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Current Account Imbalances and Capital Formation in Industrial Countries: 1949-1981

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Summary

In this paper we study the role of domestic and foreign savings in financing capital formation in 19 industrial countries during the post-World War II years. Our interpretation of the statistical evidence is that there is very little support for the view that over the medium term (i.e., periods longer than approximately five years), goods and services freed by savings in one industrial country are systematically made available through current account imbalances to support investment in physical capital in other industrial countries. Instead, there is strong support for the view that both levels and changes in domestic savings are systematically matched by levels and changes in domestic investment. The close relationship between domestic savings and domestic investment over this time period suggests that resources did not flow from one country to another in order to equalize rates of return on real capital.

We also find little support for the view that the integration of financial capital markets in recent years has altered the relationships among domestic savings, investment and current account imbalances in industrial countries. The evidence suggests that changes in net foreign assets, and the associated current account imbalances, were no more

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sensitive to cross-country differences in rates of return on physical capital in the ten years to 1981 than they had been in the 1950s, when extensive capital controls and trade restrictions hampered the economic integration of the industrial countries.

An important implication of these findings is that disturbances to domestic savings or investment relationships are not systematically accommodated by international transfers of resources, at least in the medium run. For example, the tendency for a fiscal deficit to crowd out private domestic investment will not be systematically mitigated by an inflow of foreign savings through current account deficits.

I. Introduction

The integration of financial markets among industrial countries in the 1970s and the 1980s is often cited as indirect evidence that changes in net foreign asset positions of countries (which are equal to the sum of net private and official capital flows over a given time period) have become more sensitive to differential rates of return on investment in physical capital across countries. An increase in the sensitivity of net capital flows would imply that national savings have been increasingly allocated among countries through current account imbalances in a manner that more nearly equalizes rates of return. Increased sensitivity would also imply that foreign savings have played an important role in the capital accumulation process of the industrial world. 1/

Assumptions about the nature of net capital flows are crucial in evaluating economic policy in an open economy. Because such flows can substantially modify the relationship between domestic savings and investment, they are central to the predictions of a wide range of models of open economies. For example, if changes in net foreign assets are extremely responsive to cross-country differences in rates of return, a small country can experience a prolonged budget deficit without reducing the rate of domestic private capital accumulation or increasing domestic private savings. The crowding out of domestic investment suggested by many closed economy models would not occur because any tendency for domestic interest rates to rise would attract an inflow of foreign savings through a deficit in the current account of the balance of payments. If the country was large, this would imply a noticeably lower amount of savings available for investments in foreign countries and, ultimately, a rise in world real interest rates and a slowdown in the rate of growth of world output. Furthermore, policies that stimulated domestic savings would not necessarily increase the rate of accumulation of the domestic capital stock.

Despite its importance, the behavior of net capital flows among industrial countries has not been the subject of extensive empirical testing. This may be due to the difficulty in measuring expected real

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1/ An example of this view is McKinnon (1981, p.533):

> "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."

rates of return on capital in various countries, but it is also possible that the assumption has been considered obviously appropriate and not in need of formal testing. However, two recent empirical studies by Feldstein and Horioka (1980) and Feldstein (1983) have concluded that the assumption that net capital flows tend to equalize rates of return on physical capital is at least debatable. In this paper we re-examine and extend some of the studies on this topic. The results that we present suggest that there is little support for the assumption that changes in the net foreign assets of industrial countries are sensitive to cross-country differences in rates of return, at least for periods longer than five years. There are two important implications of these findings. First, disturbances to domestic propensities to save and invest are not systematically accommodated by international transfers of resources. Second, the integration of financial markets among industrial countries, and the associated rapid growth in two-way trade in financial assets, do not necessarily imply that net trade in financial assets has played a measurable role in equalizing rates of return on physical capital among countries.

In Section II we review selected countributions in this area. From this review, it appears that an important unresolved issue is whether changes in net foreign assets of industrial countries have become substantially more sensitive to differential rates of return in recent years. In Section III we present evidence suggesting that these changes were no more sensitive in the period 1971-81 than they had been in the 1950s. In Section IV we focus on experience from 1970 to the present. In contrast to recent empirical studies--Sachs (1981, 1983)--we show that no systematic relationship between current account imbalances and investment rates is apparent during this period. Section V presents some concluding remarks.

II. A Short Survey of the Literature

If changes in net foreign assets were sensitive to cross-country differences in real rates of return, the location of investment in physical capital would be unrelated to the location of savings. In such a world, differences among investment rates in various countries would depend on the expected real rates of return on their capital stocks, whereas differences among saving rates would depend upon demographic and cultural elements and on the distribution of income. New investment opportunities in a country would not need to be financed by increases in domestic savings because every country would face an elastic supply of funds from abroad.

These ideas were utilized by Feldstein and Horioka (1980) (henceforth FH) to test whether changes in net foreign assets of industrial countries, which are the counterpart of current account imbalances, respond to changes in expected real rates of return. The hypothesis tested was that the share of income saved by individual countries is

unrelated to the share of output devoted to gross investment, i.e., to increasing and maintaining the capital stock. FH took a sample of 15 industrial countries and calculated the average gross domestic saving and gross fixed investment rates for each country during the period 1960 to 1974. 1/ Then they regressed the cross-section of the average investment rates on a constant and the cross-section of the average saving rates. They found that the slope coefficient was 0.88 and that R^2 was 0.91. The regression is reported in Table 1, row 1. For a slightly larger sample of countries, Feldstein (1983) presented similar results for various sample periods, including 1975-1979 (see Table 1, row 2). These data confirmed FH's earlier findings: industrial countries that had relatively high rates of gross fixed investment also had relatively high gross domestic saving rates.

FH also calculated the average saving and investment rates for the 15 countries in two subperiods and tested whether the cross section of the changes in the average saving rates from one subperiod to the other was correlated with the cross section of the changes in investment rates between the subperiods. This regression, which is reported in Table 1 row 6, suggests that the industrial countries that accumulated capital stocks more rapidly in the second subperiod were also those countries where savings rose as a share of GNP. This evidence led FH (1980, p.317) to conclude that: "the statistical estimates indicate that nearly all of the incremental saving remains in the country of origin. These results are quite incompatible with the assumption of complete arbitrage in a perfect world capital market." 2/

In two recent papers, Sachs (1981, 1983) has analyzed the relationship between investment and the current account balance. The aim of these papers was to show that changes in domestic investment opportunities, rather than changes in the price of oil, were the predominant cause of current account imbalances among industrial countries. Sachs computed

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1/ For the statistical definitions of these variables, see Appendix I.

