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International Capital Flows: Economic Impact and Policy Implications

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BP	balance of payments
C	domestic consumption
CA	capital account
CU	current account
Cov(.)	covariance operator
D	government debt
Δ	difference operator
E(.)	expectations operator
e^T	contractual forward exchange rate
e	(floating) price of foreign currency denominated in domestic currency
$\bar{e}$	fixed price of foreign currency denominated in domestic currency
$\underline{e}$	equilibrium exchange rate
Ex	exports
f	forward discount
F	capital inflows
G	government expenditure
i	domestic interest rate
I	domestic investment
Im	imports
K	capital stock
M^d	monetary demand
M^s	monetary supply
P	domestic price index
P*	foreign price index
p	risk premium
$\underline{p}$	equilibrium price level (in logs)
Π	profit
π	rate of domestic inflation
π^*	rate of foreign inflation
π^e	expected inflation
R	foreign reserves

r	real rate of interest
S	domestic saving
σ	standard deviation
T	taxes
Var(.)	variance operator
W	wealth
Y	real income
y	log of domestic output
$\bar{y}$	log of domestic natural output
z	real exchange rate
*	foreign variable
$\dot{f} \equiv \frac{df}{dt}$	derivative of *f(t)* with respect to time

List of Abbreviations

ADR	American depository receipt
AR	autoregressive
ARMA	autoregressive moving average
BIS	Bank of International Settlement
FDI	foreign direct investment
CIP	covered interest parity
CPI	consumer price index
EMS	European Monetary System
EMU	European Monetary Union
EU	European Union
FCRP	foreign credit restraint program
GARCH	generalised autoregressive conditional heteroscedasticity
ICAPM	international capital asset pricing model
IET	interest equalisation tax
IMF	International Monetary Fund
LOP	law of one price
NDA	net domestic assets
OECD	Organisation for Economic Co-operation a Development
OLS	Ordinary Least Squares
PPP	purchasing power parity
UIP	uncovered interest parity
URR	unremunerated reserve requirement
VAR	vector autoregressions

1. Introduction and Overview

In the wake of the latest financial crisis in East Asia (1997-98) and other emerging markets, notably Mexico (1994), Russia (1998), and Brazil (1999), a debate has resurfaced that is reminiscent of the discussions in Bretton Woods more than 50 years ago. Again international economic policymakers are exchanging views about the future of international capital markets and how much of a political effort should be made towards reforming the international financial landscape.

To this end, a vast number of proposals have been published in recent years, many of which are contradictory and mutually exclusive. Some recommend that exchange rates should become more flexible to buffer international asymmetric shocks. Others prefer the re-establishment of a multilaterally binding fixed exchange rate mechanism, similar to that prevailing during the Bretton Woods era, in order to reduce the volatility of crucial macroeconomic variables. While some emphasise the need for more vigorous intervention in financial markets on behalf of the international community, (perhaps by giving greater legal authority to international institutions such as the IMF or the World Bank), opponents to this view argue that market forces should be allowed to take their "natural" course. Finally, while some insist that policymakers should increase their efforts towards greater liberalisation of their national capital accounts, contestants of this suggestion advocate the imposition of capital controls as a means of "throwing sands in the wheels of international finance", which they believe will reduce the likelihood of systemic financial destabilisation. This paper focuses on the latter compound in this ongoing debate.

Arguably, observers offer such radically different recommendations because they have different preferential views on conflicting policy objectives and different opinions about the operating mechanisms of the international financial system.

With respect to the former, obviously, during the Bretton Woods period, economic stability was given priority over the efficiency of investment allocation,[1]

[1] Article VI. Section 3. of the IMF Articles of Agreement signed at the Bretton Woods conference in 1944 states that „members may exercise such (capital) controls as are necessary to regulate international capital movements, [...]".

while with regards to the latter, policymaker were deeply doubtful about the intrinsic self-stabilising powers of unrestricted financial markets. Accordingly, the break-down of the Bretton Woods arrangement reflected a general revaluation of this stability-efficiency trade-off. The initial post-Bretton Woods economic climate could therefore be described as one of wide-spread international market optimism leading to a broad dismantling round of barriers to international trade in financial assets.

