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The Impact of Controls on Capital Movements on the Private  
Capital Accounts of Countries' Balance of Payments:  
Empirical Estimates and Policy Implications

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Abstract

This paper reports research on the impact of controls on capital movements on the private capital accounts of countries' balance of payments using data drawn from 52 countries for the period 1985-92. The results indicate that: (1) capital controls operated by developing countries have not been effective in insulating the private capital accounts of these countries' balance of payments, and (2) capital controls operated by industrial countries significantly affected the structure of their capital flows mainly by inhibiting net foreign direct and portfolio investment outflows. The results, which are consistent with other observations, raise issues for the policy toward the maintenance and liberalization of controls on capital movements by developing countries.

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### Summary

This paper explores the impact of controls on the private capital accounts of countries' balance of payments by examining data from 52 industrial and developing countries for the period 1985-92. The paper examines different measures of private capital flows in the balance of payments, including estimates of unrecorded flows--errors and omissions in the balance of payments and estimates of trade misinvoicing. Samples of data from industrial and developing countries and from countries with restricted and liberalized regimes are examined. Equations including explanatory variables intended to capture portfolio balance and monetary explanations of capital flows are estimated. The impact of controls on capital flows is assessed through F-tests for structural differences between liberalized and restricted regimes and dummy variables identifying the nature of the exchange control regime.

The paper's main are that: (1) capital controls operated by developing countries have not been effective in insulating these countries' balance of payments, and (2) capital controls operated by industrial countries had some role in inhibiting foreign direct and portfolio investment outflows, but not in controlling other private capital movements. These findings are consistent with findings reached in other research. In particular, empirical examination of the determinants of countries' interest rates suggests that the role of capital controls in insulating national monetary policies is relatively limited, and a number of developing countries with extensive exchange controls have experienced capital flight; however, capital outflows from industrial countries are often observed to increase with the elimination of restrictions on such flows.

The increasing body of evidence on the ineffectiveness of capital controls in developing countries raises the question whether these countries should continue with such controls or eliminate them rapidly. The paper concludes that external liberalizations can support domestic financial reforms in terms of both macroeconomic flows and institutional and market development.



## I. Introduction

The post-Second World War period can predominantly be characterized as a period of restriction on cross border movements of capital. This was true of most of the industrial countries up to the 1980s and remains true for the majority of developing countries. The impact of capital controls on national economies had for many years been widely accepted: i.e., that capital controls can assist a country to run an independent monetary policy, and controls on capital outflows can help preserve domestic savings and protect the balance of payments. Indeed, the assumption that capital controls are effective underlies practically all theoretical examination of the impact of controls on capital movements. 1/ However, there is a growing concern that controls on capital movements do not achieve their intended objectives, and may even be harmful to countries' balance of payments and economic development.

Most empirical tests of the impact of capital controls on countries' interest rates, suggest that the degree of monetary independence provided by such controls is relatively limited. 2/ Nevertheless, perhaps because of data problems and the well-known difficulties of estimating international capital flow equations, there have been few, if any, attempts to test directly the impact of capital controls on countries' balance of payments. Industrial country experience with capital account liberalization suggests that capital controls have had a balance of payments impact, in that categories of capital outflows increase following the elimination of controls on capital outflows.

These diverse results, and concern about the impact of capital controls in economic development, raise questions as to what has been the role of controls on capital movements on the capital accounts of countries' balance of payments. This paper seeks to explore this question by examining cross country data drawn from 52 industrial and developing countries for the period 1985-92. The study examines a number of measures of net capital movements for countries with both liberalized and restricted capital control regimes.

The results suggest that capital controls have tended to operate asymmetrically with respect to industrial and developing countries. The main conclusions are: (1) capital controls affected significantly the structure of industrial countries' capital accounts, mainly by restricting foreign direct and portfolio investment outflows, and (2) developing countries' capital accounts appear not to have been affected significantly by the use of controls on capital movements, although there is some evidence that liberalizations of inflows tended to strengthen the capital accounts of

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1/ For a recent theoretical discussion of the impact of capital controls, see for example Park (1994).

2/ For a recent survey, see Mathiesen and Rojas-Suarez (1993).

the balance of payments. These results are important, inter alia, for the policies which should be pursued by countries in liberalizing their capital accounts.

The outline of the paper is as follows; Section II provides background on the postwar system of exchange controls; Section III reviews previous empirical work on the impact of controls on capital movements and the theoretical explanations of capital movements; Section IV reports the results of the empirical examination of the impact of exchange controls on countries' balance of payments; Section V discusses some issues raised by the results for countries' policies toward liberalization of their capital accounts; and Section VI provides conclusions.

## II. Background on Countries' Controls on Capital Controls

Controls on capital movements (and current transactions) were widely applied by industrial countries in the post Second World War period. These controls were generally targeted to achieve specific balance of payments objectives or as part of broader economic development strategies. The United Kingdom's extensive exchange controls were designed to protect sterling in the face of a weak balance of payments and a large overhang of overseas sterling balances. The controls applied by the United States in the 1960s were aimed at improving a weak balance of payments by preventing capital transfers abroad. 1/ The exchange control systems of Japan, and also of France, aimed partly at ensuring that savings were invested at home rather than abroad, while the controls applied by Germany and Switzerland aimed mainly at restricting capital inflows and preventing more rapid appreciations in these countries' currencies.

The postwar capital control regimes were consistent with members' obligations under the IMF's Articles of Agreement. Article IV, Section 3 provides that "Members may exercise such control as necessary to regulate international capital movements". 2/ The main rationale for the acceptance of controls on capital movements in the Articles of Agreement was to prevent short-term disequilibrating capital movements rather than movements of capital which would be long-term in nature. 3/

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1/ The measures included the "voluntary foreign credit restraint program" introduced in 1965 and the foreign direct investment regulations.

