

Fausten, Dietrich K.

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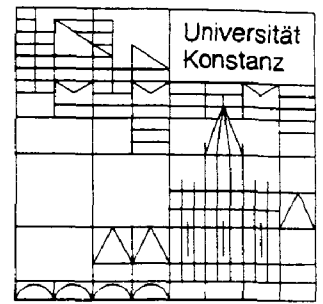
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**THE MOBILITY OF INTERNATIONAL CAPITAL:
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ABSTRACT

Net international capital movements entail equivalent net resource transfers. Arbitrage in perfectly integrated financial markets instantaneously eliminates yield differentials through valuation adjustments. But the stock adjustments that constitute the essence of net capital movements may also be impeded by imperfections in the real sector. Perfect **mobility** of funds, therefore, does not imply the absence of all impediments to international capital **movements**. They may be restrained, i.a., by differences in national term structures of interest, by real exchange rate expectations, or by industrial structure and intersectoral factor mobility.

**THE MOBILITY OF INTERNATIONAL CAPITAL:
VALUATION CHANGES AND STOCK ADJUSTMENT**

Dietrich K. Fausten*

I INTRODUCTION

The perception has been gaining ground that the international economic system has become dominated by "capital" flows. Some observers, e.g. Dornbusch and Tobin, have suggested that there is too much capital mobility abroad.¹ From this perspective, high volatility of exchange rates, and their medium-term adjustments, are attributed to the dispositions of international portfolio managers. Real exchange rates, trade flows, and domestic resource allocation are dominated, at least in the short run, by the whims of the infamous "gnomes" who have proceeded from Zürich progressively to penetrate financial centers around the globe. Their advance and ubiquitous presence have created an integrated world financial market in which capital can move freely between countries.

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¹ Typically for the "dismal science", there are dissenters. McKinnon (1979), e.g., attributes excessive exchange rate volatility to an insufficiency of speculative capital movements.

Depending on one's sentiments, the substantial expansion of the international capital market may be regarded as a boon or a bane. By virtue of its signalling function it may promote allocative efficiency and enhance global welfare. On the other hand, its potential distributional effects may elicit resentments against international rentiers as well as jingoistic sentiments. In either case, the averred dominance of the international capital market is not devoid of paradox: the meaning of classical trade theory is found in the welfare gains that accrue in consequence of international transfers of real resources, and the role of international capital movements is clearly the subsidiary one of facilitating such resource transfers by financing the associated external imbalances. Dominance of capital markets, per contra, implicitly imputes the accommodating role to real resource movements, thereby standing received doctrine on its head. Indeed, the paradox is enhanced further by the apparent mutual incompatibility between the manifest increase in the integration of international financial markets and the empirical "evidence against world capital mobility and in favor of a close relation between domestic investment and saving" (Feldstein and Horioka, 1980, 328).²

By way of resolving the paradox, and to put the empirical observation of capital immobility in perspective, it is useful to distinguish between international movements of financial capital (or funds) and of real resources. High, even perfect, mobility of

² A follow-up study (Feldstein, 1983) supports the basic finding "that sustained increases in domestic savings rates induce approximately equal increase<s> in domestic investment rates" (150).

financial capital, in the sense of high or infinite adjustment speeds in financial asset markets, need not imply a corresponding degree of international resource mobility if there are imperfections in commodity or factor markets. Conversely, perfectly integrated international commodity markets will not reveal a high degree of resource mobility if there are barriers to financial transactions. Lest exchanges are effected by barter alone, perfect international capital mobility, in the fundamental or orthodox sense of the unfettered pursuit of profit motivations on a global scale, thus presupposes perfect integration of both, of international commodity-cum-factor markets and of financial markets. Mutual interdependence between both spheres of economic behavior exposes the presumption of unmitigated dominance by either as a non sequitur.

The phenomenon of international capital mobility can be explored meaningfully only in the context of a two-sector model. Feldstein's empirical findings, based on the orthodox concept of capital mobility embedded in the real sector, are discussed in the following section. Section III investigates capital mobility in the financial sector. If financial markets are efficient, in the sense that incipient capital flows arbitrage yield differentials away, then market imbalances are absorbed by valuation adjustments alone. Net capital movements, i.e. changes in net foreign asset holdings, are not driven by financial arbitrage behavior per se, but by its ramifications for wealth and real asset formation plans, as shown in section IV. Consequently, a relevant criterion for resource transfers is the international yield differential on real capital, and section V suggests that financial asset arbitrage may not be sufficient to eliminate this differential,

even if it succeeds in maintaining covered parity between nominal interest rates. Different national term structures of interest, real exchange rate expectations and industrial structures, as well as government policies, tax systems, and risk perceptions, may introduce differential wedges into the respective relationships between arbitrated nominal interest rates and returns on real capital. Resulting international real yield differentials indicate the existence of barriers to real resource transfers and, therefore, limitations to the degree of international capital mobility in the orthodox sense, notwithstanding the fact that international financial markets are highly, or even perfectly, integrated.

II THE SAVING-INVESTMENT RELATION

The budget constraint that restricts absorption to the domestic availability of resources and, therefore, the rate of capital formation to the rate of national saving, is released when resources can move between economies. Desired income-expenditure, or saving-investment, imbalances may be covered by net saving supplied by or to the rest of the world. International transfers of net saving are manifest in simultaneous imbalances on current and capital accounts: the net real resource transfer, whether of consumption goods or of capital equipment, is financed by a corresponding transfer of funds.

Higher returns, in utility or productivity terms, in the receiving country relative to the country of origin animate the resource

transfer process. The goods market imbalance in the receiving country is associated with an excess supply of financial assets that generates the requisite financial incentives. Perfect capital mobility, in the sense of a total absence of interferences with either transfer process, eliminates yield differentials in both spheres, albeit at different speeds. In short, national patterns of "productivity and thrift" determine the international constellation of ex ante goods market imbalances. The ensuing pattern of ex post resource transfers, financed by commensurate flows of funds, equilibrates real rates of return internationally.

In recognition of the strictly accommodating function of financial flows, this orthodox approach focuses attention on the real sector. The goods market imbalance, or national excess demand for resources, is captured in the saving-investment relation

$$(1) \quad S^n - I = Ex - Im = CA$$

where S^n and I refer to national (or social) saving and investment, resp., Ex and Im to exports and imports of goods and services, resp., and CA denotes the balance on current account. We may distinguish between private and public sector saving:

$$(1') \quad S + (T - G) - I = S - D - I = CA$$

where S is private sector saving and D is the government budget deficit.

