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Measuring international capital mobility: A critical assessment of the use of saving and investment correlations

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Measuring International Capital Mobility

A Critical Assessment of the Use of
Saving and Investment Correlations

by

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The Kiel Institute of World Economics

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Measuring International Capital Mobility

A Critical Assessment of the Use of Saving and Investment Correlations*

by Stefan Sinn

I. Introduction

Economists have been interested in the degree of international capital mobility for a variety of reasons. E.g., the extent to which public deficits crowd out domestic investments depends on the ease with which domestic firms may access the international capital market. The welfare reduction due to a temporary negative shock to an economy (earthquake) is much less pronounced if it can borrow resources from abroad in order to tide itself over the initial period of reconstruction. Economic theory has suggested two different approaches for quantifying the extent of international capital mobility (Frankel (1989)):

- interest rate parity tests and
- saving and investment correlations.

Interest rate parity tests are geared to measuring the extent to which interest rates are equalized across countries. Saving and investment correlations (Feldstein, Horioka (1980)) test whether exogenous changes in national saving lead to changes of similar magnitude in domestic investment.

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This paper is a critical assessment of the use of saving and investment correlations to measure the degree of international capital mobility. Its contribution is threefold: first, it is shown with the help of a standard model of the small open economy that saving and investment correlations measure real capital mobility and not financial capital mobility. Therefore the puzzle noted by many authors that saving and investment correlations have not declined after 1973 despite manifest deregulations in financial markets is not a puzzle at all because such deregulations need not increase the ease of cross-border flows of real capital. The second contribution of the paper is to point out that the procedure of calculating saving and investment regressions employed in the literature biases the correlation coefficient towards accepting the hypothesis of capital immobility. The cause of the bias is the use of long-term averages of saving and investment shares in calculating the correlation coefficient. Economic theory provides no rationale for this practise in regressions based on a cross-section of countries. On the contrary, the intertemporal approach to the balance of payments employed here predicts that a substantial amount of capital mobility is hidden by averaging the data over long periods. This paper therefore conducts the relevant calculations on the basis of annual observations and finds that as a rule the correlation coefficients are lower than before and that there is considerable variation from year to year in the relationship between saving and investment shares. Finally, the paper provides a benchmark measure of capital mobility by comparing the international results with evidence on intranational capital flows within the United States. Although such an exercise is fraught with data problems, I interpret the evidence as preliminary support for the view that real capital flows more readily within nations than among them. However, further evidence on this matter is clearly needed in order to make this conclusion stronger.

II. The Feldstein/Horioka-Test for Capital Mobility

II.I. Rationale and Results

Feldstein, Horioka (1980) suggested measuring the extent of capital mobility by correlating saving and investment shares. Figure 1 provides a rationale for this test.¹ It is assumed that both saving and investment depend on the interest rate and other, exogenous factors. The saving schedule SS has a positive slope indicating that higher interest rates increase planned saving while the investment schedule II is negatively sloped, indicating that a rise in the interest rate reduces planned investment. In a closed economy the equilibrium interest rate will be r_1^d and saving and investment will have to be equal. If, on the other hand, international capital flows are permitted, portfolio arbitrage will ensure that the local interest rate is tied to the world interest rate r^w , and savings and investment need no longer coincide. Figure 1 depicts one possible case where investment exceeds saving and a current account deficit is recorded, which is equal to the difference between equilibrium saving S^* and equilibrium investment I^* . Now suppose there is another country which differs from the first only on account of a different saving schedule, $S'S'$. In this other country a higher savings share S^{**} prevails while the investment share remains constant. If the second country had been closed to capital movements, the investment share would have to be higher, too, by an amount equal to the rise in the savings share. The same argument can be applied to a country with a different investment schedule. The Feldstein/Horioka-test focuses on this implication of the model that saving and investment should be uncorrelated across countries if perfect capital mobility prevails and perfectly

¹ The algebra of this model is presented in Feldstein (1983) and Murphy (1984).

correlated if international capital movements do not occur. It uses a cross-section regression of the type

$$(I/Y)_i = \alpha + \beta (S/Y)_i \quad (1)$$

with the ratio of gross domestic investment to gross domestic product in country i , $(I/Y)_i$ on the left hand side and the corresponding ratio of gross domestic saving to gross domestic product $(S/Y)_i$ on the right hand side. Feldstein, Horioka (1980, p. 318) summarize their expectations concerning the outcome of the test as follows:

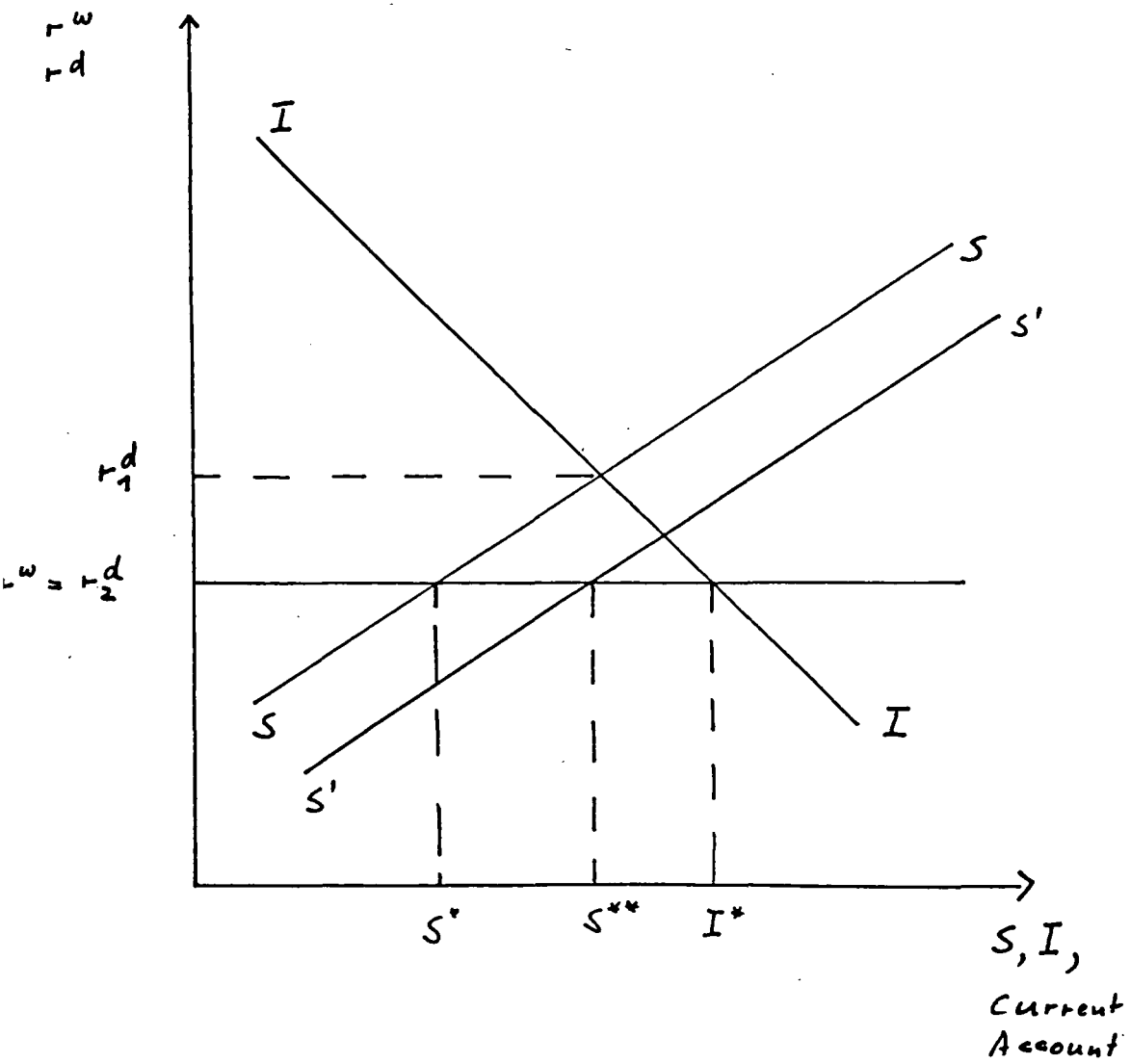
"With perfect world capital mobility, an increase in the saving rate in country i would cause an increase in investment in all countries: the distribution of the incremental capital among countries would vary positively with the elasticity of the country's marginal product of capital schedule. In the extreme case in which country i is infinitesimally small relative to the world economy, the value of β implied by perfect world capital mobility would be zero. But even for a relatively large country, the value of β would only be of the order of magnitude of its share of total world capital. The true value of β would thus vary among the OECD countries but would average less than 0.10. In contrast estimates of β close to one would indicate that most of the incremental saving in each country has remained there."

Note that the value of 1 for β does not imply that there are no net flows of capital but rather that the current account does not respond to changes in the saving rate. This can be seen by subtracting the saving share from both sides of equation (1) to find that

$$(CA/Y)_i = -\alpha + (1-\beta)(S/Y)_i \quad (2)$$

As equation (2) shows, even in a world where saving and investment are perfectly correlated ($\beta=1$) the current account need not be zero. Thus the Feldstein/Horioka test measures the responsiveness of capital flows to saving shocks and not whether there are net flows of capital between countries at all.

Figure 1 - Saving and Investment in the Open Economy



The empirical results from regression (1) can be summarized as follows (cf. Table 1 in Feldstein, Bacchetta (1989)):

- the coefficient β of regression (1) is close to one throughout the 1960s and 1970s in the OECD-countries;
- the coefficient fails to decline considerably in the 1970s while in the 1980s a decline is registered;
- the evidence for different country groups shows that the results for the overall sample of 23 OECD-countries are not very robust for smaller subsamples. In particular, the coefficient β appears to be much lower among EC-countries.

The results of Feldstein and Horioka's original paper as well as subsequent work (Feldstein (1983) and Feldstein, Bacchetta (1989)) have been closely scrutinized.² While the evidence of a close correlation between savings and investment has withstood various econometric critiques, quite a number of authors have refused to accept the interpretation that this is evidence for substantially less than perfect international capital mobility. Section II.2. examines this literature in greater detail.

II.2. Saving and Investment Correlations: A Summary of the Literature.

Subsequent work on the Feldstein-Horioka evidence falls into two separate categories. One set of authors has accepted the close correlation between savings and investment correlations as a robust empirical regularity but refuses to interpret it as evidence for less than perfect capital mobility. The other set of authors disputes the robustness of the evidence.

² Dooley, Frankel, Mathieson (1987), Frankel (1989), and Wong (1990) are useful summaries.

Most research of the first kind constructs theoretical models where perfect international capital mobility prevails (interest rates are equalized across borders) but saving and investment are correlated because changes in an exogenous variable affect both saving and investment. In a time series context, the cyclical movement of income is likely to produce this result.³ This is why most authors have used a cross-section approach. But even in a cross-section approach there may be variables that simultaneously affect saving and investment, such as the growth rate of income (Obstfeld (1986) or the presence of a non-traded consumption good (Murphy (1986), Wong (1990)). Feldstein, Horioka (1980) and Dooley, Frankel, Mathieson (1987) both address the potential simultaneity of saving and investment rates by performing an instrumental variable analysis of the saving and investment regression. Both find the original results unchanged. Another set of authors have attributed the high correlation of saving and investment to government action. In their view, governments dislike large current account balances and systematically vary their economic policies so as to offset large private current account balances (Fieleke (1982), Tobin (1983), Westphal (1983), Summers (1988)). Bayoumi (1990) tests the "policy-reaction" argument by regressing private saving and private investment. He finds the correlation coefficient to be consistently lower than the corresponding coefficients for national saving and investment. This evidence tends to support the "policy-reaction" argument as an explanation for the close

³ Another variable whose changes could produce a close correlation of saving and investment in a time series context is the net foreign asset position. Masson, Kremers, Horne (1989) argue that a shock that leads to a discrepancy of the actual net foreign asset position from its desired equilibrium level will over time bring about adjustments of the saving or investment rates that go in the reverse direction so as to restore the original net foreign asset equilibrium. Such adjustments would produce a close correlation of saving and investment rates.

correlation of saving and investment rates. It must be noted, however, that due to data limitations the evidence of Bayoumi (1990) is based on a much smaller sample of ten OECD-countries only.