2/ In the immediate postwar period members also maintained extensive restrictions on current international transactions. In general, these controls and restrictions worked to support the system of par values established under the Bretton Woods system. Some capital transactions are considered as current transactions for the purposes of Fund jurisdiction.

3/ See Keynes (1943), White (1942), U.S. Treasury (1944), and Gold (1977).

The exchange control systems of the industrial countries, especially those of the major colonial powers, were transplanted in many developing countries and retained by these countries after independence. However, there were some critical differences. First, in a number of cases the exchange control regimes were designed as part of the common monetary area arrangements which no longer applied in the newly independent countries that introduced their own currencies. Nevertheless, such exchange control systems were often accepted as a norm in these countries, without specific examination of the circumstances of the countries concerned. In some cases, the perpetuation of the controls reflected tradition, supported by the basic idea that the controls would prevent the outflow of scarce domestic savings and, therefore, help to promote development. The principal need of these countries was to attract foreign savings, but the impact of exchange controls on this is at best uncertain. Exchange controls applied to the repatriation of income, dividends, and capital, or concern that the authorities would enforce more rigid exchange control can discourage private capital inflows.

Second, while exchange control regimes were implemented by strong bureaucratic systems in the industrial countries, this was often not the case in developing countries. For example, the Bank of England devoted some thousands of staff to exchange controls when these controls were eliminated in 1979, even though the operation and implementation of most exchange control responsibilities had been delegated to the commercial banks. Effective exchange controls required not only a large trained staff, but also close collaboration with other agencies such as the customs and tax authorities in order to conduct effective cross-checking of exchange control documents. Even so, it was generally accepted that the exchange controls would be circumvented by unrecorded short-term capital movements, such as through leading and lagging of current payments, once there was a sufficient incentive. For example, the differential between domestic and euro-sterling interest rates rarely exceeded 2 percent even during periods of heavy pressure on the sterling exchange rate. <sup>1/</sup>

The institutional capacity of developing countries to implement effective exchange controls has generally been much weaker than in the industrial countries. Delegation of exchange control responsibilities to newly emerging commercial banks was quite often not possible. Exchange controls in developing countries thus tended to be much more centralized and bureaucratic than those operated in industrial countries, resulting in potentially greater losses of efficiency due to increased administrative constraints. The scope for official interference in legitimate commercial operations was thus also potentially greater. In itself, this may have provided larger incentives to avoid the official channels when conducting

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<sup>1/</sup> This differential reflects the costs of arbitrage between the domestic and euro-currency markets. If the capital controls are effective there should be no specific limit on the differential. See for example Johnston (1983).

exchange transactions. Concurrently, the authorities in many developing countries were in much weaker positions to enforce the exchange controls. Trained staff were and remain scarce, and collaboration with other agencies generally poorer. Consequently, exchange controls may have been much less effective in limiting capital outflows in developing countries than in industrial countries.

The end of the 1970s marked a turning point in the use of exchange controls to control capital movements by industrial countries with the suspension of all exchange controls in the United Kingdom (in 1979), and the dismantling of restrictions on capital movements in Japan, beginning in 1980. 1/ 2/ Australia and New Zealand dismantled most controls in 1983 and 1985, respectively, and the Netherlands removed its remaining restrictions in 1986. Subsequently, other industrial countries removed their controls on capital movements, so that by end-1994 it is expected that all remaining exchange restrictions related to industrial countries' capital movements will be eliminated. France and Denmark achieved virtually full capital account convertibility by 1989. Italy eliminated its compulsory deposit requirement, which discouraged various forms of investment abroad by residents, and Sweden and Norway liberalized exchange controls in 1989 and 1990, respectively. In March 1990, Belgium and Luxembourg abolished the two-tier exchange rate system that had been operated jointly by these countries since 1951. Finland and Austria liberalized their capital accounts in 1991. Portugal and Ireland had eliminated all restrictions of an exchange control nature by the beginning of 1993, and Greece eliminated controls on various capital transactions in March 1993, leaving only restrictions on loans and deposit accounts of less than one year's maturity, which are to be eliminated by mid-1994. Iceland abolished all exchange controls on long-term capital movements at the beginning of 1994, and undertook to abolish all such controls on short-term movements by year-end.

Some developing countries have traditionally maintained fairly liberal capital accounts, such as the Middle East oil export countries, the offshore centers of Singapore and Hong Kong, a number of open small island economies, and Panama and Liberia which use the U.S. dollar. Indonesia eliminated most of its capital controls in 1970, and Uruguay has also maintained a liberal capital account for a number of years. However, for most developing countries capital movements have remained tightly controlled until relatively recently. The generally slower progress in liberalization by

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1/ The United Kingdom relaxed capital controls in June and July 1979 and abolished them in October of that year. At end-1980, Japan implemented the Law Revising Partially the Foreign Exchange and Foreign Trade Control Law which allowed all foreign exchange transactions unless specifically restricted.

2/ During the 1980s only France, Spain, Norway, and Finland felt it necessary to suspend temporarily their freedom of operations on controlling capital movements under the OECD codes of liberalization of capital movements. For a detailed discussion see OECD (1990).



developing countries may be attributed to the more acute concerns about the shortage of domestic savings and the risk of capital flight, as well as the slower pace of liberalization generally, including current international transactions and trade flows.