Only recently have concerns re-emerged about the advantages of a fully deregulated international financial system. This re-visitation has occurred as policymakers and academics alike have been mesmerised by the volatility of international capital flows, the sheer size of daily transactions,[2] as well as their potentially destabilising impact on small open economies, as the above mentioned latest series of crises in emerging markets has dramatically demonstrated.

The objective of this paper is to have a closer look at some of the beliefs and assumptions in this renewed debate concerning the operation of the international financial system that have influenced – along with personal preferences – observers' recommendations on how to reform the international financial architecture.

One of these common beliefs is that capital mobility has increased substantially during the last few decades and that capital markets are more integrated today compared with any previous period in history. The second chapter in this paper analyses this conjecture in some more detail.

A second belief is that liberalised financial markets have compelling benefits. They are deemed to encourage savings mobilisation and efficient investment allocation, while allowing more effective ways of portfolio diversification. This assertion, as well as alternative hypotheses are discussed in chapter 3.

Finally, the fourth chapter examines the orthodox conviction that restrictions on capital flows are never an optimal policy. In conclusion chapter 5 summarises the main findings in chapters 2-4 and draws some general conclusions concerning the conduct of economic policy.

[2] The latest BIS estimates are that these could amount to $1.5 trillion.

2. The Degree of International Financial Integration

Several dramatic incidents in recent years, where spill-over effects of originally localised financial tremors were felt even in very remote countries, have consolidated the conventional wisdom that financial markets are more integrated today compared to any previous period in history. The empirical evidence, however, is not as clear-cut.

The following chapter overviews ways that have been traditionally advanced to examine the hypothesis that international capital markets behave as one. While discussing some related empirical evidence it is further attempted to explain why researchers have drawn very different conclusions about the actual degree of international financial integration, despite looking at the same data sets.[3]

Prior to this, some definitional remarks are warranted to avoid the semantic confusion often caused by the difficulty of conceptually separating financial integration from notions of financial market openness, international financial markets efficiency, and international capital mobility. In this paper, complete international financial integration is defined by two conditions: (1) capital markets allocate efficiently; (2) capital is perfectly mobile, which is viewed to depend on the presence of explicit and implicit barriers to international capital flows (that is the degree of financial market openness).

2.1. Saving-Investment Correlations

If capital is immobile, investors cannot allocate funds outside their local economy and firms cannot borrow from non-residents. Consequently, domestic investment must be equal to domestic saving. Conversely, in a world of perfectly mobile capital, domestic saving would seek out the highest returns in the world capital market, irrespective of

[3] The debate on the degree of international financial integration is closely linked to the question of what causes it. Obviously each measure of financial integration reflects a somewhat different interpretation of these causes by making assumptions about investors‘ behaviour. The latter is taken as a sufficient enough concept to subsume indirect effects of the role of progress in information and telecommunication technologies, financial engineering, as well as political reforms aimed at facilitating international financial trading.

local investment demand. By the same implication, the world capital market should serve as a source of financing for domestic investment needs. Thus, if capital markets are integrated, the investment ratio $\left(\frac{I_t}{Y_t}\right)$ should be independent of the savings ratio $\left(\frac{S_t}{Y_t}\right)$. This was also the basic idea of Feldstein and Horioka (1980), who argued that the correlation between investment and saving, in a cross-section of countries, might provide a test of international capital mobility. Commensurate with this conjecture they came up with the following econometric model:

$$[1] \quad \left(\frac{I_t}{Y_t}\right) = \alpha + \beta\left(\frac{S_t}{Y_t}\right) + \varepsilon_t$$

where β denotes the relevant regression coefficient and ε_t a random error term.