Discrepancies between planned national saving and investment at home and abroad are mutually reconciled in an integrated world

economy and traced by the current account. The current account assumes a zero balance in full stock-flow equilibrium. With perfect resource mobility, real sector disturbances, whether caused by exogenous shifts in S^n (S or D) or in I should be fully reflected in the CA balance without any compensating changes in I or in S^n , resp.. National saving and investment should be uncorrelated.

Abstracting from institutional constraints, the orthodox concept of perfect capital mobility implies that shocks to the real sector of a small economy are incapable of altering the domestic real yield relative to the world level. "Real interest parity", RIP for short, is continuously maintained. Incipient movements in the domestic real yield, caused by exogenous shifts in national saving or by innovations in the productivity of domestic capital, are instantaneously eliminated through resource transfers. Conversely, to the extent that deviations from RIP are permitted to occur, a fall in national saving, for example, raises the domestic real interest rate and reduces investment (raising the marginal product of capital). Transmission of the saving shock to investment reduces the ex ante expenditure gap and the desired resource transfer. In the polar case of absolute immobility of resources, saving shocks crowd out investment one-for-one via increases in the domestic interest rate, i.e. saving and investment are perfectly correlated. The ex ante goods market imbalance is reflected in a real yield differential, while the current and capital accounts remain unaffected by domestic real sector disturbances.

Empirical tests of the saving-investment relation, with the variables deflated by national product measures, have revealed consistently high correlations between national saving and investment rates. This finding has been relatively robust over time and across countries,³ and has been interpreted as "evidence against world capital mobility" (F&H, 1980, 328). This observation stands in piquant contrast not only to the contemporary analytical convention of assuming a high degree of international capital mobility, but also to the demonstrable increase in the integration of international financial markets that has spawned the adoption of the analytical convention and, indeed, has given rise to a fundamental reorientation of external balance analysis in recent decades.

The observed close association between saving and investment might be attributable to common causative factors, most notably to cyclical influences that drive both saving and investment, or to the large country syndrome. A reduction in large country saving raises world interest rates and to that extent crowds out domestic investment. But this phenomenon should not influence cross-section results since all countries, in the ideal reference case, face a common interest rate, and movements in that rate should not alter the international pattern of saving-investment relations.

Recognition of these considerations in econometric investigations, however, have not weakened the observed correlation.

Alternatively, government policy might be the culprit. Policy

³ Feldstein and Horioka's (1980) cross-section analysis of 21 OECD countries for the period 1960-74 was extended to 1979 in Feldstein (1983). Dooley, Frankel and Mathieson (1987) investigate 64 industrial and developing countries for 1960-84. Time series are explored by Frankel (1986) for the 1956-84 period, and up to 1987 in Frankel (1989).

authorities might react to a shortfall of domestic saving, and the associated CA deficit, with contractionary fiscal policy. The induced reduction in the government budget deficit counteracts the fall in private saving, reducing the incipient national saving-investment imbalance, and this endogenous policy response might account for the observed correlation. Instrumental variable regressions suggest that the empirical result does not appear to be attributable to this particular nexus either.

The one notable exception to the apparently universal pattern of domestic retention of national saving is the significant drop, in the 80s, of the correlation coefficient that has been observed for the U.S. in a time series investigation that extends to 1987 (Frankel, 1989).⁴ But the finding that U.S. "investment has been financed increasingly by foreign savings" (Obstfeld, 1989b, 291) has not (yet?) been replicated as widely as the original Feldstein-Horioka result.⁵ The precipitous rise in the overload of the U.S. economy that was caused by the rapid escalation of budget deficits has been accommodated by substantial international resource transfers as evidenced in the dramatic deterioration of the U.S. current account. Abstracting from a sudden surge of international good-will and of philanthropic sentiments towards the United States in particular, this recent experience constitutes *prima facie* evidence of an increase in international

⁴ The investment coefficient drops essentially to zero in IV regressions of cyclically adjusted variables.

⁵ Obstfeld (1986, 57) concludes from quarterly time series investigations (1959/60-84) of seven OECD countries: "In all cases but those of the United States and Japan, the estimated saving-investment correlations over the entire sample period differ significantly from the value of 1 that would obtain under complete capital immobility."

resource mobility. Presumably, the reduction of French and Japanese exchange controls during the 80s has contributed to this development. Yet the resource transfers, and the coterminous further liberalization of international financial markets during the 1980s, have been accompanied by a significant increase in U.S. real interest rates relative to the ROW. International real yield differentials indicate the existence of impediments to resource transfers. They provide prima facie evidence that international capital mobility, in the orthodox sense, is distinctly less than perfect, notwithstanding the apparent efficiency of international financial markets.

III MOBILITY OF FINANCIAL CAPITAL

III.1 International Integration of Financial Markets

The expansion of the world capital market continues unabated. Total international bond issues have grown approximately threefold over 1982-6 (from US\$75.4 to US\$219.3 bn).⁶ Foreign exchange market turnover in New York has increased by some 92% among banks, and by 84% among nonbank intermediaries, and its US\$50 bn daily turnover, in 1986, was barely more than half that of the London market, while Tokyo, Zürich, Frankfurt and some Pacific centres together accounted for as much again as London and New York. Daily market turnover in world financial centers was, in 1986, of the order of US\$300 bn - excluding double-counting of transactions

⁶ OECD Financial Statistics Monthly.

between institutions: by all accounts a substantial volume, even if one acknowledges that all this activity is not confined to one concurrent eight-hour working shift around the globe. Differences in time zones ensure that the market is continually active.

The recent escalation of activity in international financial markets has been assisted by institutional developments. The progressive elimination of exchange and capital controls in the industrialized countries has been virtually completed. After removing restrictions against capital inflows during the period 1978-84 Japan liberalized capital outflows in 1984, and France in 1986. Improvements in technology have reduced the costs of communication, and thereby transactions and information costs. Deregulation in national financial markets has accelerated the pace of innovation and contributed to the development of a highly differentiated range of financial assets to increasingly accommodate wealth-owners' particular requirements. At the same time, facilities have been created and expanded that afford risk-averse transactors protection against unexpected variations in nominal exchange rates. Consequently, institutional impediments to financial transactions, at least among industrialized countries, have been all but eliminated. Their financial markets are tightly integrated, and wealth-owners can pursue perceived profit opportunities freely and at minimal outright cost. It is this complex of institutional arrangements in the financial sector that constitutes the basis for the contemporary usage of the concept of capital mobility and, in particular, for the presumption of its perfection.