### III. Previous Estimates and Model Specification

#### 1. Evidence on the impact of capital controls

A number of studies have derived conclusions about the degree of capital mobility. However, these studies have not examined directly the impact of controls on capital movements on the capital accounts of countries' balance of payments, but have drawn their conclusions from an examination of the behavior of other economic variables, such as domestic interest rates or savings and investment. <sup>1/</sup>

Studies which examined the determinants of short-term domestic interest rates for countries with capital controls generally concluded that capital controls have been relatively ineffective in protecting countries against short-term capital movements or in insulating domestic monetary policies. <sup>2/</sup> A recent survey concluded that capital controls afford countries little protection for domestic monetary and interest rate policy. <sup>3/</sup> However, such studies do not necessarily imply that the capital controls have been ineffective in restricting movements of longer-term capital.

Another body of empirical evidence which suggests a lower degree of international mobility of capital, particularly among industrial countries, is that concerned with the observed significant positive correlation between domestic savings and investment for industrial countries. <sup>4/</sup> These correlations suggest that additions to savings are predominately allocated to the domestic economy. The observed correlations between savings and investments are significantly weaker for developing than industrial countries. <sup>5/</sup> Interpreting these results solely in terms of the

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<sup>1/</sup> See Frankel (1989) for a survey of empirical tests of capital mobility that do not explicitly incorporate capital flows.

<sup>2/</sup> For example, Edwards and Khan (1985), Haque and Montiel (1990), and Faruque (1991).

<sup>3/</sup> Mathiesen and Rojas-Suarez (1993).

<sup>4/</sup> See Dooley, Frankel, and Mathiesen (1987), Feldstein and Horioka (1980), and Tesar (1991) for a recent survey of the evidence and issues.

<sup>5/</sup> See Dooley, Frankel, and Mathiesen (1987).

effectiveness of controls on capital movements would suggest that such controls have tended to be effective for industrial countries but ineffective in developing countries. 1/

The various estimates of capital flight among developing countries also suggest that capital controls have been ineffective in protecting developing countries' balance of payments. 2/ For example, Mathiesen and Rojas-Suarez (1993) concluded that highly restrictive capital controls did not break the linkage between macroeconomic fundamentals and the scale of capital flight. Nevertheless, industrial country experiences suggest that controls have been effective in controlling outflows of longer-term capital. For example, the lifting of U.K. exchange controls resulted in a significant outflow of portfolio investment (Artis and Taylor 1989); and substantial portfolio outflows followed the introduction of the new foreign exchange law in Japan in 1980 (see Fukao 1990). The impact of capital account liberalization on the capital accounts of nine industrial countries is reviewed in Table 1. All of the nine industrial countries recorded larger net foreign direct investment outflows, and seven of the nine recorded large net portfolio investment outflows, either in the year of the liberalization of capital controls or in subsequent years.

## 2. Approaches to modeling capital movements

The two main approaches to explaining private capital flows are the portfolio balance approach, based on Branson's (1968) extension of the Markowitz-Tobin portfolio selection model, and the monetary approach to the balance of payments following Johnson (1971) and Kouri and Porter (1974). The former focuses on the role of risk-adjusted returns, and the latter on the role of monetary disequilibrium in explaining capital movements. While the two approaches, particularly the former, have been reworked with increasing rigor over the last 20 years, there has been relatively little change in the basic concepts expressed in the two approaches.

The pioneering work on portfolio theory by Markowitz (1959) and Tobin (1965) was based on a closed economy with a fixed price level, thus abstracting from both exchange rate and price uncertainty. Merton (1971) introduced the principles of stochastic calculus to the closed economy portfolio decision, and Solnik (1974) extended these to the international portfolio decision. This extension results in complicated asset demand functions, involving expectations, variability and covariability between asset returns, exchange rates, and price levels. Branson and Henderson (1985) discuss the assumptions that reduce these complex demand functions to a simple form, known as the international portfolio investor's rule: the

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1/ Of course, a number of other explanations for this result have also been provided. The explanations include various sources of statistical bias.

2/ Estimates of capital flight have been developed by Dooley (1986) and Morgan Guaranty Trust Company (1988).

Table 1. Industrial Country Central Accounts: A Sample of Experiences  
with Capital Account Liberalizations

(Amounts in millions of U.S. dollars)

