.154)	0.78
69 nonindustrial	0.654 (9.12)	9.618 (6.52)	0.55
All but Saudi Arabia	0.787 (14.52)	7.150 (6.24)	0.71
Nonindustrial less Saudi Arabia	0.816 (12.55)	6.932 (5.36)	0.70

Source: Underlying data are from the World Bank, *World Tables*, 2d ed. (1980).

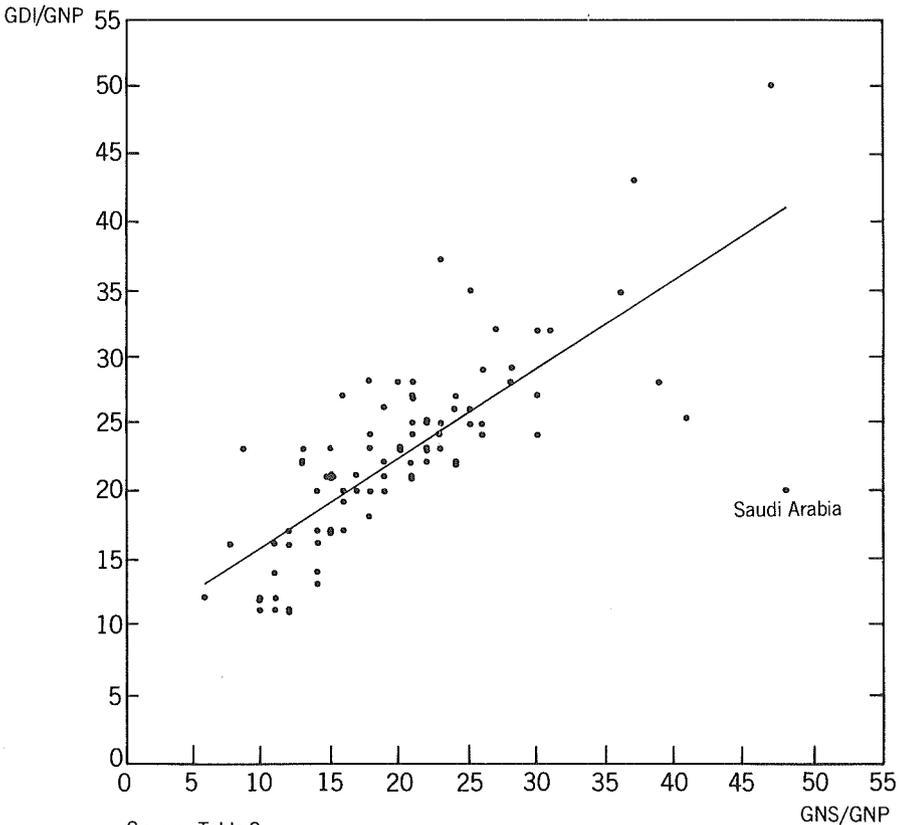
Note: The 18 industrial countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, United Kingdom, and United States.

The 69 nonindustrial countries are Algeria, Argentina, Barbados, Bolivia, Brazil, Burma, Central African Rep., Chad, Chile, Colombia, Costa Rica, Cyprus, Dominican Rep., Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Gabon, Ghana, Greece, Guatemala, Guyana, Haiti, Honduras, Indonesia, Iran, Israel, Ivory Coast, Jamaica, Kenya, Rep. of Korea, Libya, Malawi, Malaysia, Mali, Malta, Mauritania, Mexico, Morocco, Nicaragua, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Singapore, Somalia, South Africa, Spain, Sri Lanka, Sudan, Syria, Taiwan, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uganda, Uruguay, Venezuela, and Zambia.

As was true of the results reported in Table 2, the estimates presented in Table 7 generally contradict the hypothesis that capital is perfectly immobile in the long run. Except in the equation for the 18 industrial countries, the coefficient for *GNS/GNP* differs from one at the 0.01 significance level in every instance.

Chart 3

GNS/GNP and GDI/GNP, 1968 - 1977, for Eighty-Seven Countries



Source: Table 9

Conclusion

The evidence examined in this paper supports the view that, for the typical nation, especially an industrial nation, only a small fraction of an increase in saving is invested abroad in the long run. Whether this phenomenon should be interpreted as capital “immobility” is another matter, for international net capital flows—not to mention gross flows—have risen to large percentages of gross national saving in some countries for periods longer than a year. The likelihood that investors attach much higher risk to long-term than to short-term foreign investments (compared to domestic investments) does not serve to reconcile this high short-term mobility of capital with its seeming long-term immobility, because international inves-

tors who eschewed long-term commitments could simply continue to roll over their short-term investments. A different hypothesis set forth in this paper is that national policymakers act so as to enforce a balance of payments constraint which limits the accumulation of current-account deficits (net debt) or surpluses (net claims). Although fuller testing is needed, this hypothesis helps to reconcile the high short-term international mobility of capital with its apparent long-term immobility.