A unified market abhors price differentials because they afford profit opportunities by buying cheap and selling dear.

Exploitation of profit opportunities in international financial markets where assets are denominated in different national currencies linked by variable exchange rates establishes covered interest parity (or CIP). The nominal interest rate differential⁷ on comparable securities cannot diverge from the cost of hedging the associated nominal exchange rate risk represented by the forward premium on the foreign currency ($fp \equiv (f-e)/e$):

$$(2) \quad i - i^* = fp (1 + i^*) = fp \quad (\text{approximately})$$

Deviations from CIP, designated "political premia" by Aliber (1973), indicate barriers to financial transactions other than currency risk that are specific to the countries of issue. Such barriers encompass government regulations and tax rules, risk of default or expropriation or policy regime changes, transactions costs, and the like. They define the institutional framework for international portfolio investments that influences the ease with which funds can move between political jurisdictions. The extent to which CIP holds can, therefore, be regarded as an indicator of the degree of financial market integration. Alternatively, that information can be deduced from comovements of yields on assets that are denominated in identical currencies but are issued in

⁷ Formulation of the parity condition in nominal terms is not symptomatic of money illusion. An investor evaluates the alternative returns in terms of a given consumption basket. The price deflator, consequently, drops out of the expression.

different countries, i.e. from onshore-offshore interest differentials (Obstfeld, 1986, 63).⁸

Nominal onshore interest rates typically differ from offshore rates on comparable assets that are denominated in the same currency, but they have tended to move increasingly together (Fieleke, 1982). Investigating covered interest differentials, relative to Eurodollar rates, over the period 1982:9 - 1987:3 Frankel and MacArthur (1988) found the persistence of barriers against capital inflows (Germany, Switzerland, Netherlands, Japan and Hongkong) as well as against capital outflows (U.K., small European countries, Malaysia and Singapore). But deviations from CIP were small and very stable over the sample period, and they were less pronounced than they had been in the 70s. The behavior of onshore-offshore interest differentials suggests a substantial and increasing degree of capital mobility among OECD countries.⁹

III.2 Valuation Adjustment

Adjustment to market imbalances can, in principle, be effected by changes in P or in Q. The price can be adjusted to the market-clearing quantity, or quantity can be adjusted to the market-

⁸ The existence of political risk cannot be inferred from the yield structure that prevails within a particular market segment, like a Eurocurrency market at a given locality, because that market segment is contained within a single political jurisdiction.

⁹ See also evidence cited by Obstfeld (1986), 63 et sequ.

clearing price. The mode of adjustment depends on the particular characteristics of the market under consideration. Markets in homogeneous products with relatively low transactions costs and large numbers of participants tend to be characterized by price adjustment. Transactors bid for the quantity on offer and, providing communication between them is sufficiently rapid and comprehensive, they quickly establish the market-clearing price. At this price equilibrium transactions are effected. Walrasian tatonnement provides the instructive metaphor of flex-price market behavior. Real sector analogues are auction markets, such as commodity exchanges, where substantial price variations occur without any transactions taking place.

Typically, the size of asset markets is such that existing stock supplies of assets clearly dominate incremental changes in stocks. Discrepancies between desired and existing holdings of stocks of a particular asset due to perceived yield differentials are eliminated by arbitrage. In the polar case of infinite adjustment speed of prices, any emerging yield differential is instantaneously arbitrated away. Excess demand for the high-yielding asset bids up its price while the prices of substitute assets in excess supply are bid down. Price revisions instantaneously reestablish portfolio balance. At the new price structure, maximizing wealth owners willingly continue to hold the existing stock supplies of assets in their portfolios.

The progressive international integration of asset markets has brought the global financial sector increasingly into conformity with the unconstrained flex-price paradigm. A fall in onshore interest rates relative to offshore rates creates an excess demand

for offshore assets. Portfolio owners desire to move funds abroad according to their respective portfolio balance criteria. The notional excess demand drives up the relative price of offshore assets, via changes in their respective own currency prices or in the relative price of the national currencies. Price revisions proceed as long as notional excess demand persists. Once portfolio balance is reestablished the incentives for capital flows have vanished. The process of adjustment has been completed through the tatonnement mechanism that ensures that existing asset stocks are willingly held at the newly established terms. Quantity adjustments, i.e. international asset exchanges, have been made redundant by the efficacy of the price adjustment process.

Financial sector considerations in isolation would seem to lead to the peculiar observation of an inverse association between the degree of "international capital mobility" and the extent of "international capital movements". The more mobile capital is internationally the less will it move around the international economic system, precisely because its high mobility speedily eliminates any emerging incentives for its international reallocation. International capital movements are "incipient", as jargon has it, and Feldstein's paradoxical result would seem to be vindicated, albeit not the inference of capital immobility or even limited mobility.¹⁰ Incipient financial transactions leave no trace on the capital account of the balance of payments. Neither are they eligible as a quid pro quo for goods market transactions

¹⁰ Feldstein (1983, p.130) carefully emphasized that the earlier Feldstein-Horioka findings "do not imply that there is no capital mobility...<but that they>...only claim to be a test of the extreme hypothesis of perfect capital mobility."

and, therefore, for the financing of current account imbalances. Exclusive preoccupation with asset market analysis in a world of high or perfect international capital mobility provides little guidance for the investigation of balance of payments issues.

III.3 Financial Yields and Capital Movements

By way of illustration of the inconclusiveness of partitioned financial sector analysis, suppose that bonds are the only traded asset and that they are perfectly substitutable across national boundaries. This assumption is frequently employed in the literature to characterize perfectly integrated capital markets. An exogenous rise in the (common world) rate of interest increases the demand for bonds, but the home country and the ROW cannot both simultaneously experience capital outflows (or inflows). Movements in interest rates, consequently, cannot provide unambiguous indications of the direction of capital flows.¹¹ To the extent that arbitrage gives rise to net incipient capital flows in this scenario, these must be driven by factors, such as relative country size, that lie beyond the purview of asset markets.