	t-2	t-1	t	t+1	t+2	t+3	Improvement (+) or Weakening (-)	
							t compared with t-1	Average of t+1 t+2 compared with average t-1, t-2
<b>Australia (1983)</b>	<b>1981</b>	<b>1982</b>	<b>1983</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>		
Capital account	7,409	12,551	7,721	6,027	6,811	9,486	-	-
Direct investment	1,614	1,666	2,464	-1,032	183	157	+	-
Portfolio investment	673	2,399	1,183	736	2,144	1,187	-	-
Other capital	5,122	8,486	4,074	6,323	4,484	8,142	-	-
Net errors and omissions	764	377	1,280	1,282	-401	555	+	-
<b>Denmark (1989)</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>		
Capital account	7,359	3,275	-2,359	4,405	-3,286	-4,767	-	-
Direct investment	-534	-217	-976	-350	-299	-1,219	-	+
Portfolio investment	3,683	1,231	-2,749	2,900	1,854	9,243	-	-
Other capital	4,210	2,261	1,366	1,855	-4,841	-12,791	-	-
Net errors and omissions	85	-619	-347	-2,440	-2,183	-44	+	-
<b>France (1989)</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>		
Capital account	-4,733	3,787	5,156	19,093	-6,964	14,511	+	+
Direct investment	-4,071	-6,010	-9,113	-21,793	-8,835	-9,150	-	-
Portfolio investment	5,442	7,798	21,642	28,834	15,927	34,180	+	+
Other capital	-6,104	1,989	-7,373	12,052	-14,056	-10,519	-	-
Net errors and omissions	850	940	-1,688	6,501	7,905	2,460	-	+
<b>Italy (1990)</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>		
Capital account	16,638	24,733	42,679	22,957	196	...	+	-
Direct investment	1,213	51	-1,197	-4,918	-6,480	...	-	-
Portfolio investment	395	3,256	-393	-6,170	-10,647	...	-	-
Other capital	15,030	21,426	44,269	34,045	17,323	...	+	+
Net errors and omissions	-2,343	-2,820	-16,600	7,932	6,491	...	-	-
<b>Netherlands (1986)</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>		
Capital account	-5,731	-2,572	-2,309	-692	-1,324	-5,509	+	+
Direct investment	-3,284	-1,319	-726	-5,926	-1,804	-6,939	+	-
Portfolio investment	-33	272	-4,729	2,470	3,372	7,253	-	+
Other capital	-2,414	-1,525	3,146	2,764	-2,892	-5,823	+	+
Net errors and omissions	-559	-863	-2,121	-404	-3,965	-3,854	-	-
<b>New Zealand (1985)</b>	<b>1983</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>		
Capital account	31	-504	-978	-847	-1,133	-2,926	-	-
Direct investment	108	110	319	-100	-298	178	+	-
Portfolio investment	--	--	--	--	--	30	-	-
Other capital	-77	-614	-1,297	-666	-835	-3,134	-	-
Net errors and omissions	-187	812	514	-81	799	622	-	+
<b>Norway (1990)</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>		
Capital account	4,900	2,056	-760	-7,581	-175	...	-	-
Direct investment	-699	161	467	-2,180	493	...	-	-
Portfolio investment	4,226	3,043	561	-3,107	1,916	...	-	-
Other capital	1,373	1,148	-854	-2,294	-2,584	...	+	-
Net errors and omissions	-1,149	-1,305	-2,848	-219	-3,274	...	-	-
<b>Sweden (1989)</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>		
Capital account	-779	138	9,897	18,910	882	7,352	+	+
Direct investment	-3,911	-5,719	-8,172	-12,063	-1,237	-1,048	-	-
Portfolio investment	-1,065	-1,352	-1,267	1,790	7,143	477	+	+
Other capital	4,197	7,209	19,336	29,183	-5,024	7,923	+	+
Net errors and omissions	108	-1,142	-5,654	-4,668	2,664	4,698	-	-
<b>United Kingdom (1979)</b>	<b>1977</b>	<b>1978</b>	<b>1979</b>	<b>1980</b>	<b>1981</b>	<b>1982</b>		
Capital account	5,338	-7,988	-19,734	-9,483	-15,507	956	-	-
Direct investment	253	-3,028	-6,070	-1,106	-6,274	-1,750	-	-
Portfolio investment	2,495	-2,404	271	-6,795	-9,251	-12,842	+	-
Other capital	2,590	-2,556	-13,935	-1,582	18	15,548	-	+
Net errors and omissions	6,649	3,432	1,872	1,936	1,787	-3,760	-	-

proportion of wealth held as the foreign asset (FA/W) is inversely proportional to exchange rate variability ( $\sigma_e^2$ ) and directly proportional to the foreign assets' expected excess return ( $i^* + e - i$ ), where  $i$  and  $i^*$  are the domestic and foreign interest rate and  $e$  is the expected proportional change in the exchange rate. <sup>1/</sup>

$$FA/W = (1/\sigma_e^2) \cdot (i^* + e - i) \quad (1)$$

However, a relaxation of the assumptions about the nature of risk aversion reintroduces a role for covariability of returns. For example, any tendency for domestic prices and the exchange rate to covary positively increases the attractiveness of the foreign asset to risk averse investors seeking to maintain real wealth and to offset the effects of domestic inflation with higher domestic currency returns from the foreign asset.

Typically, empirical work based on the portfolio approach has collapsed considerations of expectations, variability, and covariability into a single measure of risk or, more precisely, a measure of exchange rate expectations. The proportion of wealth held as foreign assets is specified as a function of domestic and foreign interest rates, the expected depreciation in the exchange rate and additional explanatory variables (Z):

$$(FA/W) = f(i, i^*, e, Z) \quad (2)$$

Capital flows are specified as the total derivative of this expression:

$$dFA = f(.) dW + W.(f_i di + f_i^* di^* + f_e de + f_Z dZ) \quad (3)$$

The first expression on the right hand side of (3) indicates that capital flows will occur in the absence of changes in interest rates and exchange rate expectations due to changes in wealth. Data problems have usually led to the exclusion of a wealth term from empirical studies of capital movements, with changes in wealth proxied by income as one of the additional explanatory variables. Thus, equation (3) may be specified as:

$$dFA = \alpha_0 + \alpha_1 di + \alpha_2 di^* + \alpha_3 de + \alpha_4 dZ \quad (4)$$

<sup>1/</sup> If there is only one domestic asset and one foreign asset, with nonstochastic returns in their respective currencies, the only possible covariance of concern to the domestic investor is that between the domestic price level and the exchange rate ( $\rho_{ep}$ ). If relative risk version (R) is invariant to wealth and hence savings, the portfolio allocation decision can be separated from the consumption-savings decision and the foreign assets' share of wealth is given by  $(R\sigma_e^2)^{-1} [(i^* + e - i) + (R-1) \rho_{ep}]$ . If utility is logarithmic, R will equal unity and the covariance between prices and the exchange rate becomes irrelevant. The foreign assets' share is then given by equation (1). If  $\sigma_e^2 = 0$ , i.e., the exchange rate is fixed, this reduces further to the intuitive result that the demand for the foreign (and domestic) asset is infinitely elastic, i.e., interest parity holds.