2/ Harberger (1980) criticized FH's conclusions by pointing out that the correlation between saving and investment shares found by FH was biased upward by the fact the FH used gross investment and gross saving. However, Feldstein (1983) showed that FH's results hold even though net data are used instead of gross data. Harberger also showed that the sizes of the current account to GNP ratios were inversely related to the sizes of the countries. This might support the view that for small countries, in which the location of investment opportunities is more likely to differ from that of savings, net capital flows systematically tend to offset any shortage or abundance of domestic savings. Tobin (1983) pointed out that the correlation between domestic saving and fixed investment rates might be biased upwards because corporate profits account for a large fraction of gross domestic savings in industrial countries but, at the same time, they are a major determinant of gross fixed investment.

Table 1. Savings, Investments and Current Account Balances in Industrial Countries

	Number of industrial countries	Sample period		R^2
1.	15 1/	(1960/74)	(I/Y) = .035 + .88 (S/Y) (1.94)*(12.6)*	.91
2.	17 1/	(1975/79)	(I/Y) = .046 + .86 (S/Y) (1.09) (4.78)*	.57
3.	14 1/	(1971/79)	(CA/Y) = .039 - .20 (I/Y) (1.49) (1.89)*	.21
4.	14 1/	(1971/79)	(CA/Y) = .03 - .20 (I/Y) + .28 OIL (1.27)(1.9)* (1.0)	.28
5.	19	(1960/74)	(CA/Y) = -.002 - .02 (I/Y) (-.08) (-.27)	.01
6.	15 1/	(1960/69)-(1970/74)	Δ(I/Y) = .002 + .72 Δ(S/Y) (.50) (4.50)*	.52
7.	15 1/	(1968/73)-(1974/79)	Δ(CA/Y) = ... - .64 Δ(I/Y) (-6.2)*	.72
8.	17 1/	(1968/73)-(1974/80)	Δ(I/Y) = ... + 1.04 Δ(S/Y) (...)	(...)
9.	19	(1968/73)-(1974/79)	Δ(CA/Y) = -.018 - .55 Δ(I/Y) (-4.53)*(-3.6)*	.43
10.	19	(1968/73)-(1974/80)	Δ(CA/Y) = -.018 - .39 Δ(I/Y) (-4.51)*(-2.48)*	.27
11.	19	(1968/73)-(1974/79)	Δ(I/Y) = -.014 + .83 Δ(S/Y) (1.95)*(3.58)*	.44
12.	19	(1968/73)-(1974/80)	Δ(I/Y) = .013 + .81 Δ(S/Y) (2.15)*(4.36)*	.53

The notation ( ) indicates the average value of the variables during the years shown in parentheses. The notation Δ indicates the change from the average of the first period indicated in parentheses to the average of the second. The dots indicate that the statistic of the parameter is not reported by the author. I is gross domestic fixed investment, Y gross national or domestic product, CA the current account balance including official transfers, S gross national savings and OIL is net import of OIL at constant prices. See the Appendix for the sources of the data and the definitions adopted. The t statistics are shown in parentheses; an asterisk indicates that the coefficient is significant at the 5 percent significance level; and R^2 is unadjusted for the degrees of freedom.

1/ The sources for regressions 1 to 4 and 6 to 8 are as follows: 1, FH, p. 321; 2, Feldstein (1983), p. 135; 3 and 4, Sachs (1983), p. 105; 6, FH, p. 327; 7, Sachs (1981), p. 250; and 8, Feldstein (1983), p. 144.

the average current account to GNP ratios in 14 industrial countries and their average gross fixed investment rates for the 1971/1979 time period. He then regressed the cross section of current account ratios on the cross section of investment ratios and found that the slope coefficient was negative and significantly different from zero. In addition, he found a significant inverse relationship between cross sections of changes in average current account balances and changes in investment rates over various sample periods from 1968 through 1979. Based on this evidence, Sachs (1983, p. 106) concluded that "since the coefficient on investment is -0.65, a 1 percent rise in the investment rate (between 1961/70 and 1971/79) was financed on average 0.65 percent by foreign capital inflows, and only 0.35 percent by gross national savings." 1/

The contradiction between Sachs and FH's conclusions is obvious and is well illustrated by rows 7 and 8 in Table 1, which are taken from Sachs (1981) and Feldstein (1983). However, it is possible that the two regressions are not strictly comparable because they differ both in the cross section of countries included and in the sample period. Therefore, we re-estimated them using data for 19 industrial countries and the same time period. As rows 9 through 12 show, the estimated parameters changed very little compared to the results reported in the studies by Sachs, FH and Feldstein. Because it is clear that FH's and Sachs' interpretation of their results cannot both be correct, either FH's or Sachs' equation cannot be viewed as truly structural, that is, one of the two sets of correlations found in these empirical studies cannot be used to draw inferences about the behavior of economic agents.

III. Have Current Account Imbalances Become More Sensitive to Investment Changes in the 1970s?

A plausible interpretation of the data that would reconcile the conclusions of Sachs and FH is that national capital markets were not integrated during the 1950s and 1960s but were liberalized in the 1970s so that in a world of imperfect but increasing capital mobility there would still be a significant relationship between domestic savings and investment ratios. This correlation, however, should decline over time as increasing integration of capital markets tended to break down the

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1/ In Table 1, we did not report the regression which Sachs refers to because it was almost identical to the regression that is shown in row 7. The regression of the quotation is $\Delta(CA/Y) = -0.01 - .65\ \Delta(I/Y)$, $R^2 = .65$
(4.2) (4.6)
where the sample is the change from the average level for the period 1961/70 to the average of 1971/79; the cross section consists of 13 industrial countries and excludes Japan; t statistics are shown in parentheses.

relationship between domestic savings and domestic investment. As a corollary, the inverse correlation between current accounts and investment ratios should become more apparent over time.