Alternatively, suppose that bonds are not perfectly substitutable and that some shock disturbs the prevailing equilibrium to create

¹¹ Niehans (1984, ch. 10.3) elaborates the point further and diagnoses a fundamental asymmetry: "This ambiguity of interest effects is more than a technical paradox. Interest rates relate to different assets, but capital flows relate to residents of different countries. ... As a consequence, the effect of interest rates on aggregate capital flows ... must be regarded as fundamentally ambiguous" (206).

a positive onshore-offshore interest differential that is not instantaneously eliminated through arbitrage. Persistence of the higher profitability of domestic assets attracts funds into the home country, barring prohibitive controls of such transfers. However, the realization of a capital inflow presupposes a commensurate current account deficit in the home country and, simultaneously, an equivalent surplus overseas. Current account behavior cannot be inferred directly from analysis of the financial sector. However, from the national income relationship (eqn 1) it is apparent that a current account deficit requires a fall in national saving relative to investment, and conversely abroad. In the absence of an explicit transmission mechanism it is not immediately obvious how a relative rise in the domestic interest rate elicits the net stimulus to domestic spending plans, as well as the corresponding contraction of foreign expenditure, that are necessary for the realization of the desired net acquisition by foreigners of domestic financial assets.

In a flexible exchange rate system financial arbitrage may promote yield alignment through changes in nominal exchange rates. Capital flows may respond to changes in the relative price of national currencies, or to the valuation effects (capital gains) and revisions of expectations that they entail. Changes in the relative price of currencies, per se, can exert no influence on international capital movements (Stützel, 1980). In terms of the domestic currency, nominal appreciation reduces the nominal return from foreign assets *pari passu* with their price, leaving their yield unchanged. Consequently, the relative yield from domestic and foreign assets, expressed in either currency, remains unaltered. Secondly, even though the capital gains on foreign

currency-denominated assets from nominal depreciation raise domestic nominal wealth, real wealth remains unaffected or declines if portfolios include also domestic assets.¹² For foreign bonds denominated in creditor currencies¹³ the valuation effects work in the opposite direction. And, thirdly, expectations or speculative effects of exchange rate changes depend strategically on the particular expectations hypothesis that is adopted, and, for any given expectations hypothesis, on the particular composition of portfolios (Niehans, 1984, ch. 10.5). Since expectations are not directly observable, the "correct" modeling strategy continues to remain an unresolved issue despite extensive empirical work (e.g. Frankel and Froot, 1987). Thus, the response of net capital movements to exchange rate changes, induced by wealth and expectations effects, cannot be determined a priori with any confidence.

The international integration of financial markets provides the institutional framework that is conducive to international capital movements. It promotes the expeditious transmission of signals throughout the global economic system that guide resource allocation. By removing impediments to the financing of desired resource transfers, it relaxes one constraint on national absorption. But it does not explode balance sheet constraints. International capital movements change the stock of net foreign assets, while income-expenditure imbalances constitute net changes

¹² With differentiated goods, real wealth declines if the share of foreign assets in portfolios is less than the share of foreign goods in consumption.

¹³ Note that the volume of net borrowing in US Dollars by 18 OECD governments has increased from 2.6 bn in 1972 to 25.9 bn in 1982 (Golub, 1986).

in wealth. It is, therefore, useful to explore the relevant balance sheet relationships.

IV BALANCE SHEET CONNECTIONS

To identify the fundamental relationships between international capital movements and national wealth it is convenient to abstract from growth and from associated permanent capital flows.

IV.1 Net National Wealth

Individuals can use their disposable income either for consumption purposes or to build up their net worth. Net worth consists of real assets - housing, durables, production equipment, and the like - and of financial assets that may include claims to real assets. The budget constraint and net wealth for individual i are given by

$$(3) \quad y^i - c^i \equiv s^i \equiv dv^i \equiv dra^i + dfa^i$$

(N.B. $d \equiv$ discrete changes in stocks throughout this section)

$$(4) \quad v^i \equiv ra^i + fa^i$$

where v denotes net worth, ra real assets, and fa net financial assets. Aggregating over all agents gives net national wealth (V) as the sum of aggregate net private sector wealth (v^P) and net public sector wealth (v^G)

$$(5) \quad V \equiv V^P + V^G \equiv RA + FA.$$

Financial assets cancel out on aggregation in the closed economy since the corresponding liabilities are issued domestically ($FA=0$), and net national wealth is equal to the domestic capital stock. The accumulated stock of real assets owned by domestic residents (RA) is identically equal to the stock of real assets employed in the home economy (R). In the open economy, by contrast, transactors are not so constrained. Provided assets are tradable, they can hold foreign-issued assets (identified by $*$) or issue liabilities to foreigners. Suppose there are two types of financial assets, a highly liquid transactions asset, called money (M) for short, and bonds (B). The stock supplies of domestic assets (R, B, M) can be held by domestic residents (denoted by subscript h) and by foreigners (denoted by subscript f).

$$R \equiv R_h + R_f \quad ; \quad B \equiv B_h + B_f \quad ; \quad M \equiv M_h + M_f$$

Then, domestic holdings of real and of financial assets are given by

$$RA \equiv R_h + R_h^* \equiv R - R_f + R_h^*$$

(6)

$$FA \equiv B_h + B_h^* - B + M_h + M_h^* - M \equiv B_h^* - B_f + M_h^* - M_f.$$

Substituting (6) into (5) indicates the composition of net national wealth

$$V \equiv R + R_h^* - R_f + B_h^* - B_f + M_h^* - M_f,$$

Let $F \equiv R_h^* - R_f + B_h^* - B_f + M_h^* - M_f$, then

$$(7) \quad V \equiv R + F \quad \text{and} \quad F \equiv V - R \equiv V - (R_h + R_f)$$

F represents the stock of net foreign assets, i.e. the excess of holdings by domestic residents of foreign real assets, bonds, and money over foreigners' holdings of the corresponding domestic assets ($F < 0$ for net foreign indebtedness of the home economy). Net foreign assets constitute the difference between net national wealth and the domestic stock of real assets owned by domestic and foreign residents. Variations in this gap are filled by net international capital movements. Changes in net foreign assets must be reflected *pari passu* in adjustments to net national wealth, i.e. in net national saving, or in the stock of real assets employed in the home economy, i.e. in net investment.