Yet another reason why saving and investment rates might be correlated even in the presence of capital mobility is the effect of country size. The country size argument can be found in two different versions. Harberger (1980) argues that as countries become larger, they become more diversified and the need to borrow from abroad in the event of a shock declines. Since the original results of Feldstein and Horioka are based on a sample of OECD-countries, the Harberger argument could be an explanation for the high β -coefficient. However, as Dooley, Frankel, Mathieson (1987) show, the Harberger argument only explains why the ratio of the current account to GNP will be smaller for larger countries (as indeed it is), but not why the regression coefficient should be smaller. The second version of the country size argument relates the size of a country to its effect on the world interest rate. If an increase in national saving in one country leads to a decline of the world interest rate, optimal investment in that country will change although the investment schedule has not changed. Thus if a country is big enough to move the world interest rate, saving and investment will once again be correlated although perfect capital mobility prevails. For cross-section studies, however, the potential dependence of the world interest rate on movements of the national interest rate of a large country is not a problem, since the argument refers to two points in time whereas in a cross-section study only the observations from one point in time are used (Dooley, Frankel, Mathieson (1987)). Of all the explanations offered for the cross-section evidence (why are high saving countries also high investment countries?) the "policy-reaction" explanation seems the most convincing. It

remains to be seen, however, whether it is robust to a test with a bigger sample of countries.

A second category of authors have refused to accept the robustness of the evidence on saving and investment correlations. They argue that a few observations dominate the sample and thus exert a particular strong influence on the regression coefficient (Murphy (1984), Wong (1990)). This "outlier" argument is assessed in Figure 2. It displays the evolution of the regression coefficient β (cf. equation (1)), calculated with annual observations of saving and investment shares, from 1960 to 1988.⁴ Three samples are used: the first one, indicated by a "+", includes all 24 OECD-countries. For this sample, the coefficient β drops dramatically after 1972. If one removes Luxembourg from the sample, this dramatic drop is no longer observed (data indicated by an "x"). This reduced sample of 23 OECD-countries is the one that forms the basis of the most recent article by Feldstein and Bacchetta (1989).⁵ If one finally drops Japan from the sample, another country suspected in the literature to be an outlier, the result is hardly affected at all as is indicated by the line connecting the inverted triangles in Figure 2.

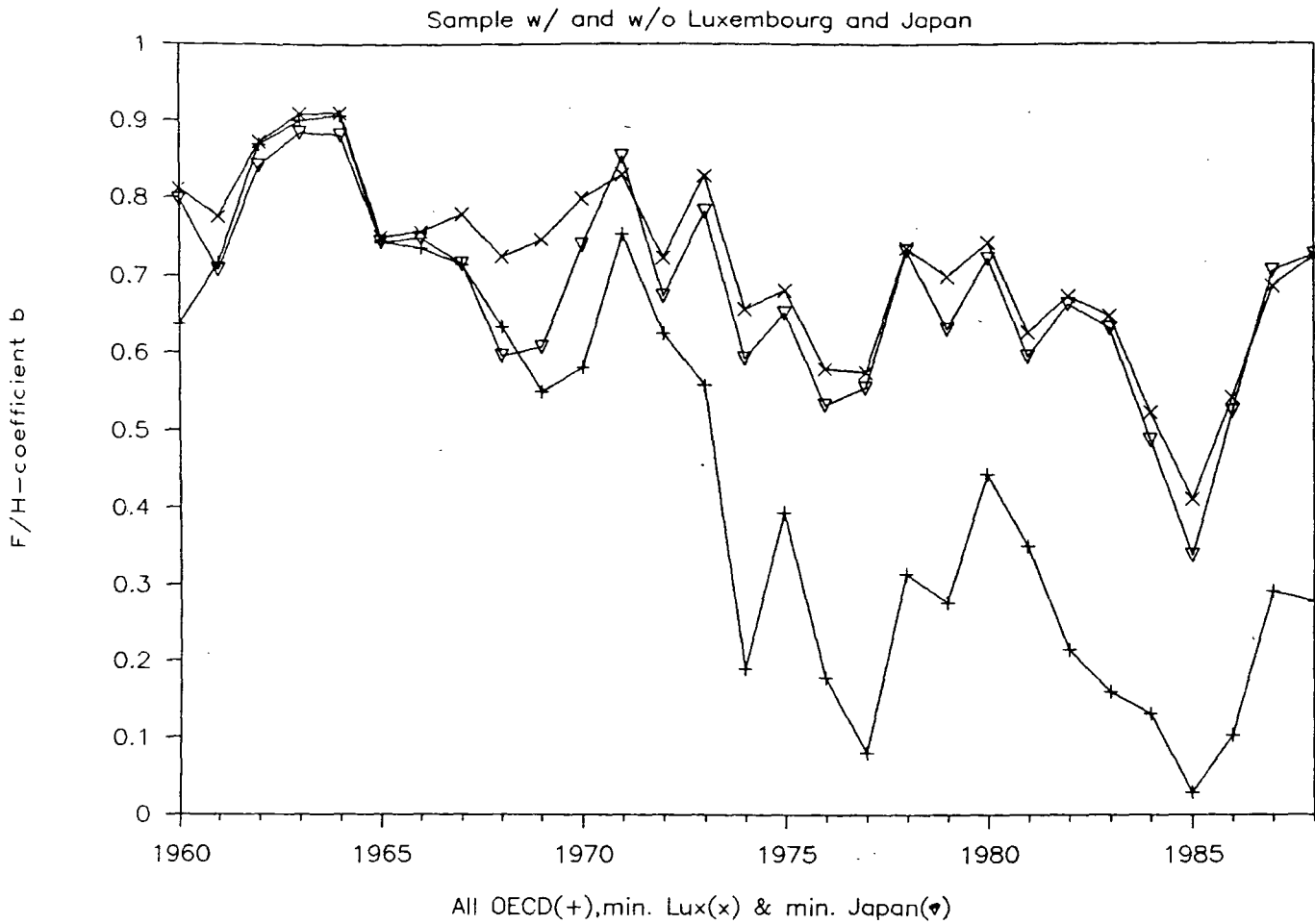
Econometric theory offers little guidance as to the treatment of "outliers" such as Luxembourg.⁶ However, evidence reported in Als (1988) would suggest that the growing presence of international banks in Luxembourg starting in the mid-1970s has produced severe difficulties

⁴ The rationale for calculating β in this way is explained in greater detail in section IV.2.

⁵ The samples in earlier articles by Feldstein considered a smaller group of OECD-countries because consistent national accounts data were not available then for all countries.

⁶ See the discussion in Kennedy (1985).