Either wittingly or otherwise, the specification tends to be modified further by replacing the change in interest rates and exchange rate expectations (and other variables) with their present level, leaving the simple expression:

$$dFA = \alpha_0 + \alpha_1 i + \alpha_2 i^* + \alpha_3 e + \alpha_4 Z \quad (5)$$

Where uncovered interest parity (UIP) holds,  $\alpha_2$  and  $\alpha_3$  can be constrained to be equal and opposite to  $\alpha_1$ . If exchange rate expectations can be modelled by relative purchasing power parity (PPP), equation (5) can be rewritten in terms of the real interest rate differential. 1/

$$dFA = \alpha_0 + \alpha_1 [(i - \pi) - (i^* - \pi^*)] + \alpha_2 Z \quad (6)$$

There are, however, a number of weaknesses with this approach, most notably that UIP assumes risk neutrality while PPP suffers, inter alia, from measurement problems stemming from the distinction between traded and nontraded goods. 2/ Also, high and variable inflation in some developing countries at various points in time implies large swings in real interest rates in measured, if not, expected terms. 3/

The monetary approach to explaining capital movements has a long history going back as far as Hume's 1752 exposition of the specie flow mechanism. The monetary approach was resuscitated by Johnson (1971) who emphasized the difference between supply and demand for money in explaining the overall balance of payments. In developing an empirical application of the approach, Kouri and Porter (1974) listed four problems with the empirical application of the portfolio model. First, simultaneity bias caused by the domestic interest rate's sensitivity to capital flows results in an underestimation of its coefficient. Second, there is no allowance for substitution between bonds and money. Third, for the purposes of policy analysis, the portfolio model approach treats the domestic interest rate as the instrument of monetary policy (implicitly assuming complete sterilization of capital flows). Fourth, and again regarding policy analysis, the approach only allows for an indirect role for such variables

1/ Since  $e = \pi - \pi^*$ .

2/ For a recent survey of the vast empirical literature on exchange rate determination and interest parity, see Froot and Thaler (1990). Krugman (1993) casts serious doubt on the validity of UIP, both theoretically and empirically. Frankel and MacArthur (1988) rewrite the real interest rate differential as the sum of the nominal differential less the forward cover premium (covered interest parity), the difference between the forward premium and actual depreciation, and the difference between actual depreciation and the inflation differential (PPP). They found that most of the variation in real interest rate differentials was due to a failure of PPP to hold. IMF (1994) discusses measurement problems with PPP.

3/ The parameter constraint on the real interest rate differential was not accepted by the data.

as money and income, via their effect on the domestic interest rate. These criticisms seem somewhat overstated, and there are a number of counter arguments. For example, under anything other than a pure float, the estimated coefficients on monetary aggregates in single equation estimation are also vulnerable to simultaneity bias. The second criticism follows from an oversimplified application of portfolio theory, not from portfolio theory itself, and concerning the first, third, and fourth criticisms the interest rate normally is the instrument of monetary policy and therefore may be exogenously determined at least in the short term.

Kouri and Porter's (1974) specification is based on the identity that the change in net foreign assets equals the change in money less the change in net domestic assets. Within this identity, however, are behavioral equations and directions of causation. For example, the model incorporates a portfolio decision between base money, domestic bonds, and foreign bonds. Empirical tests of the model are usually in the form of estimating the "offset coefficient": the extent to which an increase in the banking system's (net) domestic assets is offset by a fall in its (net) foreign assets rather than by an increase in the demand for money. 1/ A loosening (tightening) of credit would be fully offsetting via capital outflows (inflows), in the first instance at least, if the demand for money and traded goods respond slowly to the credit-induced changes in interest and exchange rates. If the demand for money and traded goods adjust quickly to the credit expansion, the feedbacks on capital flows will be more complex. 2/ Usually, the offset coefficients are studied using a money demand function (incorporating nominal income and the nominal domestic interest rate) augmented by some measure of domestic credit expansion.

### 3. Model specification

In practice, most empirical studies of capital flows combine elements of the two approaches--without necessarily compromising either of the approaches to a great extent. This is the approach followed in this paper. Portfolio model considerations are assumed to be reflected in the relative real returns on domestic ( $i-\pi$ ) and foreign assets ( $i^*-\pi^*$ ), and the change in wealth by national income. Monetary approach to the balance of payments considerations are reflected in the difference between the demand for money ( $M^D$ ) and the money supply ( $M^S$ ) in the domestic market. The demand for money is assumed to be a function of domestic income and nominal interest rates,

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1/ Recent empirical applications to Nigeria and the ECCB can be found in Jimoh (1990) and Looney (1991), respectively. Aghevli and Khan (1977), using panel data for 39 countries, found support for the monetary approach.

2/ These complex feedbacks have been analyzed using macro models. For example, Jonson, Moses, and Wymer (1977), using a macroeconometric model of the Australian economy, concluded that offsetting external flows were not sufficiently rapid to prevent monetary disturbances influencing prices and output in the short run. However, such approaches have not been in vogue for some time.

while the supply of money is assumed to be a function of the government's budgetary position, (GB). The government's budgetary position also has a role as a potential confidence variable explaining capital flows in a portfolio model. Thus, the model to be estimated empirically may be written as:

$$NC = \alpha_0 + \alpha_1 \ln Y + \alpha_2 i + \alpha_3 GB + \alpha_4 (i - \pi) + \alpha_5 (i^* - \pi^*) + \alpha_6 c \quad (7)$$

where NC is a measure of capital and c is a variable for controls on capital movements and it is anticipated that  $\alpha_1, \alpha_3, \alpha_4 > 0$ ;  $\alpha_2, \alpha_5 < 0$ .