This possibility was advanced by Harberger (1980) and Feldstein (1983). Feldstein (1983) argued that capital market integration was enhanced in the 1970s by various measures, an example being the elimination of the interest rate equilization tax in the United States. As a result, the industrial countries may have moved toward a world of equal rates of return even though domestic savings patterns still largely determined the accumulation of domestic capital stock. Feldstein supported this hypothesis by pointing out that the R^2 in the regression of the cross section of investment rates on that of savings rates sharply declines if the sample period that is used to calculate the average rates includes the years after 1974 (Table 1, rows 1 and 2). He also pointed out that the negative correlation between current account balances and investment rates that Sachs found for the 1970s had not been apparent for the 1960s. This can be seen by comparing rows 3 and 5 in Table 1.

The conjecture that the development of international credit markets has tended to break the linkage between domestic savings and investment is certainly appealing. The growth of Eurocurrency and Eurobond markets as well as the expansion of international banking and other types of financial intermediation among residents of different countries has been a prominent institutional change during the 1970s. However, it is not necessarily true that a large volume of two-way trade in financial assets is associated with net trade in financial assets. But it is the net trade, together with the associated net trade in goods and services, that allows domestic investment to diverge from domestic savings.

In this section we test the hypothesis that the sensitivity of changes in net foreign assets of industrial countries to differential rates of return increased from the 1950s to the 1970s. Because the 1950s are widely viewed as a decade in which the industrial countries behaved as insular economies, the test provides a good benchmark for evaluating the degree of integration of the national markets for physical capital in the 1970s. 1/ In practice, we selected the period from 1949 to 1959, which was characterized by extensive trade barriers and exchange controls on current account transactions, to represent the 1950s. As for the 1970s, we selected two periods. The first period covered 1971 to 1981 so that its initial year coincided with the first devaluation of the dollar and the gradual move toward the managed float. The second period covered 1974 to 1981, the years that followed the first oil shock.

1/ For example, see McKinnon (1981).

Table 3 shows that the industrial world as a whole increased its investment rate by nearly 2 percentage points between the 1950s and the 1970s. The increase in the median investment rate was even larger as it rose from 20.3 percent to nearly 23 percent. Thus, there is enough variation in the data to make the comparison between the two decades significant.

If net foreign assets were more sensitive to differential rates of return in the 1970s than in the 1950s, the following testable implications would arise: the correlation between the cross section of the average savings and investment rates would be lower in the 1970s than in the 1950s; the correlation between the cross section of average current accounts and investment rates would be negligible in the 1950s, but significantly negative in the 1970s; and the cross section of the changes in the average investment rates between the two decades would be unrelated to the cross section of the changes in the average savings rates but negatively related to the cross section of the changes in the average current account rates. Table 2 shows that the data clearly reject the hypothesis that changes in net foreign assets have become more sensitive to yield differentials, regardless of the period used to represent the 1970s.

Additional information about the hypothesis that changes in net foreign assets were more sensitive to differential rates of return in the 1970s can be obtained by comparing the variances of the average investment rates, of the average domestic saving rates, and of the average current account to GNP ratios. Table 3 shows these variances calculated for the cross section of 19 industrial countries for 1949/59, 1974/81 and 1971/81. The null hypothesis that the variances of the savings rate and investment rate did not change between the 1950s and the 1970s could not be rejected at the usual significance level. 1/ Thus, the differences that existed among the saving and investment rates of the industrial countries in the 1950s continued to exist in the 1970s, i.e., the proportion of industrial countries that invested and saved more than the average remained constant. The same thing is true for the proportion of industrial countries that invested and saved less than average. If national markets for real capital had become more integrated in the 1970s, and if savings and investment had responded to real interest rate movements, the dispersion of the savings and/or investment rates around their means would have increased or decreased but would not have remained constant. In addition, if national markets for real capital had become more integrated, the differences among the current account to investment

1/ Because the distribution used to test the hypothesis of the equality of the variances is based on the assumption that the random variable is distributed normally, we used a χ^2 goodness-of-fit test to test the normality of the data. In every case, we could not reject the hypothesis of normality.

Table 2. Capital Mobility: the 1950s and the 1970s 1/

	Sample period		R^2
1.	(1949/59)	(I/Y) = .053 + .69 (S/Y) (2.13)* (6.25)*	.69
2.	(1949/59)	(CA/Y) = .009 - .04 (I/Y) (.32) (-.30)	.005
3.	(1971/81)	(I/Y) = .030 + .88 (S/Y) (.88) (6.12)*	.71
4.	(1971/81)	(CA/Y) = .033 - .19 (I/Y) (1.17) (-1.66)	.11
5.	(1974/81)	(I/Y) = .034 + .88 (S/Y) (.91) (5.47)*	.68
6.	(1974/81)	(CA/Y) = .04 - .24 (I/Y) (.76) (-.93)	.12
7.	(1949/59)-(1971/81)	Δ(I/Y) = .021 + .78 Δ(S/Y) (4.87)* (6.11)*	.70
8.	(1949/59)-(1971/81)	Δ(CA/Y) = -.015 + .05 Δ(I/Y) (-3.15)* (.46)	.01
9.	(1949/59)-(1974/81)	Δ(I/Y) = .024 + .77 Δ(S/Y) (5.67)* (5.81)*	.70
10.	(1949/59)-(1974/81)	Δ(CA/Y) = .019 - .02 Δ(I/Y) (-3.58)* (.19)	.01

1/ The notations are the same as in Table 1. The cross section included 19 industrial countries.

Table 3. A Comparison of Variances: The 1950s and the 1970s

	1949/59	1974/81	1971/81
Fixed investment/GNP:			
Overall ratio for the industrial countries	.199	.216	.216
Median	.203	.220	.228
Variance	.001142 = S_1	.001644 = S_2	.001572 = S_3
Saving/GNP:			
Overall ratio for the industrial countries	.215	.220	.223
Median	.227	.223	.225
Variance	.001673 = S_4	.001345 = S_5	.001394 = S_6
Current account/GNP:			
Overall ratio for the industrial countries	.005	-.003	-.002
Median	.003	-.019	-.011
Variance	.000338 = S_7	.000563 = S_8	.000430 = S_9
Current account/fixed investment:			
Variance	.009325 = S_{10}	.011347 = S_{11}	.008821 = S_{12}

Test of equality of variances

Null hypothesis	Alternative hypothesis	Value of the F statistics 1/
$S_1 = S_2$	$S_1 < S_2$	1.44
$S_1 = S_3$	$S_1 < S_3$	1.38
$S_4 = S_5$	$S_4 > S_5$	1.24
$S_4 = S_6$	$S_4 > S_6$	1.20
$S_7 = S_8$	$S_7 < S_8$	1.66
$S_7 = S_9$	$S_7 < S_9$	1.27
$S_{10} = S_{11}$	$S_{10} < S_{11}$	1.22
$S_{10} = S_{12}$	$S_{10} > S_{12}$	1.06

1/ Under the alternative hypothesis the value of the F statistics should exceed the critical value of the F distribution which is $F_{.95}(18, 18) = 2.22$.

ratios of the industrial countries would have substantially declined in the 1970s, if compared with the 1950s. 1/ When we computed the variance of this ratio in the three periods, we found that it was almost the same in 1974/81 and in 1971/81 as in 1949/59. The comparison among these variances thus provides another bit of evidence against the hypothesis that capital became more mobile in the 1970s.