Analogous considerations apply to the foreign economy, so that the following *ex post* relationship holds:

$$(8) \quad dF \equiv dV - dR \equiv S^n - I \equiv - (S^{n*} - I^*) \equiv - (dV^* - dR^*) \equiv - dF^*$$

Net international capital movements can occur only if there are compatible realignments in the real sector. In terms of stocks, there must be a realignment between national wealth and real assets employed in the domestic economy. In terms of flows, there must be a commensurate gap between net national saving and investment. Further, these realignments in the domestic real

sector must be mutually compatible with obverse realignments in the foreign economy. Changes in net foreign assets, in this aggregative context, are not associated with particular constellations of financial asset holdings.

If real assets are not tradable ($R_f=0$ and $R \equiv R_h$), then clearly the stock of net foreign assets can be increased only through national saving or real capital decumulation. With tradable real assets, foreign assets can be acquired also through changes in the domestic ownership of the existing domestic capital stock. But such ownership changes between domestic and foreign residents leave the net foreign asset position unaffected, for given wealth. Even direct foreign investment, i.e. changes in the stock of real capital employed in the home economy ($R \equiv R_h + R_f$) relative to total real assets owned by domestic residents ($RA \equiv R_h + R_h^*$), per se does not affect net foreign assets.

From expressions (5) and (7), and substituting for FA and F, we get

$$V \equiv RA + FA \equiv R + F \quad \text{and} \quad R - RA \equiv FA - F$$

$$FA - F \equiv B_h + B_h^* - B_f + M_h + M_h^* - M_f - (R_h^* - R_f + B_h^* - B_f + M_h^* - M_f) \equiv -(R_h^* - R_f)$$

$$(9) \quad R - RA \equiv FA - F \equiv -(R_h^* - R_f)$$

If a foreign investor buys or builds a plant in the home economy, the domestic capital stock and national wealth are augmented accordingly ($dR_f \equiv dR \equiv dV$) but net foreign assets stay the same. The increase in foreign ownership of domestic capital, by itself,

reduces net foreign assets. The financial liability incurred by the foreigner in the process may be discharged by reducing foreign financial claims on home residents (B_f and/or M_f decrease and, therefore, B_h and/or M_h increase), or by issuing financial liabilities to home residents (B_h^* and/or M_h^* increase). The increase in domestic ownership of financial assets ($dFA=dR$) is reflected in an increase in net foreign financial assets. In the former case financial liabilities to foreigners decline, in the latter financial claims on foreigners rise. Consequently, in expression (9), the changes in the financial asset positions cancel. Net foreign assets, however, remain unaffected: the increase in net foreign financial assets is exactly offset by the increase in foreign ownership of domestic real assets. The increase in the domestic capital stock owned by foreigners, *cet. par.*, must be reflected fully in a reduced balance of cross-border holdings of real assets. Net foreign assets will decline only in the event that the increase in the domestic capital stock is prevented from augmenting national wealth *pari passu*. That presupposes a fall in national saving or an increase in domestic holdings of real assets at home or abroad in excess of national saving.

Consequently, net international capital movements are ultimately constrained by the ease - or difficulty - with which the requisite real sector adjustments are pursued.¹⁴ They are not influenced by mere cross-border ownership changes but they are fundamentally

¹⁴ See, e.g., Obstfeld (1989a) for modeling adjustment to fiscal policy shocks in a growth context, and Vosgerau (1987) for an exploration of the substitution vs complementarity relation between international trade flows and factor movements.

determined by the adjustment behavior of capital stocks and net national wealth.

IV.2 Net Private Wealth

The framework of the preceding argument may be considered to be excessively aggregative by virtue of its failure to distinguish between private and public sectors. Differences in behavior patterns and substantial reservations about the validity of Ricardian equivalence suggest that the relationships be expressed in terms of private wealth. Rewriting expression (5)

$$(5') \quad V^P \equiv V - V^G \equiv RA + FA^P \equiv R + R_h^* - R_f + FA^P$$

For simplicity assume that the public sector does not hold any claims on the private sector and only issues liabilities so that (negative) net public sector wealth equals the outstanding stock of bonds and transactions assets:

$$V^G \equiv - (B + M)$$

Private agents disregard the contingent future tax liabilities that are associated with public debt. Private sector net financial assets (FA^P) include gross holdings of claims on the public sector, but they are not influenced by government debt held by foreign wealth owners.

$$(6') \quad FA^P \equiv FA - V^G \equiv B_h + B_h^* + M_h + M_h^*$$

Net foreign assets are then determined from expression (7)

$$(7') \quad F \equiv V - R \equiv V^P - R + V^G \equiv V^P - R - (B_h + B_f + M_h + M_f)$$

In terms of private wealth, net foreign assets are potentially influenced by stocks of financial assets. The term in brackets represents the outstanding stock of liabilities issued by the domestic government. To the extent that increases in this stock are not reflected in higher net wealth of the domestic private sector they must reduce net foreign asset holdings, given the level and composition of R . Domestic acquisitions of new public sector debt issues raise private sector wealth but leave foreign assets unchanged ($dV^G = dV^P$ and $dF = 0$). Foreign acquisitions reduce net foreign assets, as do sales from domestic portfolios of foreign financial assets to the extent that they reduce V^P . Changes in the composition of financial portfolios, i.e. mere ownership changes, leave net foreign assets unchanged.¹⁵

To illustrate, assume that bonds are the only traded asset. Then the definition of net foreign assets together with (7') implies

$$(10) \quad F \equiv B_h^* - B_f \equiv V^P - R - (B_h + B_f) \quad \text{where } R \equiv R_h$$

¹⁵ This simple truism has often been neglected in discussions of the "capital flight problem" under fixed exchange rates. Redistribution of foreign asset ownership from the public to the private sector does not reduce the stock of net foreign asset holdings, but may improve allocative efficiency to the extent that private agents are more responsive than the public sector to market incentives.