Estimation of this model raised a number of questions. First, is whether the dependent variable should be a stock or a flow and whether it should be the stock or flow of all transactions, or capital transactions only. The portfolio model suggests the stock, or change in the stock, of private capital while the monetary approach suggests the flow of all current and capital transactions, i.e., the overall balance of payments. 1/ For most of the countries in this study there are no reliable stock data and, therefore, flow data are used. 2/ Consistent with the portfolio approach, only private capital transactions are considered.

A second question is whether to model net or gross flows. Both the portfolio and monetary approaches are based on net positions; the former because of the two-way possibility of investment and the latter because of the concept of excess, i.e., net, demand for money. Moreover, countries are usually concerned with their balance of payments. In any case, data on gross flows are incomplete and, by definition, nonexistent for unrecorded capital flows proxied by net errors and omissions and misinvoicing. 3/

A third question, common to both approaches, is the treatment of direct as opposed to portfolio investment. The monetary approach, despite being couched in terms of domestic versus foreign bonds, is based on an identity which concerns the overall balance of payments and thus does not distinguish between the two types. For the portfolio model, the assumption that the domestic (foreign) interest rate equals the risk- and tax regime-adjusted domestic (foreign) rate of profitability is of course an oversimplification.

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1/ The change in the stock differs from the flow due to valuation effects.

2/ One possibility is to use flow data on interest and other income remittances and an estimate of the yield that produced these flows. This method is the first step used by Dooley (1986) in estimating capital flight.

3/ Early versions of the Multicountry Model (MCM) developed at the Board of Governors of the U.S. Federal Reserve System attempted unsuccessfully to model gross (recorded) capital flows. Later versions modelled net flows, but--given continually poor results--focused on price linkages rather than quantity linkages (see IMF (1991)). The focus on financial prices rather than quantities is now quite pervasive in the empirical literature on capital mobility.

Recent literature on the determinants of FDI has focused on the role of location-strategic policies of multinational firms (see Buckley (1993)). Given data limitations, however, the approach taken in the paper is to simply subtract direct investment from the dependent variable and proceed with the same specification.

Fourth, there is the question of whether the flows should be modelled in terms of a common currency or in domestic currency terms. It is clear that the portfolio approach requires use of a common or reserve currency: returns from different countries need to be standardized and investors need a measure of their aggregate wealth. The monetary approach, however, concerns the domestic demand for, and supply of, money and hence may best be modelled in terms of the domestic currency. The approach taken here is to denominate capital flows in U.S. dollars and adjust those explanatory variables which reflect monetary considerations accordingly. This is done by: (1) measuring income--which also helps play the role of a portfolio growth effect in the absence of a wealth variable--in U.S. dollars, but including a separate exchange rate term to allow for other possible effects of the exchange rate, and (2) proxying credit expansion with the central government budget balance as a ratio to GDP. This variable also acts as a measure of confidence/risk, thereby making it consistent with both approaches to modelling capital flows. 1/ 2/

Fifth, is the question of whether to expand the list of explanatory variables in an attempt to include other factors which could explain private capital movements. One possibility was to include a dummy variable for the existence of a Fund program, but such an approach poses a number of difficulties, including whether the program is on track. A number of additional explanatory variables were examined including the current and lagged values of the real effective exchange rates, the current and lagged values of national money supplies, and different combinations of inflation and interest rates. The alternative specifications did not change significantly the results.

Finally, there is the question of how to model explicitly capital controls' effects on capital flows. The literature does not provide much insight into this. The usual argument is that, for countries with fixed exchange rate regimes and high inflation/large fiscal deficits, capital outflows can be controlled successfully but this merely delays an eventual

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1/ Giovannini and de Melo (1993) argue that to the extent that capital controls prevent capital outflows and allow domestic interest rates, including those paid by the government, to be artificially low, the budget balance will be positively correlated with the capital account. Such a correlation would be separate to the positive correlation suggested by the above considerations.

2/ The domestic nominal interest rate should also be adjusted. For this reason, the log level of the exchange rate is included explicitly in the equations.



crisis in the overall balance of payments; the crisis will manifest itself in the current account. While at least two arguments have been advanced to the contrary, 1/ they require data on real equilibrium exchange rates and expectations about controls to be empirically tested. Moreover, this study is concerned with general developments in the balance of payments, not just crises for countries with fixed exchange rates. Thus, the approach taken in this study, is to use dummy variables to mark various capital regime changes. The estimated model including dummy variables for the nature of the capital central regime (c) is, therefore, specified as: 2/

$$\begin{aligned} NC = & \alpha_0 + \alpha_1 \ln Y/e + \alpha_2 i + \alpha_3 GB/Y + \alpha_4 (i - \pi) \\ & + \alpha_5 (i^* - \pi^*) + \alpha_6 c + \alpha_7 \ln e \end{aligned} \quad (8)$$

It should be noted that the objective of this research was not so much to develop structural estimates of the determinants of private capital movements, but rather to test whether countries' capital control regimes had an additional impact on those movements. Therefore, the adoption of a pragmatic approach, which included in the estimation equations economic variables which would be considered important determinants of private capital movements along with dummy variables to describe the capital control regime seems appropriate. The test of the role of capital controls is therefore conditioned and takes account of other factors which might explain countries' net private capital movements.