IV. The Evidence Re-examined

Our failure to find evidence of increased integration among national markets for physical capital in the 1970s and 1980s leaves unresolved the apparent contradiction between FH's and Sachs' results. In this section we re-examine and extend their work. First, we focus on the stability of the estimated slope coefficients in Sachs' and FH's equations.

a. The stability of the coefficients

The first set of regressions used by FH and Sachs (1983) relates a cross section of average levels of saving rates (S/Y) to cross sections of average levels of investment rates (I/Y) and of the current account to GNP ratios (CA/Y). FH and Feldstein (1982) found that (S/Y) were highly correlated with (I/Y) in various sample periods. By contrast, rows 3 and 5 of Table 1 show that the negative correlation between (CA/Y) and (I/Y) is not apparent before the 1970s. As we discuss in Section III, a plausible explanation of these results is that since the beginning of the 1970s the industrial world has slowly moved towards a regime where real rates of return tend to be equalized across countries. The second set of regressions used by FH and Sachs (1981, 1983) relates a cross section of changes in average investment rates to both a cross section of changes in average saving rates and to a cross section of changes in current account rates.

In order to check the stability of the regression coefficients through time, we divided the post-World War II years into five subperiods and refitted FH's and Sachs' equations for each pair of consecutive subperiods. The subperiods were selected so that all of them included roughly the same number of business cycles; the last two subperiods--1968/73 and 1974/79--coincided with the sample period used in Sachs (1981). We report the results in Table 4. The correlation between the cross sections of changes in saving and investment rates appears to be

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1/ We assume here that the two oil shocks did not systematically affect the relationship between current account balances and investment rates among industrial countries in the 1970s. This assumption is supported by the data. For example, see the regression shown in row 4, Table 1.

Table 4. The Stability of the Coefficients 1/

(1950/55)-(1956/61)	$\Delta(I/Y)$	= .018 + .55 $\Delta(S/Y)$ (2.65)* (4.74)*	R^2 = .57
	$\Delta(CA/Y)$	= -.005 - .12 $\Delta(I/Y)$ (-.446) (-.59)	R^2 = .02
(1956/61)-(1962/67)	$\Delta(I/Y)$	= .009 + .77 $\Delta(S/Y)$ (1.83)* (2.73)*	R^2 = .30
	$\Delta(CA/Y)$	= -.000 - .32 $\Delta(I/Y)$ (-.10) (-2.39)*	R^2 = .25
(1962/67)-(1968/73)	$\Delta(I/Y)$	= -.002 + .55 $\Delta(S/Y)$ (-.79) (3.18)*	R^2 = .37
	$\Delta(CA/Y)$	= .007 - .28 $\Delta(I/Y)$ (2.45)*(-1.25)	R^2 = .08
(1968/73)-(1974/79) 2/	$\Delta(I/Y)$	= .014 + .83 $\Delta(S/Y)$ (1.95)* (3.58)*	R^2 = .43
	$\Delta(CA/Y)$	= -.017 - .55 $\Delta(I/Y)$ (-4.53)*(-3.61)*	R^2 = .43
(1968/73)-(1974/80) 2/	$\Delta(I/Y)$	= .013 + .81 $\Delta(S/Y)$ (2.15)* (4.36)*	R^2 = .53
	$\Delta(CA/Y)$	= -.018 - .39 $\Delta(I/Y)$ (-4.51)*(-2.48)*	R^2 = .27

1/ The notations are the same as in Table 1. The cross section included 19 industrial countries.

2/ These equations also appear in Table 1.

high throughout the years and it increases substantially after 1973. 1/ By contrast, the negative correlation between the investment and current account rates takes a large value only between 1968 and 1979, which is the sample period used by Sachs (1981). However, this value declines substantially, from -.55 to -.39, if 1980 is added to the sample period. Before the 1970s, the estimated slope coefficient in Sachs' equation is significantly different from zero only between 1956 and 1967.

Because the cross section consists of only 19 countries and because the negative correlation between the cross section of changes in investment rates and the cross section of changes in current account balances emerges in only two periods, a natural question to ask is whether the correlation depends on a few outliers. 2/ Charts 1 and 2 show the scatter plots of the average changes in investment rates and the average changes in current account rates between 1956/61 and 1962/67 and between 1968/73 and 1974/79, that is, the only two subperiods in which the negative correlation between the two variables is significant. 3/ The plots clearly indicate that the negative slope of the regression line depends on one outlier in the first subperiod, Canada, and on three outliers in the second subperiod, Switzerland, Norway and New Zealand. When we re-estimated Sachs' equation without these outliers, we obtained an estimate of the slope coefficient that was not significantly different from zero. 4/

Not only does the investment-current account relation depend on a few outliers, but--in the case of Switzerland--this relation may not stem from differentials in rates of return on domestic capital. The sharp

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1/ This increase, however, may be overstated by several exogenous factors. During the sample period, total savings in many countries were depressed by a redistribution of income in favor of labor, which reduced corporate profits and by a decline in public sector savings, caused by an expansion in social welfare programs. At the same time, the increase in energy prices and the larger role played by governments in the economies caused a decline in the investment rate by reducing the expected return on physical capital.

2/ Here we do not give any precise statistical meaning to the word outlier.

3/ The scatter plot for the period 1968-1980 looks almost identical to that for 1968-1979.

4/ The fitted regressions were the following. (The notations are the same as in Table 1.)