Figure 2 - Robustness of the Feldstein-Horioka Coefficient



in interpreting the national accounts statistics of Luxembourg.⁷ In particular, the national saving rate of Luxembourg is biased upwards by the accounting treatment of foreign banks' profits. As long as these profits are not repatriated, they count as national saving although the banks are foreign-owned. As the title of Als' article indicates, the issue has not been resolved. There thus seems to be some justification in leaving Luxembourg out of the sample, at least until a consensus has been reached on this matter. In line with the literature, this article therefore regards the evidence from 23 OECD-countries as indicative and robust for the extent of real capital mobility among the industrial countries.

The Feldstein/Horioka evidence thus seems to have stood up remarkably well to the different criticisms levied against it. One explanation for the puzzle seems to be the "policy-reaction" hypothesis. Another explanation that many authors refuse to accept would be that capital is genuinely immobile between countries. Since a thorough discussion of this point requires a precise formulation of the nature of net capital flows, it is to this issue that I turn next.

III. Saving, Investment, and Net Capital Movements: The Basic Fisherian Model

Modern open-economy macroeconomics is based upon individual utility maximisation within an intertemporal framework (Blanchard, Fischer (1989); Frenkel, Razin (1987)). The basic idea is an old one which goes back to the work of Irving Fisher (1930). Essentially, this approach applies the idea of the permanent income hypothesis that households smooth

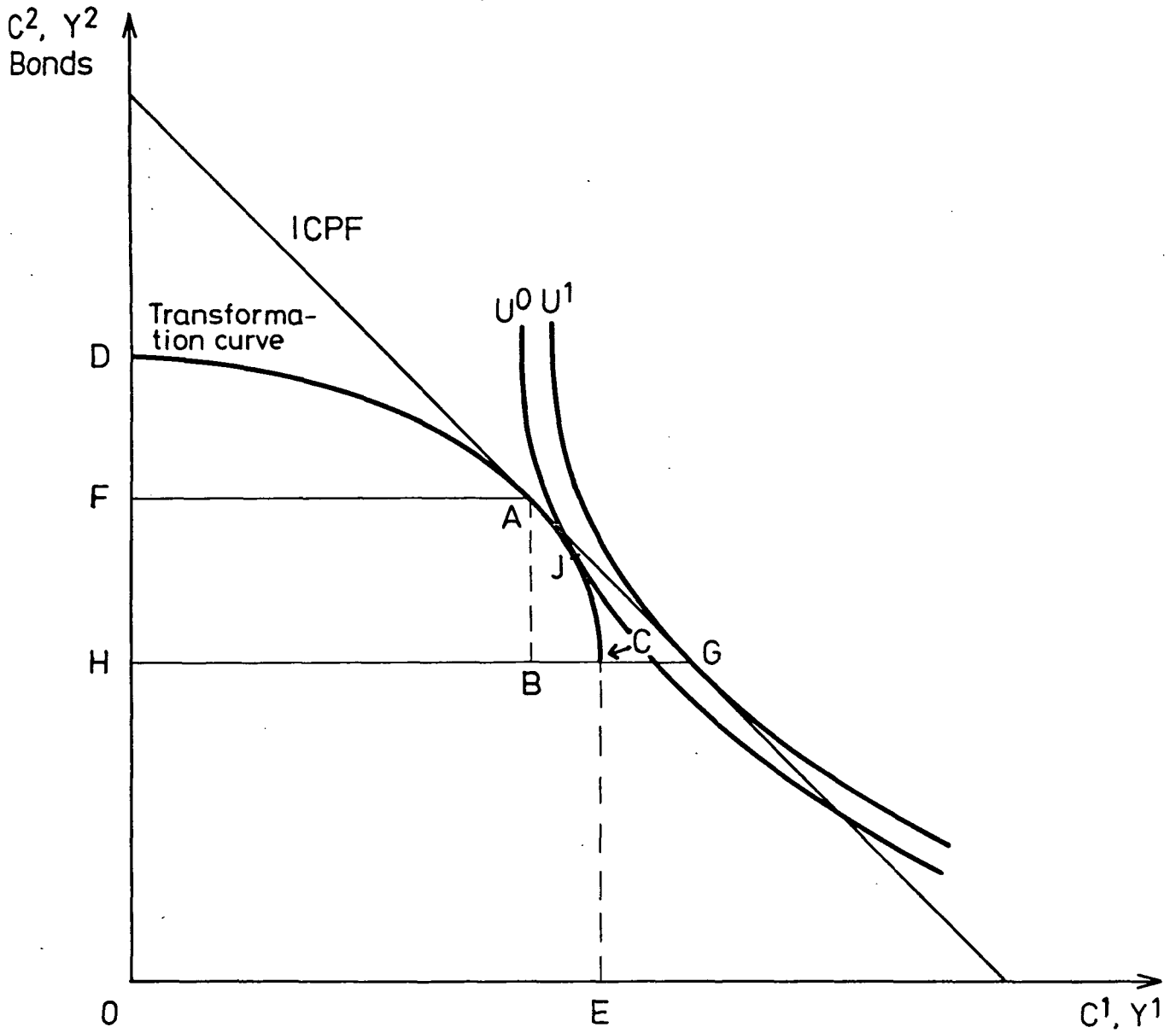
⁷ Note that at this point in time the discrepancy between sample 1 and sample 2 becomes large (cf. Figure 2).

their consumption pattern over time when faced with changing income streams to countries. The model is confined to two periods and considers a small open economy. In period 1 two goods are produced, one used for consumption ("wine"), another for production ("machines"). Households can borrow and lend freely on the international capital market. Firms maximise profit and households maximise utility. As a first step, the intertemporal decision calculus for the whole economy is sketched out in Figure 3.

The supply side of this model economy is determined by the decisions of individual firms. Profit-maximising firms will equate the marginal product of capital to the world interest rate. The optimal production point A is found by shifting the capital market line to its highest point of tangency with the transformation curve, DACE. The capital market line is the locus of all possible combinations of consumption today and consumption tomorrow. It is also known as the intertemporal consumption possibility frontier (henceforth ICPF), a term that is adopted here. The optimal level of investment BC can be read off to the left of E. OE represents the initial level of income. Note that the shape of the transformation curve describes the productivity of domestic investment: Steeper transformation curves imply a higher productivity of investment. Output produced in period 2 will be OF.