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1/ Wyplosz (1986) argues the (real) exchange rate can be devalued beyond its equilibrium value when reserves deteriorate to some crucial level so that reserves begin accumulating. Inflation will cause them to run down at some later date but the process can be repeated. A key assumption is that residents are successfully prevented from holding foreign assets, so that nonresidents' holdings of domestic currency represent a limit on the extent to which the domestic currency will be sold. Bacchetta (1990) argued that capital controls on outflows could actually prompt inflows in a crisis. If residents anticipate controls to be imposed temporarily on outflows, they may repatriate foreign assets before the imposition (and repurchase them after the imposition) in an effort to boost money balances to finance increased consumption in light of the inevitable devaluation.

2/ Attempts to proxy changes in wealth with world income and/or world money proved unsuccessful. Attempts to use the actual money supply rather than GB/Y and attempts to restrict  $\alpha_5 = -\alpha_4$  consistent with UIP and PPP also were not accepted by the data.

#### IV. Empirical Estimates

##### 1. Data considerations

Earlier research on the impact of capital controls on the capital accounts of countries' balance of payments may have been inhibited by data considerations. First, is the concern that reported capital movements would not be a good measure of actual capital flows when the capital controls are circumvented. Second, data on countries' capital control regimes are difficult to compile, although information is provided in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

The approach adopted here is as follows. We constructed and examined a number of possible measures of the net private capital account. These measures included, in addition to measured total net private capital movements, recorded net errors and omissions in the balance of payments and, in the equations of developing countries, estimates of the under- and overinvoicing of trade transactions. Measures excluding longer-term portfolio and direct investment flows are also examined.

Net errors and omissions as a residual item in the balance of payments includes, inter alia, various types of unrecorded private capital movements, including those resulting from the leading and lagging of trade payments. A number of countries also do not report separately short-term capital movements but include these in net errors and omissions.

The estimates of the misinvoicing of trade transactions measure the extent to which the imports and exports recorded in the balance of payments misrepresent the value of goods shipped. Such misinvoicing can be an important channel for the circumvention of controls on capital movements. For example, a company seeking to export capital outside the exchange control regulations might overinvoice its imports or underinvoice its exports. In the first case, the company would be permitted under the exchange control regulations to make a payment equivalent to the declared value of the imports which would be larger than warranted by the actual value of the goods imported. In the second case, the company would be required to repatriate only the value of goods declared, and to the extent that the actual value of goods is higher than the declared value it will be able to acquire on assets abroad. Since the dependent variable in this study is the net inflow, misinvoicing is defined here as underinvoicing of imports plus overinvoicing of exports as calculated by the difference between the trade data reported by the country and its trading partners and therefore measures unrecorded capital inflows. A description of the estimation procedure is provided in Appendix I. As discussed in this Appendix, under reasonable assumptions the use of misinvoicing appears appropriate only in the equations for developing countries.

Specifically, the empirical work examined the following measures of the private capital account. For developing countries, these were:

- (1) the net capital movements recorded in the balance of payments excluding official capital;
- (2) measure (1) plus errors and omissions reported in the balance of payments;
- (3) measure (2) plus estimated misinvoicing of external trade transactions; and
- (4) - (6) the above measures excluding net direct investment flows recorded in the balance of payments.

The measures excluding net direct investment flows ((4) - (6)) are examined in order to test whether capital controls impacted differently on short- and long-term capital flows. The use of annual data makes it difficult to capture the dynamics of short-term flows unless they are sustained over a year. Nonetheless, the results from this study are consistent with those obtained from examining the determinants of short-term interest rates. The above measures, except those including misinvoicing, were examined for industrial countries. In addition, for industrial countries measures excluding both direct and portfolio investment flows are also examined. It was not possible to investigate these measures for developing countries, because of the limited number of developing countries providing data on portfolio investment flows.

The basic data source was International Financial Statistics (IFS). Where necessary, this data was updated using information from country data banks (including the World Economic Outlook). <sup>1/</sup> The empirical estimates examined countries experiences for the period 1985-92, a period when a number of countries altered their capital control regimes. Starting with the full membership of the Fund, a number of countries were eliminated based on known peculiarities to their capital accounts. These countries included the United States as the principal reserve currency country, the petroleum exporting countries in the Middle East, and some small island economies which utilize another country's currency. Further countries were eliminated because of problems of data availability. This resulted in a sample of 52 countries, drawn from all regions with a diversity of exchange control regimes. The list of countries in the sample is provided in Appendix II.

Sample countries' capital control regimes were defined using various issues of the Annual Report and Exchange Arrangements and Exchange Restrictions and for industrial countries, the OECD's Codes of Liberalization of Capital Movements. Capital control regimes were defined as either liberal or restricted. Liberal regimes were identified as those in which capital movements are generally free but certain specified

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<sup>1/</sup> A detailed description of the data is provided in Appendix II.

restrictions, e.g., on types of direct investment, may continue to apply. <sup>1/</sup> Countries which maintained restrictive capital control regimes during the sample period but altered the intensity of controls were also identified. The identified changes were divided into measures: (1) to liberalize capital outflows; (2) to liberalize capital inflows; (3) to tighten controls on capital outflows; and (4) to tighten controls on capital inflows.

## 2. Testing procedures

Equation (8) was estimated for the different measures of net private capital flows. The estimated equations included country-specific intercept dummies and shifts dummies to identify the capital control regimes. The capital control regimes were represented by 0:1 dummies as follows:

$D_1 = 0$  for country with liberalized capital movements

$= 1$  for country with restricted capital movements.