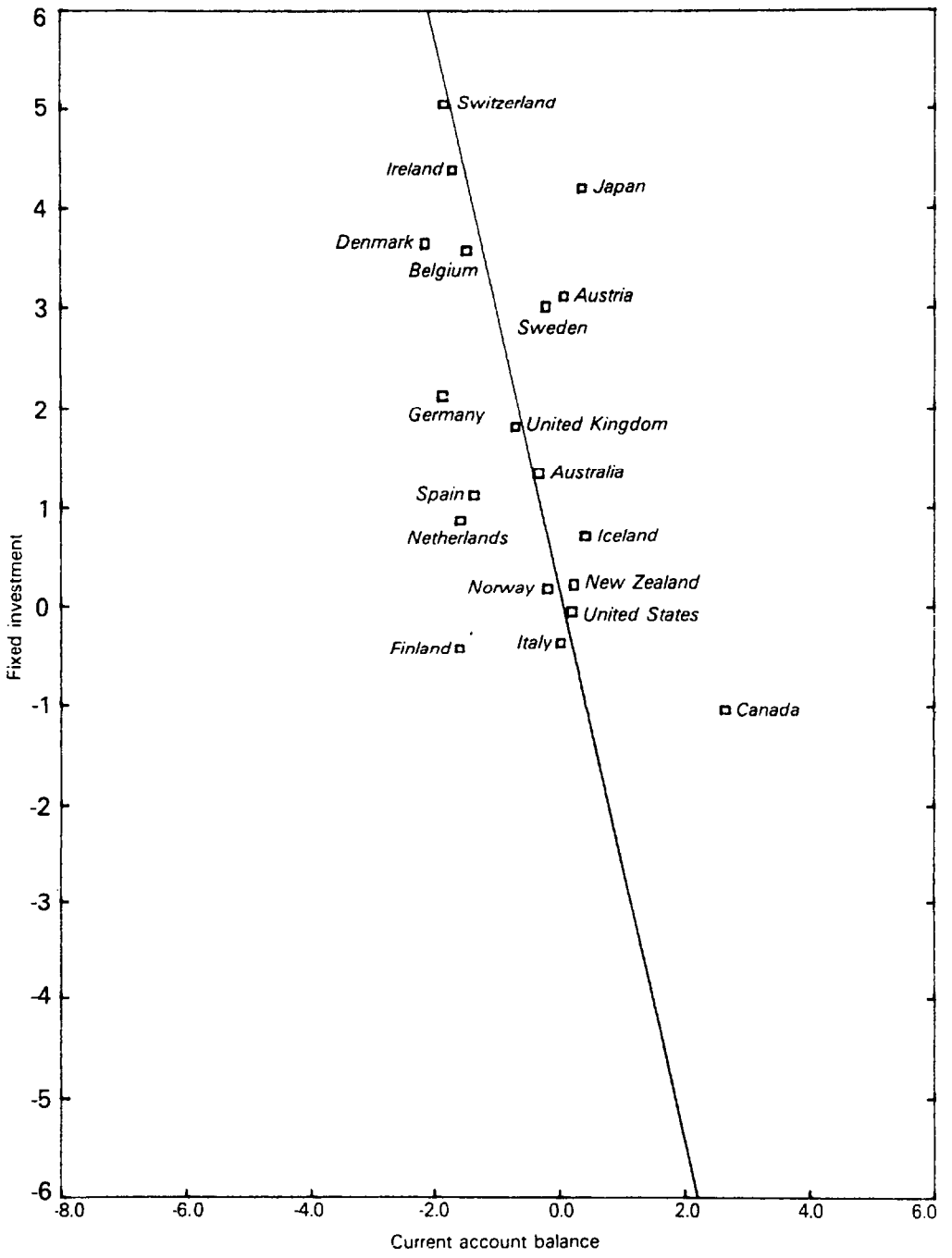
$$(1956/61) - (1962/67) \quad \Delta(CA/Y) = \underset{(-1.34)}{-.004} - \underset{(-1.60)}{.19}\ \Delta(I/Y) \qquad R^2 = .14$$

$$(1968/73) - (1974/79) \quad \Delta(CA/Y) = \underset{(-5.14)}{-.011} - \underset{(-1.01)}{.11}\ \Delta(I/Y) \qquad R^2 = .07$$

CHART 1

CHANGES IN FIXED INVESTMENT AND CURRENT ACCOUNT BALANCES: 1956/61-1962/67[1]

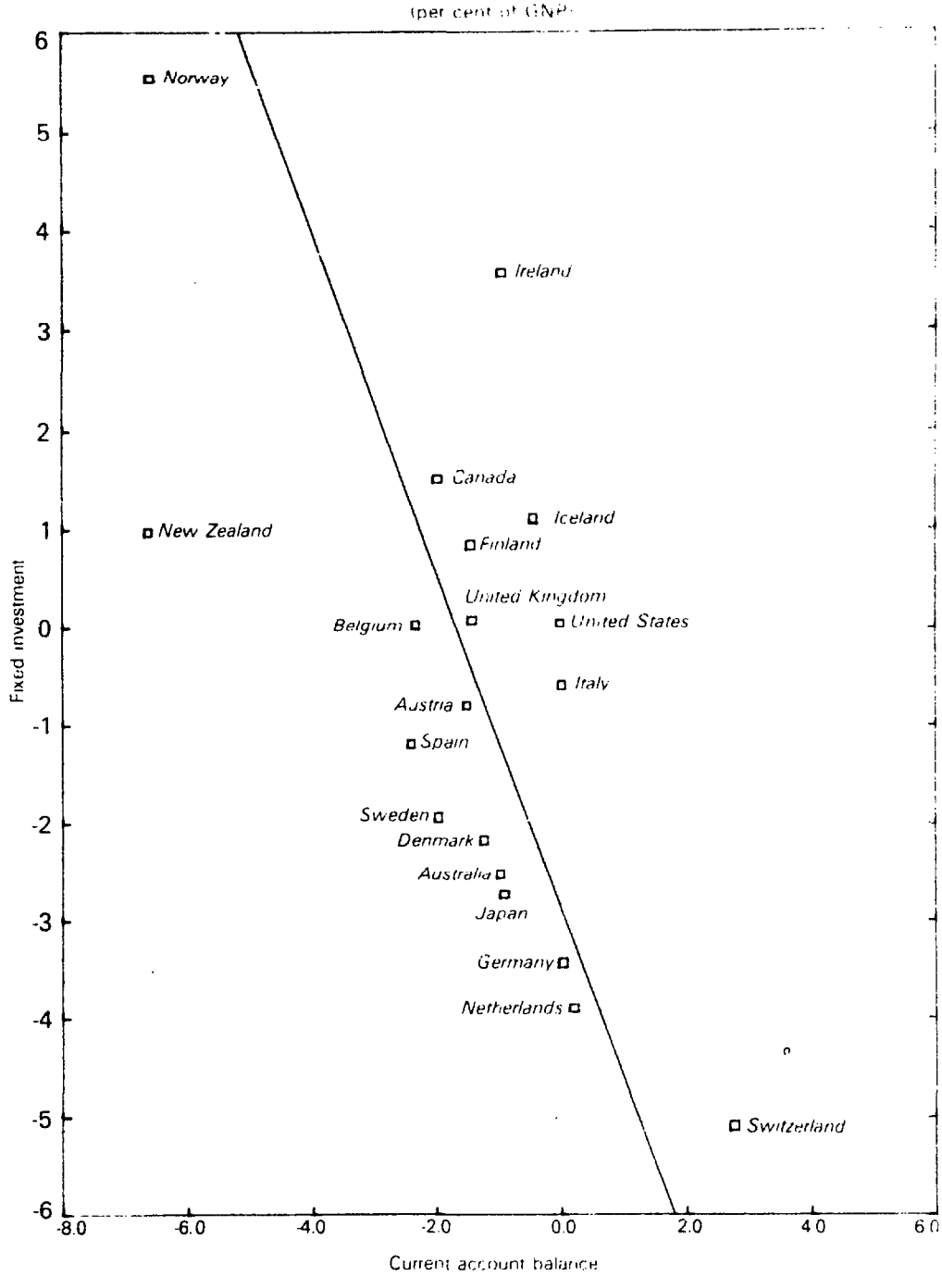
(In percent of GNP)