Under the null hypothesis of perfect financial integration among OECD countries, Feldstein and Horioka computed a theoretical (mean) value of 0.1 for a regression coefficient between savings and investment ratios to be consistent with the conjecture that domestic investment of OECD countries was not constrained by domestic saving during their sample period from 1960 to 1974. This calculation took into account that the coefficient should vary across countries in accordance with each country's capital stock.

Against their own expectation, actual estimates of β were nowhere close to the hypothesised value and statistically indistinguishable from unity (see Table 1). Consequently, the authors concluded that most of any incremental saving remains in its country of origin, which contradicts the conventional wisdom of a high degree of capital mobility among OECD countries.[4]

[4] The regression was also run for saving and investment net of depreciation, but it was thought that errors of measurement in the depreciation estimates could cause a spurious bias of the correlation coefficient. This is so because inflation discourages real saving and at the same time can lead to a high discount rate for depreciation, which causes the investment ratio to fall, without there being any causality of savings on investment.

Table 1. The Feldstein-Horioka Measure for OECD countries 1960-74

	Gross Saving and Investment			Net Saving and Investment		
Sample Period	constant	β^e	R^2	constant	β^e	R^2
1960-74	0.035 (0.018)	0.887 (0.074)	0.91	0.017 (0.014)	0.938 (0.091)	0.87
1960-64	0.029 (0.015)	0.909 (0.060)	0.94	0.017 (0.011)	0.936 (0.072)	0.91
1965-69	0.039 (0.025)	0.872 (0.101)	0.83	0.022 (0.02)	0.908 (0.133)	0.75
1970-74	0.039 (0.024)	0.871 (0.092)	0.85	0.018 (0.018)	0.932 (0.107)	0.83

[e] estimated
Source: Feldstein and Horioka (1980), p. 321.

However, the empirical assertion of high savings-investment correlations may not be sufficient to prove a low degree of financial integration. This is because the possibility exists that other factors like, for instance, methodological and econometric deficiencies cause a spurious relationship between domestic saving and investment, without the implication being a rejection of perfect international capital mobility. The following passages discuss this conjecture and present some evidence to determine whether or not non-fundamental factors can resolve the Feldstein-Horioka-paradox.

2.1.1. Non-Fundamental Causes

Model-Specific Sources of Bias

The assumption that investors would shift funds in accordance with a country's marginal product of capital, implies a very crude proxy of actual investors' behaviour. It is likely that this assumption exaggerated the gap between the theoretical and the empirical β-value, as it does not take into account transaction costs, nor the fact that investors tend to adjust raw returns to capital by a discount premium that compensates them for the absorption of risk. There are several reasons why cross-border investment may impose a greater risk and higher transaction costs than a comparable domestic investment. With respect to the risk premium, the most obvious is, of course, the

absence of exchange risk for domestic projects.[5] Political uncertainties and information asymmetries concerning foreign markets may also feed into higher risk premia on foreign assets, while additional transaction costs may be caused by unfamiliar contractual procedures abroad, for example. If risk premia and transaction costs for foreign investments are very large, investment-saving correlations would differ from zero for reasons other than a low degree of capital mobility.

By considering net capital flows only, the Feldstein-Horioka measure (FH-measure) excludes the possibility that a small volume of net capital flows may coincide with a large volume of gross in- and outflows which just happen to be of similar magnitude. Again the reason for the failure of the model is linked to the narrow concept of what constitutes an incentive for foreign investment. In assuming that there is only one representative national rate of return and that this return is the only relevant parameter for investment, the model implicitly postulates that financial transactions cannot take place in both directions at the same time. In reality, there are, of course, multiple reasons for international capital flows that are consistent with the simultaneity of capital in-and outflows.

Feldstein and Horioka have also been subject to severe criticism concerning their failure to account for the possible endogeneity of national saving and investment ratios, also known as the common-factor problem. According to this conjecture, the finding that relatively high saving ratios are associated with relatively high investment ratios could simply mean that factors that generate high saving ratios in a given country also generate high investment ratios.