The demand side of the model is governed by utility-maximising consumers. The problem of the consumer is to choose consumption levels in both periods given initial income OE, the transformation curve, his time preference incorporated in the indifference curves U and the world interest rate r . The optimal level of consumption in period 1, GH, is found at the point of tangency G of the ICPF with the utility indifference curve U^1 . The consumer's optimal decision equates the marginal rate of substitution between consumption today

Figure 3 - The Basic Fisherian Model



and consumption tomorrow to the world interest rate.

Supply and demand side together determine the balance of payments. In period 1 domestic investment exceeds national (dis)saving (CG) by the amount BG, this difference is equal to the trade deficit. Since there are no transactions on the service account in the first period, the trade deficit equals the current account deficit. The model is confined to two periods, debt plus interest must therefore be repaid and transferred abroad in the second period. This transfer of real resources is equal to FH, the current account surplus in the second period. Note that the trade surplus in the second period (not shown in Figure 3) must exceed the current account surplus by the amount of interest payments to foreign lenders. Bonds can easily be introduced in the Fisherian framework. In our example, residents sell to nonresidents pieces of paper promising a share of their future income AB against immediate access to foreign real resources used for investment BC and a part of consumption CG. Such pieces of paper are commonly known as bonds. In analogy to static trade theory, ABG might be called the intertemporal trade triangle.

IV. Implications of Consumption Smoothing for the Interpretation and the Conduct of Saving and Investment Correlations.

The model presented has implications for the interpretation and calculation of the correlation between saving and investment. Note first of all that the gap between the two variables involves the trade of real resources against debentures. The looseness of the saving-investment link therefore measures the ease of cross-border trade of resources (capital goods and consumption goods) against paper, i. e. the extent of real capital mobility and not the extent of financial capital mobility. A second implication concerns the calculation of saving and investment

correlations. If it is true that countries have to observe an external budget constraint as our model stresses, then in the longer run current account deficits have to be reversed. In this case the use of long term averages of saving and investment shares for the calculation of the regression coefficient β biases the test towards the result of capital immobility.

IV.1. Saving and Investment Correlations Measure Real Capital Mobility.

What does the β coefficient measure? As stated in the beginning of this paper, economists have employed two different approaches to measuring the extent of "capital mobility", interest rate parity tests and saving and investment correlations. It seems helpful to put the two methods into perspective and define the notion of capital mobility more explicitly. Ruffin (1984, p. 248) defines a transfer of capital as a "change in the location but not the ownership of physical capital". This definition provides a particular neat way of differentiating between a number of important phenomena in international economics. Consider the matrix of Table 1. Suppose there are two countries A and B and the capital good is initially located in country A. The upper left cell of Table 1 includes those international transactions which involve both a change in ownership of the capital good and a change in location. This is international trade in capital goods. The upper right cell contains international portfolio transactions: the capital good remains in country A but is acquired by residents of country B. In effect, a claim on the profits from the machine (a security) is sold to residents in country B in exchange for another security. In national as well as in international financial markets the majority of the transactions are of this type. Note that since the wealth of both partners in a

security transaction remains unchanged, no capital flows are initiated by such a transaction. The lower left cell contains international movements of real capital. These involve the transfer of capital goods across borders but no change in ownership.⁸ Finally, all domestic transactions fall into the lower right cell.

Table 1 - Change in Location and Ownership of Capital Goods.

		Change of location: Does the capital good cross the border between countries A and B ?	
Change in owner- ship:		Yes	No
Does a resident of country B acquire ownership of capital good?	Yes	International Trade in Capital Goods	International Trade in Securities
	No	Real interna- tional capital movements	Domestic transactions

Interest rate parity tests assess whether international trade in securities (upper right cell) is unhindered. Tests based on saving and investment correlations measure how easily real capital flows between countries (lower left cell). Although both tests are often said to measure the extent of "international capital mobility", they really measure two different phenomena. Flows of capital do not

⁸ This is not to deny that there may be international trade of consumption goods against securities.

necessarily have to be elastic in order to ensure equality of yields. As Niehans (1984, pp. 121) puts it: "A few telephone calls are all that is necessary". On the other hand, large net flows of capital do not require the existence of interest rate differentials. From the point of view of the consumption smoothing approach, net capital movements occur if there is a gap between saving and investment. These movements involve the transfer of real resources and thus fall into the category of real capital movements as defined in Table 1. The Feldstein/Horioka-approach therefore measures the responsiveness of real resource flows to variations in the savings or investment rate. It has little to do with financial capital mobility, the trade of securities against other securities.

This observation may resolve the puzzle of the β -coefficient's time trend in the 1970s. Several authors have found the small decline in the β -coefficient in the 1970s perplexing. A number of reasons are usually cited why one would expect a looser relationship between saving and investment in the 1970s (Dooley, Frankel, Mathieson (1987, p. 512); Obstfeld (1986, p. 91):

- dismantling of widespread barriers to capital controls that impeded international money flows,
- the rapid growth of the Eurocurrency markets,
- increased activity of multinationals,
- advances in telecommunications technology,
- the recycling of the OPEC surpluses.

From the point of view of the model developed in the previous section, it is only the last one that has an (indirect) bearing on the evidence. As far as the other reasons are concerned, it is clear from the analysis of the previous section that one should not expect the liberalization of portfolio transactions to have a direct effect on the β -coefficient. Only the lifting of controls that forbid the

international movement of goods against ownership titles (bonds, shares, trade credit) would have a loosening effect on the saving and investment correlation.

IV.2. Long Term Averages Bias the Result towards Capital Immobility.

The test on saving and investment correlation has in almost all cases been conducted with a cross-section of countries where the data on saving and investment shares for individual countries are long-term averages (at least five years). The rationale underlying this approach may be summarized as follows. A cross-section approach is used in order to avoid the measurement difficulties associated with the possible comovement of saving and investment over the business cycle (Feldstein (1983, p. 142)). Long-term averages are taken because they are thought to reflect the long term adjustment of domestic investment to a sustained change in the saving rate.⁹ The crucial feature of the intertemporal approach to the current account is its emphasis on the external budget constraint of the economy which implies that in the long run the current account is zero. There cannot be sustained deficits or surpluses. A shock should produce a series of current account surpluses (deficits) followed by a series of current account deficits (surpluses). If the consumption smoothing approach to the current account balance describes reality well, the use of long-term averages in a cross-

⁹ It should be noted that the potential comovement of saving and investment over the business cycle is not a reason for using long-term averages in a cross-section regression. There seems to be some confusion on this point in the literature. Bayoumi ((1990), p. 368) e. g. justifies the use of average saving and investment rates with the need "... to abstract from the effects of the business cycle".

section aggression will tend to bias the regression coefficient towards one.