[1]The line depicts the regression (CA·Y) = –.000– 32 (I·Y)

CHART 2

CHANGES IN FIXED INVESTMENT AND CURRENT ACCOUNT BALANCES: 1968/73-1974/79[1]



[1] The line depicts the regression [illegible]

increase in the Swiss current account surplus after 1973 reflected a marked improvement in investment income which was probably related to the "safe haven" status of Swiss capital markets. As a consequence, it is difficult to interpret the data as showing that changes in the current account position were due to changes in the expected real rate of return of the capital stocks in the country. Chart 2 further illustrates this point. From 1968/73 to 1974/79, industrial countries differed markedly in their capital accumulations. For example, Ireland and Canada increased the share of income allocated to fixed investment by nearly 4 and 2 percentage points, respectively. By contrast, Germany and the Netherlands decreased this share by over 3 percentage points. However, notwithstanding the differences in investment rates, the vast majority of industrial countries experienced similar changes in the current account rates.

It seems reasonable to conclude that a few isolated episodes appear to determine the statistical negative correlation between current accounts and investment rates in the 1970s. This correlation is thus insufficient to support the hypothesis that changes in net foreign assets were responsive to changes in investment opportunities in the industrial world.

b. Joint estimation

The contrasting results that FH and Sachs obtained with the same set of data from the 1970s may be the result of some specification error due to omitted variables. 1/ The best way to test this form of misspecification is to include variables in the regression that might be important. The problem with this approach is that it is difficult to find a few variables that capture the effect of the numerous shocks that might have affected both endogenous and exogeneous variables during the sample period. 2/ An alternative strategy for testing the "omitted" variable hypothesis is to use an instrumental variable approach. We assumed that

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1/ A second form of possible misspecification may be the functional forms of the equations chosen. We noted that the constant terms in the regressions reported were large and precisely estimated. This implies, for example, that even if the average investment rates of industrial countries had not changed between the 1960s and 1970s, their average current accounts would have deteriorated by nearly 2 percentage points in proportion to GNP, a conclusion that contrasts with the tone of Sachs' papers. Thus, a large constant may be an indication that the functional forms of the equation are misspecified. However, we found that quadratic functions fitted the data very poorly.

2/ Given that the sample period covers the first oil shock, we included changes in the terms of trade, but without much success. Sachs (1983) reports a similar regression with oil imports as an independent variable; see rows 3 and 4 in Table 1.

FH's equation was truly structural, i.e., changes in savings rates determine the systematic part of changes in investment rates. 1/ Under this assumption, an omitted variable would affect investment rates through their random component. If the negative correlation between investments and current accounts was due to an omitted variable, then changes in investment rates would not have any explanatory power in Sachs' equation once the random component had been eliminated from them. Therefore, we re-estimated Sachs' equation by using the predicted values from FH's equation as the explanatory variable. As Table 5 shows, the correlation between the cross sections of changes in investment rates and of changes in current account balances disappears. Although one can always argue that the results stem from the choice of an unsatisfactory instrumental variable, we think that these regressions are sufficient to cast some doubt on the specification of Sachs' equation.

Table 5. Instrumental Variable Estimation 2/

(1968/73)-(1974/80)	$\Delta(CA/Y) = -.014 + .02\ \Delta(\hat{I}/Y)$ (.005) (.30)	$R^2 = .001$
(1968/73)-(1974/79)	$\Delta(CA/Y) = -.014 + .09\ \Delta(\hat{I}/Y)$ (.004) (.24)	$R^2 = .007$

c. The adding up constraint

Because of the constraint resulting from the national income identity, an increase in the investment rate cannot be associated with an increase in the saving rate by the same amount unless the current account balance remains unchanged. 3/ This adding up constraint is used by both Sachs and FH to interpret their results, even though they never test it. 4/ In this section we jointly estimated their equations by constraining the sum of the slope coefficients to be equal to one. To implement the estimation we stacked the observations as follows:

1/ The assumption that FH's equation is truly structural was justified by the robustness of the FH results which had emerged from the previous section.

2/ A ^ indicates predicted values; the standard errors are in parentheses.

3/ Here we are disregarding the changes in the inventory investment that are very small for the two periods considered.