Further, in their analysis the authors implicitly assumed that the world savings rate was exogenous, however, this may not hold for a very large country. The reason is that if a country is large enough – and arguably most OECD countries are - a fall in national saving might drive up interest rates and crowd out investment at home as well as elsewhere in the world.

In the event either of the latter two effects are of substantial economic relevance, it would be erroneous to conclude from a co-movement of domestic investment and domestic saving that capital mobility is low.

[5] Adjusting returns for exchange rate risk can reflect two things (in reality both apply simultaneously): (1) Investors do not have perfect foresight. Therefore, with the exception where investors form zero expectations of currency devaluation (the latter applies for a random walk model of exchange rate changes), a positive risk premium will be deducted from the raw rate of return before comparing it to available domestic inmvestment; (2) Purchasing power parity does not hold (see Annex I).

Sampling and Measurement Bias

Estimates have been shown to be extremely sensitive to the length of the sample period for which averages are computed. For instance, if calculated as decade averages, savings-investment correlations are prone to reflect the *separate* tendency of net saving (S^n) and net investment (I^n) to cancel out over time according to

$$[2] \quad \sum_{t}^{T}\left(S_t^n\right) = 0$$

$$[3] \quad \sum_{t}^{T}\left(I_t^n\right) = 0$$

which is the same as the current account moving from surplus to deficit and vice versa in order to fulfil an intertemporal budget constraint (see Sinn, 1992). Therefore, in the Feldstein-Horioka study, the estimation period of subsamples may not have been sufficiently small to prove that savings-investment correlations are indeed high for every period.

In addition, a measurement bias follows from using aggregate savings and investment data from national account statistics, which tend to disregard intertemporal imbalances inbetween ends of periods. This was readily admitted by Feldstein and Horioka themselves, who argued that their test merely asserted that over a long enough period net savings and net investments cancel out

$$[4] \quad \sum_{t}^{T}\left(S_t^n\right) = \sum_{t}^{T}\left(I_t^n\right) = \sum_{t}^{T}\left(S_t - I_t\right) = 0\,,$$

further, this is inconsistent with the one-market-hypothesis under which savings and investment should be serially uncorrelated.

Finally, a source of downward measurement bias, although arguably most relevant for developing countries, is that official data on capital flows tend to be incomplete. One reason for this is that - per definition - they do not capture transactions in curb and illegal financial markets, both of which may actually absorb a

substantial amount of a country's overall financial activity depending on the state of evolution of the financial sector. Alternatively, due to innovations in financial engineering, data on the true volume and maturity of capital flows may be seriously distorted and thus figures on the total amount of net investment erroneous.

Evidence of Endogeneity

If investment is determined by domestic saving only, a country's investment rate must depend on the national rate of return but not on other variables that are correlated with domestic saving, as stated by the following econometric regression

$$[5] \quad \left(\frac{I_t}{Y_t}\right) = \alpha_0 - \alpha_1 i_t + \varepsilon_t$$

where α_1 denotes a linear coefficient, and ε_t is an error term. If investment is to be uncorrelated with domestic saving, it is crucial that this error term be purely random. In other words, if factors other than the cost of capital that determine investment, happen to be uncorrelated with national saving, then there will be no econometric problem. To demonstrate that such a lack of correlation is an absurdly strong condition, the most popular response is to assert that governments usually react systemically to offset current account imbalances. For instance, policymakers usually seek to attain a low target current account balance through appropriate fiscal or balance of payments policies. If cross-country targets are similar, a high correlation of national savings and investment across countries would follow automatically for reasons that have nothing to do with capital immobility or investors‘ myopia. Other variants of common factor problems arise from the fact that investment and saving are both closely associated with population and productivity growth (see Obstfeld, 1986, Vamvakidis and Wacziarg, 1998).[6,7]

[6] Not all of these factors necessarily bias the estimated correlation upwards. For example, if a government decides to grant subsidies to certain industries, investment should rise but the budget surplus, and therefore national saving should lower.