An example may serve to illustrate this criticism. Figure 4 records saving, investment, and the current account of Norway between 1970 and 1985. There is a pronounced rise in the current account deficit after 1973 which is followed by just as rapid a decline of the deficit after 1977. Within five years the current account moves from a deficit of almost 14 percent of GDP (1977) to a surplus of 9 percent of GDP (1981). The driving forces behind these events need not be recounted here as they have been documented elsewhere.¹⁰ The crucial point in the present context is the fact that if one were to calculate the average saving rate and the average investment rate of the whole period 1970-1985, the gap between the two of them would be a mere 0.6 percent of GDP (S/Y: 28.5 percent of GDP; I/Y: 27.9 percent of GDP on average for 1970-1985). Thus despite the manifest responsiveness of the Norwegian current account to external shocks a long term comparison of saving and investment rates shows that they are almost equal. For the Feldstein/Horioka test as it is usually conducted this provides further evidence of capital immobility.

How important is this criticism for the sample of 23 OECD-countries that is usually analyzed in the literature? In order to answer this question, I have calculated saving and investment regressions (equation (1)) in a cross-section but using annual data for each equation. The time period considered is 1960-1988, the data are gross saving and gross investment rates taken from OECD (1990), the standard source

¹⁰ Olsen (1989)

Figure 4 - Saving, Investment, and the Current Account of Norway.

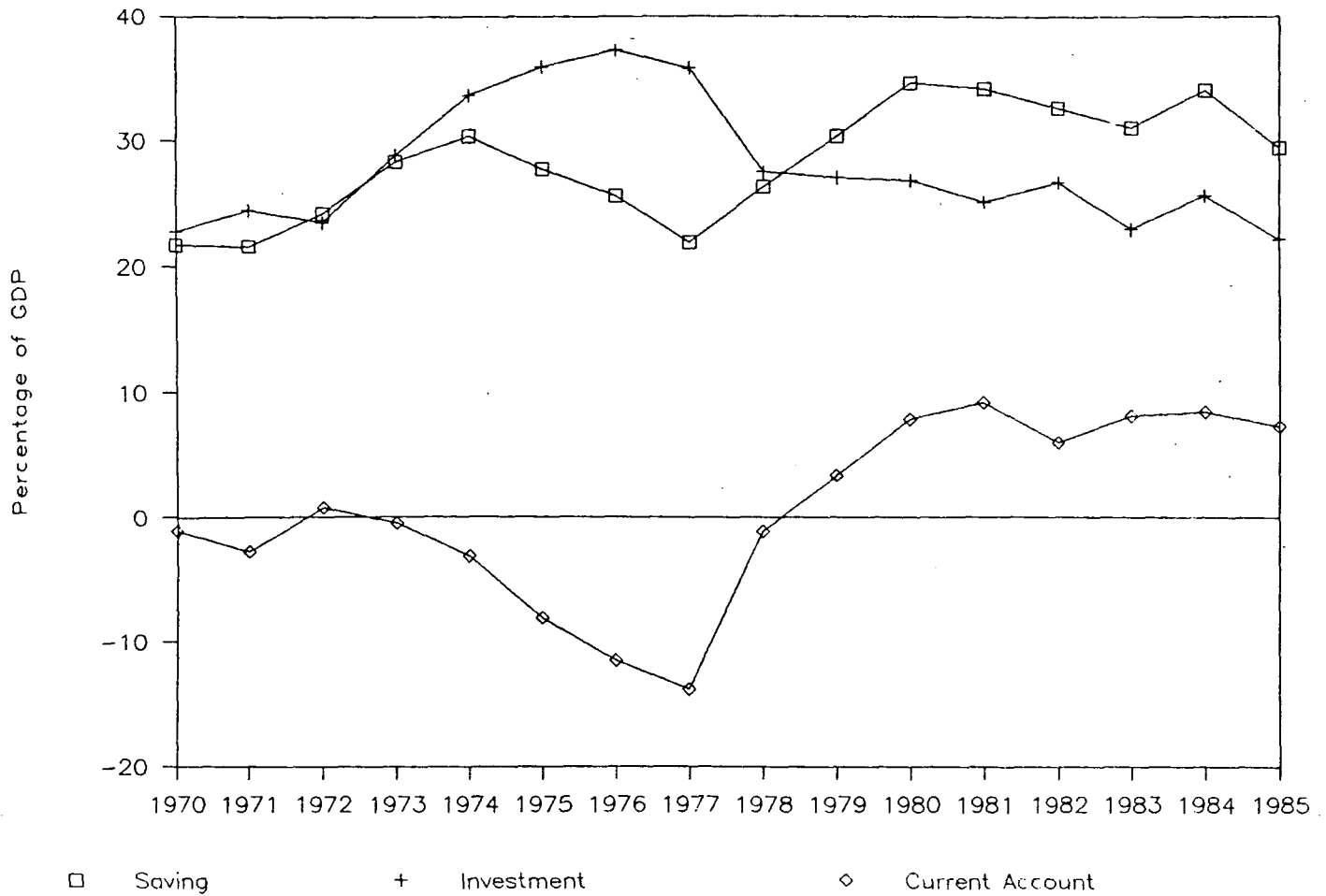


Table 2: Saving and Investment Regressions 1960 - 1988

Estimated equation: $(I/Y) = \alpha + \beta (S/Y)$,
 23 OECD-countries, t - value in brackets