For given stocks of domestic private wealth and real assets, exchanges of bonds between domestic and foreign residents cannot influence the stock of net foreign assets ($dB_h + dB_f = 0$). They decline only if the sale of domestic bonds from domestic portfolios simultaneously reduces domestic private wealth or increases domestic real assets. The former is incompatible with rebalancing of financial portfolios, while the latter involves a substitution between financial and real assets that leaves total private sector wealth unchanged. But this outcome presupposes an imbalance in the real sector. Any adjustments that are strictly confined to the financial sector, by definition, cannot influence net private wealth or the stock of real assets in the domestic economy.

Notwithstanding the association between stocks of financial assets and of net foreign assets, the effect of nominal interest rates on the latter, i.e. on international capital movements, remains fundamentally ambiguous (Section III.3, *supra*). Take again the extreme case of perfect substitutability between domestic and foreign bonds and assume stationary expectations. Then financial market disturbances affect both domestic and foreign desired bond holdings in the same direction. The net effect on international capital movements depends on the relative strengths of these effects; differences between them must involve private wealth changes or substitutions between financial and real assets.

The basic propositions remain intact. Economic openness permits the accumulated stock of net national saving to be allocated to net foreign assets (that include real assets) as well as to real assets employed in the home economy. The crucial constraint is

that net foreign asset holdings can be altered only through net public or private sector saving and investment - barring manna from heaven, unexpected resource discoveries and similar fortuitous wealth-augmenting occurrences. Financial portfolio rebalancing as such does not affect net foreign asset holdings. They are determined by the relation between the domestic capital stock and wealth, national or private. Financial arbitrage behavior motivated by nominal interest rates does not permit direct inferences to be drawn for net capital movements between countries.

V INTERNATIONAL REAL YIELDS

Net international capital movements cannot be divorced from real sector considerations. The real return to capital (r) guides global resource allocation towards the place of highest return. In the absence of impediments to resource movements, real returns are equalized internationally so that real interest parity (RIP) holds:

$$(11) \quad r = r^*$$

RIP provides a potentially more informative indicator of the mobility of international capital movements than does CIP.

The empirical rejection of the perfect capital mobility assumption suggests that RIP is not a meaningful characterization of the global capital market. Frankel (1985), i.a., presents evidence to

that effect. Yet CIP appears to hold quite well in financial markets (Section III.1, *supra*). The divergent behavior of nominal and real yields could be attributable to impediments to "communication", i.e. to the transmission of signals, between the financial and the real sectors, or to imperfections that are specific to the real sector. The possible nature and incidence of such imperfections may be explored in terms of the relationship between RIP and CIP.

Suppose that nominal interest rates compensate wealth owners for expected inflation (π^e):

$$i = r + \pi^e + r \cdot \pi^e \approx r + \pi^e \quad \text{and} \quad i^* = r^* + \pi^{*e}.$$

Then the real interest differential is given by

$$\begin{aligned} r - r^* &= (i - i^*) + (\pi^{*e} - \pi^e) \\ (12) \quad &= (i - i^* - fp) + (\pi^{*e} + e^e - \pi^e) + (fp - e^e) \end{aligned}$$

where fp is the forward premium on foreign exchange and $e^e > 0$ represents the expected rate of nominal depreciation of the domestic currency. The RHS terms in parentheses represent successively the covered interest differential, expected real depreciation of the domestic currency, and exchange or currency risk in terms of the divergence of the forward discount on the domestic currency from its expected nominal depreciation.

Stationary equilibrium requires that the LHS and each bracket on the RHS of expression (12) assume a value of zero. The RIP

arbitrage condition merely requires that the RHS be zero: divergences from equilibrium in one of the three categories of determinants are consistent with maintenance of RIP provided they are offset by countervailing divergences elsewhere. A covered interest differential in favor of the home country can be offset by expected real appreciation of the domestic currency or by perceived currency risk, i.e. by the expectation of nominal depreciation sufficiently in excess of the forward discount. Conversely, deviations from RIP must be associated with some combination of departures from CIP, "ex ante PPP", or "correct" risk assessment in the forward market. In any event, CIP does not imply RIP.

Provided that CIP is maintained in financial markets and abstracting from differences in taxation systems, international real interest differentials must be associated with expected real exchange rate changes or with perceptions of currency risk. Changes in these determinants destabilize the relation between nominal and real interest rates, and compromise the operation of the Fisher effect. Such seemingly "unusual behavior of real interest rates" (Huizinga and Mishkin, 1986) is not confounding if economic openness is explicitly taken into consideration. It may arise from factors that influence the degree of substitutability between real assets employed in the domestic economy and internationally traded financial assets. Chinks in these links, at home and abroad, drive wedges into the international relation between real yields that prevent the complete external financing of desired expenditure imbalances. Concomitant with the advances in the international integration of financial markets these

barriers to capital movements appear to have gained in importance.¹⁶

V.1 Term-Structure Effects

Arbitrage eliminates yield differentials between comparable assets. One facet of comparability is the duration of the investment. In principle, parity conditions can be expected to hold only for assets of similar duration. This requires that all terms in the RIP relation should refer to the same time horizon. Failing that, real interest differentials could emerge as a result of mutually incompatible maturities.

The preceding discussion intimates a close association between net international capital movements and long-term rates. Arbitrage at long term may be inhibited by substantial uncertainty and lack of hedging facilities. Typically, forward markets of reasonable depths do not extend beyond relatively short maturities. CIP tests indicate, usually at the three-months horizon, that financial arbitrage eliminates profit opportunities and pins down yields at the short end. If financial arbitrage is indeed dominated by relatively short-term considerations, then the observed deviations

¹⁶ Among major industrial countries RIP was more significantly rejected during the post-1973 subperiod of the float than during the entire 67-79 period (Mishkin, 1984).

from long-term RIP could be attributable to differential time profiles of returns in the national economies.¹⁷

Different levels of the yield curve may accentuate these term structure effects through their influence on the duration of assets of a given maturity. Only for deep-discount, i.e. zero-coupon, bonds does the duration of an asset coincide with its maturity. The revenue stream from positive coupon payments shortens the duration of the investment.¹⁸ Assets issued in countries with a high nominal interest regime have a shorter duration than assets of the same apparent maturity that are issued in low interest countries. If international arbitrage equalizes yields on assets of a given duration, and if yield curves have the same shape across countries, then yield differentials emerge between assets of a given designated maturity. By way of example, suppose that yield curves at home and abroad have identical positive slopes, that a high interest regime prevails in the home country, and that arbitrage is not restricted. Yield parity for a given duration of investment, *cet. par.*, involves domestic assets with a longer maturity than foreign assets, and implies a positive real interest differential in favor of the foreign country on assets of the same designated maturity.