4/ For example, see the quotation from Sachs on p. 7, in Section II.

$$\begin{bmatrix}\Delta(I/Y)_i\\ \Delta(CA/Y)_i\end{bmatrix} = \begin{bmatrix}1 & \Delta(S/Y)_i & 0 & 0\\ 0 & 0 & 1 & \Delta(I/Y)_i\end{bmatrix}\begin{bmatrix}c\\ d\\ a\\ b\end{bmatrix} + \begin{bmatrix}u^1{}_i\\ u^2{}_i\end{bmatrix}$$

where i is the country index, thus ranging from 1 to 19. The system can be re-written in a more compact way, or Y = XB + U. The assumption that the disturbances in both Sachs', and FH's equations are homoskedastic implies that:

$$E(u^k_j u^k_i) = \begin{cases}\sigma^2_k & j = i\\ 0 & j \neq i\end{cases} \qquad \text{for} \quad k = 1, 2$$

and $E(u^1_j u^2_i) = 0 \qquad j = 1, \ldots\ldots\ldots, 19$

The variance-covariance matrix of the disturbances can then be expressed as

$$E(UU') = V = \begin{bmatrix}S & 0\\ 0 & S\end{bmatrix}$$

where $S = \begin{bmatrix}\sigma^2_1 & 0\\ 0 & \sigma^2_2\end{bmatrix}$

The constraint on the coefficients can be expressed in matrix form as:

$$r = RB$$

where r = 1 and R = [0 1 0 1]

The constrained estimators of the parameters $\hat{B}$ can then be obtained as (Theil, 1971):

$$\hat{B} = B' + CR' (RCR')^{-1} (r - RB')$$

where

$$B' = (X'V^{-1}X)^{-1}X'V^{-1}Y \text{ and } C = (X'V^{-1}X)^{-1}$$

The constrained estimates are shown in Table 6 for the two sample periods.

Table 6. Constrained Estimates 1/

(1968/73)-(1974/80)	$\Delta(CA/Y)$	=	-.016 - .15 $\Delta(I/Y)$
			(.004) (.11)
	$\Delta(I/Y)$	=	+.021 + 1.15 $\Delta(S/Y)$
			(.004) (.11)
(1968/73)-(1974/79)	$\Delta(CA/Y)$	=	-.016 - .33 $\Delta(I/Y)$
			(.004) (.12)
	$\Delta(I/Y)$	=	.026 + 1.33 $\Delta(S/Y)$
			(.004) (.12)

If the sample period includes 1980, the estimate of the slope coefficient in Sachs' equation is smaller than two standard deviations, while the estimate in FH's equation is not significantly different from 1. By contrast, if 1980 is left out, the slope estimate in Sachs' equation is equal to -.34 and is now significantly different from zero even though it is substantially smaller than the estimate obtained in the unconstrained regression. As to the FH equation, the constraint has the effect of increasing the slope coefficient to 1.33, a value which has no immediate economic interpretation. The point that emerges from this joint estimation is that one minus the estimated coefficient in the original Sachs' equation grossly understates the fraction of gross capital formation that is financed by domestic savings.

d. The analysis of the time series

An alternative procedure to test for misspecification, though not a rigorous one, is to analyze the time series properties of the variables used in the regressions. The two basic equations can be rewritten as:

$$(I/Y)_{ti} = a_o + a_1 (S/Y)_{ti} + a_2 X_{ti} + u_{ti}$$

$$(CA/Y)_{ti} = b_o + b_1 (I/Y)_{ti} + b_2 Z_{ti} + e_{ti}$$

1/ The standard errors are in parentheses. They were obtained from the variance-covariance matrix

$$V(\hat{B}) = C - CR' (RCR')^{-1} RC$$

where X_{ti} and Z_{ti} are two variables that might have some explanatory power in the regressions but that are omitted; u_{ti} and e_{ti} are serially uncorrelated disturbance terms; and i is the country index. Because the most conflicting results are obtained by FH and Sachs with regressions that use changes in the level of the variables over two periods of time, we attach a t subscript to the variables to make explicit the time dependency of the regressions. If changes in net foreign assets were insensitive to differential rates of return and if the equation adopted by FH was correctly specified, i.e., no relevant variables were left out, then a_0 and a_2 would be equal to zero and a_1 equal to one. The first equation could then be rewritten as

$$(I - S)/Y_{ti} = u_{ti}$$

so that savings would differ from investments only by serially uncorrelated error terms, and current accounts would simply offset unanticipated shocks to the investment and the savings functions. Thus u_{ti} could be interpreted as a forecasting error since, by assumption, people would not plan to accumulate net claims on nonresidents.

This is a testable implication of the hypothesis that national markets for physical capital are not integrated if either investment rates or savings rates are highly serially correlated in every country and if a proper unit of time is chosen. Clearly, if both investment and savings rates were white noise, the test would be powerless. Fortunately, the serial correlation in the time series of investment rates is indeed very high, as we show in Table 7. As for the unit of time, the longer the unit, the more realistic is the hypothesis that expected investments equal savings. In what follows we use annual data, which is probably too short a unit of time for testing this hypothesis.

Under the competing assumption that national markets for real capital are perfectly integrated and that Sachs' equation is not misspecified, $(I - CA)/Y_{ti}$ would be serially uncorrelated or substantially less correlated as compared to $(I/Y)_{ti}$. In other words, if investment rates were characterized by long cycles that reflected movements in the saving rates, then saving rates would also be characterized by the same cycles and the saving-investment gaps would be white noise. By contrast, if changes in net foreign assets were caused by movements in investment rates, current account balances would be characterized by long cycles and saving rates would be white noise.

In Table 7, we report the Box-Pierce statistics for the estimated autocorrelation functions of $(I - CA)/Y_{ti}$, $(I/Y)_{ti}$ and $(I - S)/Y_{ti}$. The statistics indicate that investment rates are highly serially correlated for each country. They also indicate that the autocorrelation function of $(I - CA)/Y_{ti}$ generally resembles that of $(I/Y)_{ti}$ with the exceptions limited to Australia and, to a lesser extent, Canada and Iceland. By contrast, the hypothesis that the saving-investment gaps $(I - S)/Y_{ti}$ are