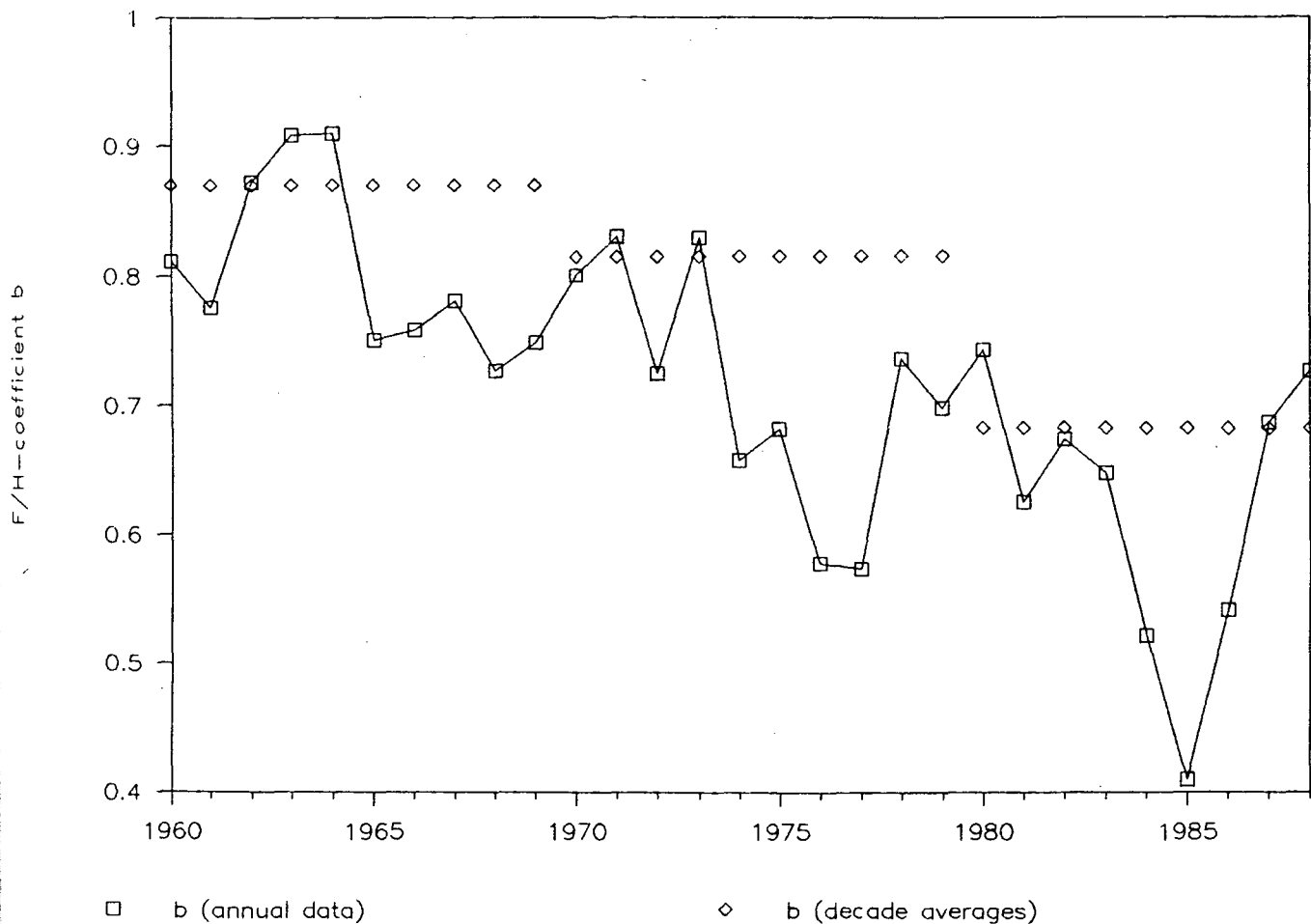
	α	β	R bar 2
1960	0.0536 (2.2052)	0.8115 (8.0427)	0.7432
1961	0.0634 (2.4533)	0.7754 (7.3140)	0.7047
1962	0.0374 (1.7855)	0.8726 (10.065)	0.8201
1963	0.0310 (1.7933)	0.9087 (12.453)	0.8751
1964	0.0322 (1.6743)	0.9100 (11.834)	0.8634
1965	0.0734 (2.3789)	0.7502 (6.0723)	0.6199
1966	0.0713 (2.3762)	0.7575 (6.2405)	0.6330
1967	0.0621 (2.0646)	0.7803 (6.3603)	0.6420
1968	0.0710 (2.5302)	0.7257 (6.3853)	0.6439
1969	0.0630 (2.6830)	0.7477 (8.1585)	0.7488
1970	0.0554 (2.3098)	0.8004 (8.8117)	0.7770
1971	0.0477 (1.7084)	0.8307 (7.7473)	0.7285
1972	0.0644 (2.8802)	0.7242 (8.6898)	0.7721
1973	0.0442 (1.4130)	0.8293 (7.3310)	0.7057
1974	0.1165 (2.4796)	0.6564 (3.5616)	0.3469
1975	0.0990 (2.0475)	0.6812 (3.2330)	0.3005
1976	0.1215 (2.3896)	0.5776 (2.6277)	0.2116
1977	0.1225 (2.0299)	0.5732 (2.1620)	0.1431
1978	0.0712 (1.6954)	0.7349 (4.0645)	0.4137
1979	0.0873 (2.1633)	0.6971 (4.0439)	0.4110
1980	0.0834 (2.8052)	0.7414 (5.7303)	0.5914

Table 2 ctd.

1981	0.1060 (2.5941)	0.6244 (3.3234)	0.3135
1982	0.0927 (2.2147)	0.6725 (3.3122)	0.3119
1983	0.0861 (2.7462)	0.6467 (4.2426)	0.4359
1984	0.1109 (3.8141)	0.5209 (3.8287)	0.3831
1985	0.1318 (4.9273)	0.4093 (3.2392)	0.3014
1986	0.1032 (3.5465)	0.5410 (3.9768)	0.4024
1987	0.0739 (3.5377)	0.6859 (7.1167)	0.6929
1988	0.0667 (2.7475)	0.7260 (6.7465)	0.6693
average 1960-1969	0.0397 (2.5527)	0.8703 (13.746)	0.8952
average 1970-1979	0.0585 (1.9236)	0.8150 (6.6167)	0.6604
average 1980-1988	0.0821 (3.2037)	0.6816 (5.7180)	0.5903
average 1960-1988	0.0632 (2.854)	0.7805 (8.3116)	0.7558

Data Source: OECD (1990)

Figure 5 - The Feldstein-Horioka Coefficient Based on Annual Data, 1960 - 1988



used by the literature. The results are reported in Table 2¹¹ and summarized in Figure 5.