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Discussion

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One theme of this conference has been that from the point of view of economic growth, one is interested in *national* saving, so that policies which merely reshuffle saving between different groups in the economy do not add to domestic capital accumulation. Reshuffling abroad counts too. Domestic saving that is invested abroad of course adds to national wealth. But it does not add to the domestic capital stock. As we have been forcefully reminded in the last few years, the United States is not a closed economy, and this paper usefully raises the question of the extent to which increases in national saving are likely to result in changes in domestic or foreign investment.

It came as something of a surprise to most international economists when Martin Feldstein and Charles Horioka concluded on the basis of cross-national regressions that capital was basically not very mobile between countries in the long run. After all, we had spent the last 10 years arguing over and testing the hypothesis that short-term capital was perfectly mobile between countries and even perfectly substitutable between assets denominated in different currencies. In the long-term area, the analysis of multinational corporations is a highly developed subfield. No matter that for some of us a purely neoclassical analysis of long-term investment misses most of the interesting problems. No matter that the evidence does not now seem to support perfect substitutability of assets denominated in different currencies. We were still convinced that capital was substantially mobile between countries. One can argue that short-term capital mobility is high on the basis of covered interest differentials as shown in Fieleke's Chart 1. The volume of private international long-term investment flows has also been large during the last 10 years of recurrent current-account deficits in oil-importing countries.

So I am very pleased that Norm Fieleke has taken on the job of confronting the Feldstein-Horioka conundrum. Or is it a conundrum? The basic idea, as Norm points out, was to regress long-term average investment/GDP ratios on long-term average saving/GDP ratios across a group of industrialized countries. With a coefficient of approximately unity, this seems to imply that increased domestic savings go entirely into domestic investment, "in the long run." The basic problem with this approach, as Fieleke convincingly points out, is that the saving and investment rates are jointly determined. I would add that they are jointly determined even in the long run by what neoclassical economists called productivity and thrift. And these factors differ significantly between countries. Furthermore, saving

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and investment are connected by a well-known identity, and the net foreign balance component of that identity often shifts around suspiciously like a random variable.

Norm Fieleke concentrates his analysis on size as a determinant of both saving and investment, but I think he could go even further. To illustrate, I ran the following cross-national regression on ratio data for 23 OECD countries, averaged over the period 1960–1980:

$$G/Y_i = .004 + .998 T/Y_i \quad R^2 = .895$$

(13.7)

In this regression G/Y_i is the average 1960–80 ratio of government spending to GDP in country i and T/Y_i is the average ratio of government receipts to GDP.¹ On the basis of this regression one might be tempted to conclude that governments always spend their revenues and do not borrow in the long run! Well, I doubt if many of us would be likely to accept that conclusion as relevant for economic policy questions. As Rudy Penner has just pointed out, G/Y has risen faster than T/Y in the United States in recent years and is expected to fall by less in the near future. So if the Feldstein-Horioka regressions are not reliable, how should we approach the question of the degree of long-term capital mobility? Fieleke's paper tries several alternatives. First, in Tables 2 and 3, he reruns the Feldstein-Horioka regressions and some additional ones for net foreign investment using levels instead of ratio data, after converting savings, investment, and GDP into dollar terms. I also have reservations about these regressions for several reasons. First, I believe that size as measured by GDP is not the only underlying cause of differences in national saving and investment rates. Other factors, such as the rate of growth of output or productivity and demographic factors such as the dependency ratio have been found to have significant influences on cross-national differences in saving rates and therefore investment rates, as indicated by studies reviewed in the OECD background paper available to conference participants.² If that is the case, such factors should definitely be taken into account.

Second, the Sturm and Blades paper indicated that changes in the definition of saving can affect the cross-national distribution of savings ratios. If the adjusted ratios were close to uniform across countries, then the statistical regression would tend to break down. A cursory look at their results does not suggest that definitional changes will be very important, however. While the coefficient of variation of gross savings ratios declines from .20 to .15 with the adjustment for consumer durables, the variance of savings ratios remains about the same, with most of the difference attributable to an

¹Data from *OECD Economic Outlook, Historical Statistics, 1960–1980*. (Paris: Organization for Economic Cooperation and Development, 1982), Tables 6.4, 6.5. Data include all OECD members except New Zealand.