¹⁷ Frankel (1989) challenges this conjecture by citing some evidence on swap-covered return differentials on 5- and 7-year government bonds that "compare favorably with the magnitude of the short-term differentials" (p 31).

¹⁸ E.g., the duration of a bond with an apparent maturity of 20 years is 13.09 years at 5% coupon, 9.36 years at 10%, and 7.2 years at 15% (McKinnon and Robinson, 1989, Table 8).

The estimation of real interest rates from data alone is fraught with difficulties since market expectations are not directly observable. Nonetheless it is interesting that the scenario sketched above is qualitatively consistent with evidence reported by Frankel (1985, p.200) and by Campbell and Clarida (1987, p.114). They report negative long-term (10-year government bonds) real interest differentials for the U.S. relative to a weighted average of the other G7 countries during the high U.S. interest regime of the 80s. This finding is robust with respect to alternative expectations proxies. Not unexpectedly, the magnitude of the differential (in February 1985) varies substantially, between -0.96 and -3.46.

The real rate process, i.e. the constellation of factors that determine the relation between nominal and real interest rates, need not remain invariant over time. Huizinga and Mishkin (1986) argue that changes in the direction of monetary policy, or in the way policy is conducted, have exerted a discernible effect on the real rate process. Shifts in the monetary policy regime affect the variability of ex ante real rates and the correlation between ex ante real rates and expected inflation. Relaxation of interest rate control appears to be associated with a significant decrease in the strength of the Fisher effect (Oct. 1979: abandon interest rate smoothing; Oct. 1920: sharp monetary tightening via rise in discount rate). During the inflationary periods preceding these regime changes, as well as after monetary aggregates were deemphasized in Oct. 1982, the Fisher effect appeared to be strong. The negative correlation between nominal interest rates and ex ante real rates became significantly positive during the 1979-82 interval. Thus, international differences in the timing of

policy innovation may drive a wedge between real interest rates even if nominal rates are perfectly arbitrated.

V.2 Integration of Commodity Markets

The relation between real interest rates is susceptible to expected changes in the real exchange rate (rer^e). This is not a trivial point, even though it is often disregarded in partitioned asset models. If RER-expectations are ignored, or, more respectably, if the RER follows a random walk, and if CIP holds, then any real interest differential is immediately attributed to the existence of exchange risk. If, moreover, financial assets are assumed to be perfectly substitutable, then RIP must hold.

Abstracting from RER-expectations reduces relation (12) to

$$(12') \quad r - r^* = (i - i^* - fp) + (fp - e^e).$$

Perfect substitutability of financial assets reduces the parity condition further, so that Fisher Open implies RIP:

$$(12'') \quad r - r^* = (i - i^* - e^e) = 0.$$

Putting the argument the other way round: even in the ultimate state of financial integration - homogeneous assets, no exchange rate or political risk - deviations from purchasing power parity can cause real interest rates to diverge. Conversely, in this ideal world of finance, RIP presupposes that purchasing power

parity is continuously maintained. RIP requires not merely perfect financial integration but also perfect integration of goods markets (Krugman, 1989).

Empirical evidence against the random walk hypothesis for RER is accumulating (Stein, 1989, and further evidence cited there). Relative prices appear to have had little explanatory power for nominal exchange rates during the floating rate period. Stein observes that "almost all of the variation in the nominal exchange rate <of the \$US against G-10 currencies for the period 1973.I-87.IV> is associated with variations in the RER" (p.7) and reports that the random walk hypothesis for the RER is rejected with confidence. These empirical results expose the conjecture that rationally expected RER changes are zero as exceedingly tenuous. International real long-term bond yields¹⁹ are strongly correlated, but "the differential exhibits persistent trends" and has a three-quarter life of three years (p.23). Moreover, there is a strong positive correlation between the long-term real interest differential and changes in RER.²⁰

The real relative price of national outputs (RER) adjusts to equilibrate goods markets in response to expenditure shifts.

¹⁹ The inflation adjustment to nominal bond yields consists of a three-year centred moving average of CPI inflation rates ranging from six quarters in the past to six quarters in the future.

²⁰ Frankel (1989) presents qualitatively compatible short-term (3 months) evidence from 25 countries for the period 1982.9-1988.1 (Table 5) suggesting "a high correlation of the real interest differential and expected real depreciation across countries" (p.37). His data also reveal slow adjustment of RER to equilibrium, at a rate of appr. 30% p.a. (16), and at a rate of 16% p.a. in a 119 year sample of US-UK data (19).

Excess demand for domestic output causes RER to appreciate if domestic goods are not perfectly substitutable with foreign goods. Unless an autonomous permanent increase in expenditure on domestic goods (fall in national saving) elicits an equivalent long-run appreciation of RER, the short-run RER appreciation is expected to be reversed in due course. The rationally expected depreciation of the RER is reflected in an increase in domestic real interest rates, relative to those abroad, that curb planned domestic spending (investment). Slow convergence of RER is consistent with the persistence of the real interest differential that restrains domestic absorption. This contains the extent of the current account deterioration and inhibits net capital movements accordingly, even though financial markets may be perfectly integrated.

This effect may be strengthened if the demand shift causes innovations in the long-run equilibrium RER (\bar{RER}). Current account deficits during the process of adjustment to the exogenous expenditure increase deplete the net foreign asset position and, consequently, they diminish the flow of net income receipts from abroad. Reestablishment of current account balance, then, requires a higher trade balance and, therefore, a depreciation of the long-run \bar{RER} in order to raise domestic competitiveness. The adjustment is brought about, according to popular acclaim, by the wealth effect of current account deficits that improves international competitiveness through the reduction of domestic spending. Given the short-run real appreciation determined by the goods market imbalance, this innovation in \bar{RER} increases both, the expected rate of real depreciation (\dot{rer}^e) and the real interest differential:

$$(12''') \quad r - r^* = (pi^*e + e^e - pi^e) \equiv rer^e = v(RER - RER)$$

where v is an adjustment parameter that captures the speed of convergence.