Figure 5 shows the evolution of the coefficient β over time and compares it with the results from regressions using the standard approach. It is quite clear that there is an upward bias in the usual approach. In the 1970s all but two of the "annual" values of β lie above the β calculated with decade averages. In the other two decades, three "annual" values are higher than the "average" β . In addition, considerable variability of the β measure is hidden when one considers decade averages. Note e.g. the fall in β after 1973. Nevertheless, it must be pointed out that the new evidence presented here is not such as to completely overturn the original Feldstein/Horioka findings. The values of β from the regressions based on annual observations are still higher than 0.1, the value Feldstein/Horioka predicted.

V. A Benchmark for Capital Mobility: Intranational Capital Flows.

The puzzling fact remains that the β -coefficient's level is quite high. In order to get an idea of what level of β one might expect to find in a perfect capital market I will calculate the β coefficient for the federal states of the U.S.A. Presumably this benchmark estimate should come as close as possible to the level of β one might expect to prevail in the real world if capital mobility is totally unhindered.

The study of Romans (1965) on interregional capital flows within the United States provides the data necessary for this exercise. He measures household and firm savings of the

¹¹ Table 2 also includes regressions using long term averages of saving and investment rates. The reader may compare these results to those reported by Feldstein, Bacchetta (1989). Data revisions are a likely source of the small discrepancy.

residents of U.S. states by adding up over all possible forms of saving. The central government saving share is allocated to the different states by calculating the difference between total taxes paid by residents of a state and total receipts from the central government (subsidies, interest payments). To this he adds the saving share of the state government. The study by Romans covers only two years (1953 and 1957) but includes data for all forty-nine U.S. federal states. Figure 6 presents a scatter plot of the data for 1957, the picture for 1953 is hardly different. The regression line which also appears in Figure 6 has the equation¹²

$$(I/Y)_i = 0.186 - 0.1114 (S/Y)_i$$

(15.17) (-1.47)

with an adjusted R^2 of 0.024.

This (limited) evidence suggests that intranational capital flows are much more responsive to variations in the savings rate than international capital flows.

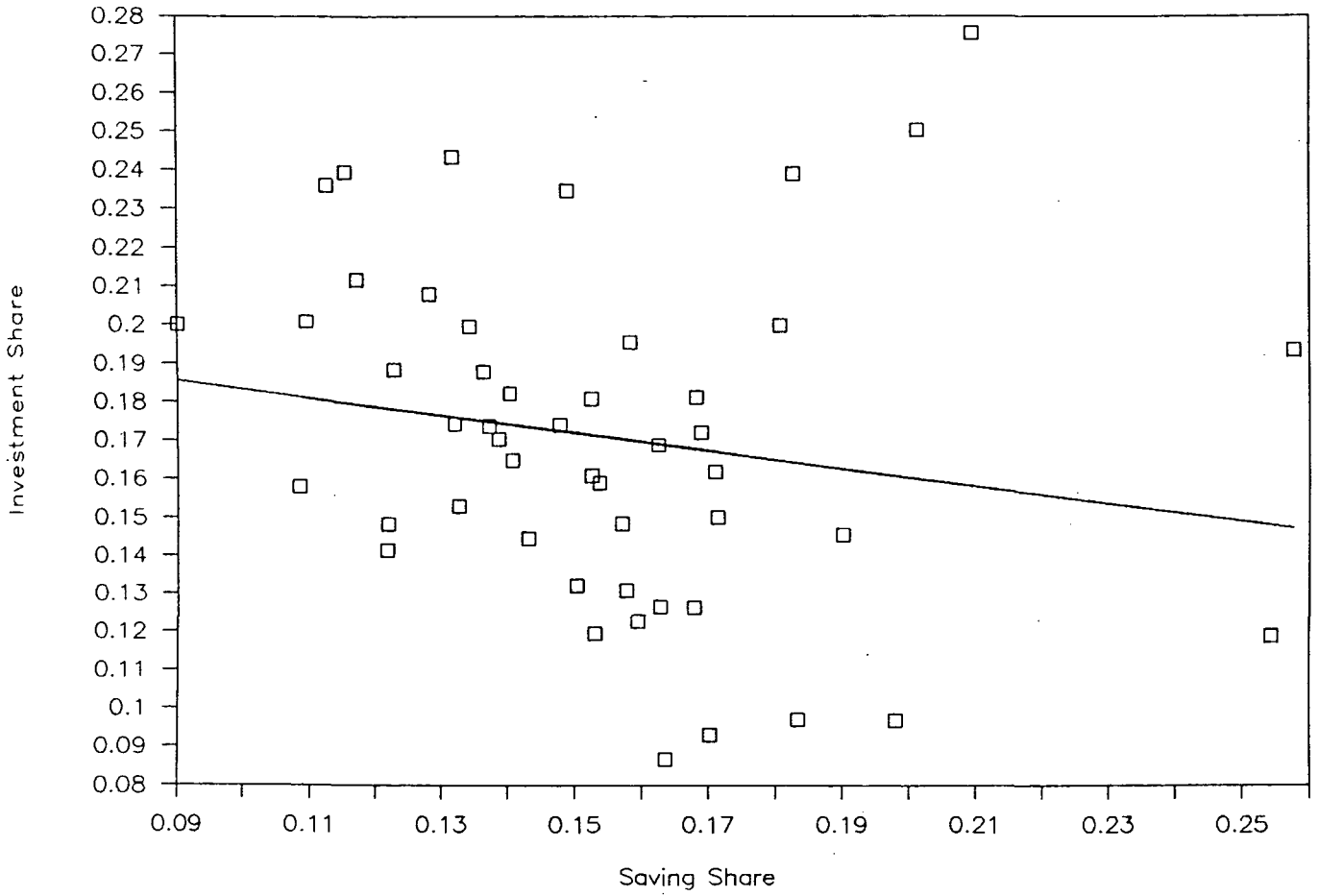
VI. Conclusion

This paper is an evaluation of the use of savings- and investment correlations to measure capital mobility. It is shown that a simple model of the current account based on intertemporal utility maximization suggests that

- the practise of calculating the correlation coefficient using long term averages of saving and investment biases the result towards measuring capital immobility;
- the correlation coefficient is a measure of real capital mobility and not financial capital mobility,

¹² t - values are reported in brackets.

Figure 6 - Saving and Investment in US Federal States, 1957.



- and that therefore reasons for a change of the coefficient must be sought in the real sphere and not - as widely expected in the literature - in the deregulation of financial markets.

Finally it is shown that the saving and investment link is much looser within a nation than among nations.

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