Table 7. Autocorrelation Functions 1/

Significance level of the Box-Pierce Q(n) statistics for n lags	$(I/Y)_{ti}$		$(I - S)/Y_{ti}$		$(I - CA)/Y_{ti}$	
	Q(4)	Q(6)	Q(4)	Q(6)	Q(4)	Q(6)
United States	.004	.015	.570	.710	.034	.090
Canada	.000	.000	.063	.140	.056	.090
Australia	.000	.000	.160	.290	.937	.990
Japan	.000	.000	.062	.107	.000	.000
New Zealand	.000	.000	.500	.670	.069	.070
Austria	.000	.000	.000	.000	.000	.000
Belgium	.000	.000	.015	.040	.000	.000
Denmark	.000	.000	.000	.000	.000	.000
Finland	.000	.000	.052	.118	.010	.022
Germany	.000	.000	.003	.013	.000	.000
Iceland	.000	.000	.336	.403	.056	.127
Ireland	.000	.000	.065	.133	.000	.000
Italy	.001	.003	.650	.489	.001	.003
Netherlands	.000	.000	.189	.210	.008	.023
Norway	.038	.064	.009	.031	.006	.014
Spain	.000	.000	.056	.111	.005	.017
Sweden	.000	.000	.085	.170	.000	.000
Switzerland	.000	.000	.001	.000	.000	.000
United Kingdom	.000	.000	.010	.028	.000	.000

1/ The sample period was 1948/1981 for the majority of the countries; 1949/1981 for Australia, Germany and New Zealand; 1950/1981 for Italy and Belgium; 1952/1981 for Japan; and 1954/1981 for Spain.

The Q(n) statistics is equal to $T \sum_{i=1}^{n} r_i$ where r_i is the ith estimated autocorrelation and T is the sample size. A number in the table which is close to zero indicates that the series is serially correlated.

white noise cannot be rejected for 12 out of 19 countries. In the remaining cases, $(I - S)/Y_{ti}$ is less correlated than the investment rates with the exceptions of Austria, Denmark, and Switzerland. Although this test is only suggestive, it adds to the evidence that national markets for real capital were not highly integrated among industrial countries during the sample period.

V. Conclusion

In this paper, we showed that the hypothesis that national markets for real capital are highly integrated finds little support in the data from 19 industrial countries. By re-examining and extending existing studies, we found that cross-country differences in investment rates have mirrored the differences in saving rates during the post World War II years. Moreover, this relation was as strong in the 1970s as in the 1950s when international trade in goods and factors of production was hindered by extensive restrictions and controls. We also found that the link between current account balances and investment opportunities that seems to have emerged in the 1970s is accounted for by data from a few countries and perhaps by the presence of shocks to those two variables that were common to all countries.

In view of the evidence presented here, we conclude that changes in the propensity to save or to invest on the part of residents of an industrial country result in changes in that country's investment share or saving share, while current accounts act as temporary shock absorbers. Unfortunately, we are unable to explain why the industrial countries were still behaving like "insular" economies in the late 1970s, even though a substantial part of the barriers to the international mobility of goods and factors of production, which existed in the 1950s, had been phased out.

We acknowledge the possibility that the evidence presented might be consistent with the hypothesis that no differentials in real rates of return existed among industrial countries over the time studied. This could occur if fiscal policies in industrial countries were constantly aiming at balancing current accounts. Although we cannot rule out this possibility, we think it is unlikely that governments have been able to influence systematically aggregate savings rates.

The apparent lack of integration among national markets for real capital can be reconciled with the existence of current account imbalances among industrial countries and with the expansion of the international capital markets in the 1970s. In view of the evidence presented in the paper, current account imbalances seem unrelated to differences in rates of return. Instead they seem to reflect a variety of unanticipated shocks to incomes and terms of trade, or shocks that are believed to be temporary. Over time, these unintended changes in net foreign

assets might sum to zero as portfolios are adjusted to desired levels. It is clear that there have been isolated instances of industrial countries, for example, Norway, Canada, and New Zealand, that have imported a substantial amount of foreign savings. The possibility remains, however, that these are unusual events that should not be viewed as reflecting an increased integration of national capital markets among industrial countries.

The virtual elimination of effective controls over financial capital movements among industrial countries and the existence of extraterritorial credit markets provide ample opportunity for savings originating in one country to find their way to investment or consumption loans in another country. However, it is also clear that the very large volume of two-way trade in financial assets that has developed in recent years could accommodate portfolio preferences associated with diversification, tax avoidance, or avoidance of controls on domestic financial intermediation, without any net capital flow associated with redistribution of world savings. But it is the net flow that plays an important role in equalizing rates of return on real capital among countries.

Data: Sources and Definitions

a. Current account of the balance of payments

We obtained the data for the current accounts of the balance of payments of the industrial countries by adding the lines 77a.d., 77and, 77aed, and 77afd of the International Financial Statistics (IFS). Because the current accounts were expressed in dollars, we converted them to local currencies by using the average market exchange rate (line ah). Only the time series for Canada and Ireland were available in the data bank of the IFS for the entire period beginning in 1949. The initial dates for the other countries ranged from 1951 for Italy and the Netherlands to 1967 for Sweden. For most countries we were able to extend these time series back to 1949 by using the data published in International Monetary Fund, Balance of Payments Yearbook, volumes 3 through 19. However, there were no data for the current account of Switzerland in 1949, and of Spain from 1949 until 1954. In addition, there were no data on the transactions between metropolitan France and the franc area before 1967. As a result, we decided to leave France out of the sample.

b. GDP/GNP

We obtained the GDP/GNP from line 99a or 99b of the IFS. The series of the GDP/GNP for Canada, U.S., U.K., Iceland, Ireland, and Switzerland are available from 1949. However, the GDP/GNP series for Belgium, the Netherlands, Sweden, Norway, Denmark, Austria, Italy, and Germany were available in the IFS only from 1950. For this group of countries we extended the time series back to 1949 by using the volume and price indices of GDP/GNP published in OECD, Statistics of National Product and Expenditure, No. 2, 1957. We took the indices of GDP/GNP at constant prices for Japan and Finland from United Nations, Statistics of National Income and Expenditure, Statistical Papers Series H, No. 9, (May 1956). This publication was also the source of the GNP at current prices in Japan for the period 1949-51. However, because these series systematically differed from the series of the IFS for those years in which there was overlapping, we multiplied the GNP at current prices in 1949-51 by 1.23 which was equal to the ratio between the series in IFS and in the U.N. publication during the period 1952-54.

d. Fixed Investment

Gross national fixed investment was taken from the IFS (line 93e). For the years during which it was not available in IFS, we used the same sources as for the GDP/GNP.

e. Savings

Gross national savings were obtained by adding gross domestic fixed investments, changes in inventories and current accounts of the balance of payments. Sachs (1981) used the same procedure. By contrast, Feldstein (1983) used the conventional national income accounts measure. However, he showed that his results do not depend on the way in which savings are calculated.

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