[7] One other obvious version of the endogeneity problem arises in time-series studies from the strongly pro-cyclical nature of saving and investment (even when expressed as shares of GNP). For this reason Feldstein and Horioka restricted their analysis to cross-section data. Another possibility is to adjust

Since not controlling for common causes may have undermined Feldstein and Horioka's original results, several authors have modified the basic study outline of Feldstein and Horioka through an instrumental variables approach.[8] The latter implies the replacement of distorting endogenous variables on the right hand side of equation [1] with so-called instrument variables that do not correlate with the error term ε_t.

Dooley, et al. (1987), for instance, used as an instrumental variable the ratio of military expenditure to GNP to estimate the saving-investment correlation for a sample of 14 industrial and 48 developing countries. Although some of the coefficients for developing countries lost their statistical significance, the coefficients for industrial even increased compared to an ordinary least square regression. His finding, therefore, only emphasises the puzzling discrepancy between regression estimates and the presumption of high financial integration among industrial countries.

In a similar, more recent study, Vamvakidis and Wacziarg (1998) employed instrumental variables that controlled for population growth and business cycle effects. Yet again, they found β-coefficients not to differ significantly from unity (0.896 on average). This reality forced them to reject the hypothesis of financial integration among high-income countries.

Overall, these results do not warrant much optimism about the conjecture that controlling for common causes alone could resolve the domestic saving-investment anomaly.

Evidence of a Sampling Bias

In a study of the US Economy between 1929 and 1987, Frankel (1993) revealed the sensitivity of β-coefficients to the dividing of observations into different sample periods. His results are recorded in Table 2.

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saving and investment data cyclically. In addition, many other factors could be thought of, such as energy shocks, real wages, strikes, or the presence of non-traded goods or of immobile production factors, etc. that will influence domestic saving and investment in the same direction, without the implication being a rejection of financial integration

[8] Feldstein and Horioka (1980) themselves used instrumental variables, including the ratio of retirees over the age of 65 to the population aged over 20-65, the ratio of younger dependents to the working-age population, the labour-force participation rate of older men, and the benefit-earnings replacement ratio under social security.

Table 2. The Feldstein-Horioka Coefficient in the US 1955-87

Sample Period	Gross Saving and Investment[a]		
	constant	β^e	R^2
1955-87	0.00[b]	-0.06 (0.25)	0.25
1956-87	0.00	0.03 (0.26)	0.42
1955-79	-0.68 (0.17)	1.37 (0.23)	0.73
1956-79	-0.57 (0.18)	1.05 (0.19)	0.70
1980-87	0.39 (0.36)	0.13 (0.17)	0.30
1981-87	0.58 (0.37)	0.22 (0.16)	0.34

[a] Instrumental variables regression of US investment against national saving (as shares of GNP and cyclically adjusted)
[b] Constant term is automatic zero because cyclically adjusted rates are residuals from a 19 87 regression against the GNP gap
Source: Frankel (1991), p. 32.

The highlighted figures in Table 2. show that, reducing the sample period from 30 to 15 years causes the β-coefficient to rise to a level almost 46 times greater than the 30 year coefficient. This cautions against an automatic interpretation of high decade- or five-year-period β-estimates as evidence in favour or against the financial integration hypothesis.

Likewise, Krol (1996) argued that the original approach to work with time averaged-data in cross-sectional regressions in order to eliminate business cycle effects would bias the results toward finding evidence for capital *im*mobility. he proposed to work with annual data in panel regressions and to control for business cycle effects by including a time dummy. Making these adjustments, Krol found in fact lower beta-coefficients in the order of magnitude of 0.2 for a panel of OECD countries, yet business cycle effects appear to be insignificant.

Gundlach and Sinn (1992) argued that using cross-section data clouds different institutional structures between countries. They therefore suggested to exploit the fact that the difference between saving and investment is the mirror-image of the current account balance. They proposed to test for the stationarity of the latter, since a non-