In principle, RER need not depreciate, even if net asset holdings are substantially depleted during the adjustment to the expenditure stimulus (Campbell and Clarida, 1987). A trade balance improvement may be generated, and current account balance reestablished, at an appreciated long-run RER by the configuration of low expenditure shares on domestic goods, strong wealth effects, and low world interest rates.²¹ Irrespective of any specious parameter constellations, goods market balance requires a real appreciation after the increase in planned expenditure. Excess supply of financial assets drives up nominal interest rates and attracts incipient flows of funds into the economy. They cause the nominal exchange rate to appreciate until equilibrium in the markets for financial assets is reestablished at the initial stocks. Financial arbitrage establishes CIP, but the expectation of real depreciation precludes RIP.

Net capital movements occur only during the subsequent process of adjustment to long-run equilibrium. The characteristics of this

²¹ The lower the share of expenditure on domestic goods, the larger is the real appreciation required to switch a given domestic excess demand onto foreign goods. The stronger the wealth effect, the larger is the reduction in expenditure for a given decumulation of wealth. The associated debt service obligation and requisite trade balance improvement are lower the lower are world interest rates (Campbell and Clarida, 1987, p.112).

process depend crucially on the particular nature of the expenditure shock. Distinguish between a fall in national saving and an increase in investment demand that are respectively attributable to an increase in the government budget deficit and an improvement in technology that increases the marginal efficiency of capital (Stein, 1989). The associated excess supply of financial assets drives up domestic interest rates. In either case, the instantaneous real (and nominal) appreciation switches demand onto foreign goods. Excess domestic absorption is accommodated by a current account deficit and capital inflows that are attracted by high domestic yields. The persistence of the yield differential indicates that desired absorption is not fully accommodated. Subsequent adjustment depends on the evolution of domestic demand relative to output. In the case of the fall in social saving, the wealth effect of increasing foreign indebtedness may curb domestic expenditure, and the reduction in aggregate demand reverses the RER appreciation ($dF=dV<0$). Conversely, the rise in domestic investment raises domestic output relative to aggregate demand, the more so if the improvement in technology increases the capital intensity of production. Higher domestic competitiveness depreciates RER and improves the trade balance, counteracting the capital inflows. The magnitude of net capital movements is ambiguous a priori ($dF=dV-dR \ 0$).

The precise dynamics of the adjustment process are influenced by the industrial structure of the economy and by intersectoral factor mobility (Arndt, 1988, 1989). Short-run sectoral factor specificity inhibits supply responses and places more of the burden of adjustment onto relative price changes. The responsiveness of the trade balance to the RER is reduced

correspondingly. The expansion of domestic demand causes the relative price of nontradables initially to rise beyond its long-run equilibrium value. Irrespective of any particular innovations in RER, short-run overshooting²² of RER increases the expected rate of real depreciation and, *cet. par.*, widens the *ex ante* real yield differential. The intensity of this effect varies directly with the share of nontradables in the domestic consumption basket.²³ Low capital movements are the counterpart to the "sluggishness of the trade balance" (Arndt). In the extreme case with all expenditure devoted to nontradables "the lack of integration of goods markets effectively frustrates any linkage of capital markets, even if there is no barrier to capital movements *per se*" (Krugman, 1989, 1084).

²² Short-run overshooting is not due to sticky commodity prices but rather reflects excessive price adjustment due to the short-run immobility of factors.

²³ The RIP relation can readily be amended for the two-good framework. Let r_{cpi} denote the domestic real interest rate in terms of the domestic consumption basket, and the true domestic price index $CPI = P_n^a \cdot (EP_t^*)^{1-a}$. Then

$$\begin{aligned} rer^e &= pi_t^* e^e - cpi^e = pi_t^* e^e - (api_n^e + (1-a)(e^e + pi_t^* e^e)) \\ &= a(pi_t^* e^e - pi_n^e) \quad \text{and} \end{aligned}$$

$$r_{cpi} - r^* = (i - i^* - fp) + (fp - e^e) + a \cdot (pi_t^* e^e + e^e + pi_n^e).$$

The yield differential varies, *cet. par.*, directly with a , the share of domestic spending on nontradables.

VI CONCLUSION

Positive correlations between national saving and investment in a world of highly, even perfectly, integrated financial markets is not as paradoxical as might be averred at first glance.

"Basically, international capital movements, though influenced by financial factors, are not a financial phenomenon" (Niehans, 1984, 200). They are a general equilibrium phenomenon instead. Their occurrence is determined neither within the real sector nor within the financial sector in isolation. It is the result of interaction between the two spheres of economic behavior. Inadequate recognition of this interdependence, and the undifferentiated use of the term "capital mobility", have contributed to obfuscate the nature of international capital movements and the meaning of international capital mobility. The scope for semantic confusion could be contained by explicit distinction between **mobility** and **movements** of funds - and of resources.

The stock of net foreign assets represents the difference between domestic wealth and real assets employed in the home economy. Net international capital movements are determined by those factors that influence the relationship between these two magnitudes. Appearances to the contrary notwithstanding, the increasingly sophisticated and pervasive manipulations of the "gnomes" have not obliterated the fundamental importance of productivity and thrift.

Real assets are rarely arbitrated directly. The lines of communication run through the financial markets. If funds mobility is unrestricted, then financial arbitrage instantaneously eliminates international yield differentials through valuation

adjustments. But international capital movements are all about stock adjustments. Only the consequence of valuation adjustments, i.e. the short-run equilibrium structure of yields relative to national productivity and thrift, constitutes the motivating force for international resource transfers. Net resource transfers are the sine qua non for net financial asset transfers. The realignment of wealth and real asset stocks, and of net financial assets, dissipates this force.

Imperfections in the real sector that impede resource mobility prevent the establishment of RIP, even if funds are perfectly mobile. Consequently, differential degrees of imperfection in the financial and real sectors become manifest in differential deviations from the parity conditions. While perfect funds mobility maintains CIP continuously, the valuation adjustments are not fully transmitted to the real sector or they are prevented from eliciting equilibrating adjustments. The coexistence of CIP with deviations from RIP helps to explain the surprising lethargy of international net movements of funds in the presence of virtually unrestricted funds mobility. Rather than provoking dismissal as paradox, this empirically robust phenomenon evokes the well-known horse-and-water aphorism.

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