²See Franco Modigliani, "The Life Cycle Hypothesis of Saving and Intercountry Differences in the Saving Ratio," in W. A. Eltis, M. F. Scott, and J. N. Wolfe, eds., *Induction, Growth and Trade* (Oxford: Clarendon Press 1970), pp. 197–225.

increase in the mean of savings ratios. Other factors seem to have even less impact on the dispersion of savings ratios.

More fundamentally, it seems to me that a simultaneous equation approach is needed to sort out the long-run factors determining domestic saving and investment rates and therefore net foreign investment. This would undoubtedly be a formidable job and is clearly beyond the scope of Fieleke's paper. George von Furstenburg has made such an effort for the United States in an article in the IMF Staff Papers, so perhaps he can comment on the difficulties of this approach in the general discussion.³

Fieleke's next attack on the problem is to examine time series data on current account balances in a group of OECD countries. The data in Tables 4 and 5 show no trends. Table 6 indicates the relatively greater reliance on foreign borrowing (or lending) that is typical of smaller countries, as Fieleke notes the inverse correlation between size and average absolute current balances. Table 6 further shows that current accounts are quite variable, which is not news to people who try to forecast their movements. This is the basic piece of information that ought to enable us to dispose of the Feldstein-Horioka contention. The issue of capital mobility as it affects saving and investment behavior should be related to capital movements at the margin, that is, in response to some change in saving or investment incentives. The fact that on average most capital is invested at home is not relevant to the question.

Fieleke goes on to point out that cumulative current account imbalances do not appear very large according to his data. This, as he notes, could be in response to policy reactions to current account imbalances. Recently I have estimated a series of monetary policy reaction functions that attempt to determine what internal and external factors appear to be causing changes in the instruments of monetary policy in 10 OECD countries.⁴ I found that current accounts as proxied by trade balances were significant determinants of policy reactions in the 1960s and 70s for France, Japan, and the United Kingdom. Some indicator of external imbalance, not always the current account, appeared to be significant for all 10 of the countries in my sample, although the apparent magnitude of response to external factors varied considerably from case to case. The United States had the smallest response to external factors and the United Kingdom the largest, at least before Mrs. Thatcher took power.

These findings support Fieleke's view that some part of the long-run stability in current accounts that is evident in the data arises from economic policy. One reason for such policies may be the "noneconomic" objective of minimizing foreign control over domestic industry or resources, which is evident in France, Japan, Canada and elsewhere. Another reason particularly relevant in a period of floating exchange rates is unwillingness

³George von Furstenburg, "Domestic Determinants of Net U.S. Foreign Investment," *IMF Staff Papers* 27(4) (December 1980), pp. 637-678.

⁴Stanley W. Black, "The Use of Monetary Policy for Internal and External Balance in Ten Industrial Countries," in J. Frenkel, ed., *Exchange Rates and International Macroeconomics* (Chicago: University of Chicago Press, 1983 forthcoming).

to accept the exchange risk inherent in large foreign currency debt obligations. And even if governments are willing to assume such risks, limits to foreign borrowing exist even for OECD countries and occasionally are reached, as witness the cases of the United Kingdom and Italy in 1976.

Fieleke's paper concludes with an extension of the Feldstein-Horioka methodology to a larger group of countries, with findings that appear to contradict the Feldstein-Horioka results. For reasons stated above, I do not think this evidence is very strong in either direction and would prefer to see the analysis pursued in some other way.

If the question is the mobility of long-term capital, I believe the correct approach is to test the responsiveness of direct foreign investment to factors affecting its profitability. I think the results of such tests support the conclusion that capital is rather mobile. If the question is mobility of *short-term* capital, then evidence on arbitrage and risk premia in forward markets is relevant information. Here again, I believe the tests support the conclusion that capital is rather mobile.

I have recently heard the view that it is inappropriate to look at the capital account of the balance of payments for such information, that we must look instead at the determinants of domestic saving and investment behavior. But these are simply two sides of the same coin, as a quick look at the national income or flow of funds accounts should tell us. Whether it is easier to explain foreign investment by itself or as the difference between total investment and domestic investment is a tactical research question, not an issue of principle.

Let me conclude with some remarks about implications for policy. I don't think we can analyze the effects of incentives to savings and investment without considering the possibility that their impact leaks abroad. It should be no surprise that the investment tax credit applies only on domestic investment. The strenuous debates over deferral of tax on foreign source income and the foreign tax credit-versus-deductibility issue should alert us to the stake that major U.S. corporations on the one hand and unions on the other have in foreign earnings and investment. Offshore assembly is important for U.S. firms and increasingly for foreign firms operating in the United States. These kinds of location decisions are influenced, if not determined, by tax considerations. But to find out how they respond, I think we must look to disaggregated data, not to cross-national data on long-period averages of aggregated data.