$D_2 = 1$  for a country with restricted capital movements which liberalizes capital outflows.  $D_2$  takes a value 1 in the period when the liberalization is undertaken and in subsequent periods unless the country subsequently fully liberalizes capital movements, in which case  $D_2$  would take the value 0 while  $D_1$  would become 0 rather than 1.

$D_3 = 1$  for a country with restrictive capital movements which partly liberalizes capital inflows.  $D_3$  is constructed in a similar manner to  $D_2$ .

$D_4 = 1$  for a country which introduces or intensifies controls on capital outflows.  $D_4$  takes a value 1 in the period when the controls are introduced and in subsequent periods. If the country which introduces new controls was initially classified as liberal ( $D_1 = 0$ ),  $D_1$  also becomes 1.

$D_5 = 1$  for a country which introduces or intensifies controls on capital inflows.  $D_5$  is constructed in a similar manner to  $D_4$ .

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<sup>1/</sup> In classifying capital control regimes as restricted or liberal a detailed study was made of the description of each country's exchange system. The focus was primarily on the existence of exchange controls which affected capital movements as evidenced by: (1) "bona fide" tests of the authenticity of current payments or other specific restrictions or authorizations; (2) repatriation requirements; (3) multiple currency practices specific to capital movements; and (4) restrictions on remittances of income and dividends. Appendix III provides background on the classification of controls on capital movements.

Different subsamples were examined. The full sample was split between industrial and developing countries and between countries with liberalized capital movements and those with restricted capital movements. Separate regressions were estimated for the different subsamples. The importance of capital controls on net capital flows was examined with reference to the size and significance of the capital control dummies, and through F-tests comparing the residual sum of squares from the regressions for the full and subsamples of data.

### 3. Empirical results

The estimation results from pooling the cross country and time series (1985-92) data are reported in Tables 2-4. Table 2 reports the results for the widest measure of net private capital; Table 3 excludes direct investment. These tables report results for all countries in the sample and the industrial and developing country subsamples. Table 4 reports the results for industrial countries' net private capital flows excluding direct and portfolio investment flows. Each country sample is further divided into restricted and liberalized regimes. Results are reported for the different definitions of net private capital flows: measured capital (MC); measured capital plus net errors and omissions (MCEAO); and measured capital plus errors and omissions plus misinvoicing (MCEAOMS) for the full sample of countries and the developing countries subsample only.

The overall explanatory power of the equations, as measured by the R-bar squared statistic, for the widest measure of net private capital flows (Table 2) is quite high, particularly for pooled cross country-time series data. The explanatory power tends to increase with the inclusion of errors and omissions and the estimates of misinvoicing, but declines with the exclusion of direct investment flows (Table 3) and direct and portfolio investment flows (Table 4). These results may suggest a high degree of fungibility between different types of capital flows, and between recorded and unrecorded capital flows, which is reflected in the equations explaining the broadest measures of capital flows better than the submeasures.

The results for the parameter estimates confirm previous findings of the difficulties in obtaining robust structural parameters of international capital flows. Nevertheless, for developing countries, the monetary disequilibrium terms (the nominal domestic interest rate, and income and budget balance) are almost always of the expected sign (negative, positive, and positive, respectively), and the income and budget balance terms are significant. <sup>1/</sup> The real interest rate terms are typically insignificant, often of the wrong sign and with no clear tendency to increased significance as the definition of capital is broadened. These results suggest that the monetary approach may be more relevant in explaining capital movements in

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<sup>1/</sup> The exception is the income and budget balance terms in the liberalized regime subsample, where the results need to be interpreted with caution as the degrees of freedom are quite low.

Table 2. Estimates of Net Private Capital Flows: Broadest Measure

	D1	D2	D3	D4	D5	i	ln(Y/e)	ln e	B/Y	1- $\pi$	1*- $\pi$ *	R <sup>2</sup>
<b>All countries</b>												
MC	2,733	-137	1,743	3,245	1,222	-.24	4,480	404	32,950	.03	-177	.52
	(1.25)	(-.06)	(.90)	(.66)	(.46)	(-.28)	(1.96)	(.94)	(1.73)	(.04)	(-.37)	
MCEAO	3,413	-416	1,678	3,069	1,297	-.36	4,439	852	29,210	.08	-121	.56
	(1.59)	(-.018)	(.88)	(.63)	(.50)	(-.43)	(1.97)	(1.31)	(1.57)	(.11)	(-.26)	
MCEAOMS	3,159	277	-260	2,739	1,094	-.41	5,253	567	36,690	.15	-202	.63
	(1.50)	(.12)	(-.14)	(.58)	(.43)	(-.50)	(2.37)	(1.37)	(2.00)	(.22)	(-.44)	
<b>Countries with restricted capital control regimes</b>												
MC	--	-702	1,650	3,727	2,326	-.40	4,112	527	18,690	.14	-94	.43
	--	(-.68)	(1.92)	(1.41)	(1.98)	(-1.03)	(3.62)	(2.28)	(2.09)	(.44)	(-.37)	
MCEAO	--	-743	1,727	4,436	2,239	-.43	3,935	592	19,090	.12	2.29	.40
	--	(-.76)	(2.11)	(1.77)	(2.01)	(-1.17)	(3.64)	(2.70)	(2.25)	(.41)	(.01)	
MCEAOMS	--	409	208	2,684	2,478	-.60	3,590	726	25,670	.2433	163.8	.46
	--	(.33)	(.20)	(.86)	(1.78)	(-1.32)	(2.66)	(2.65)	(2.42)	(.60)	(.54)	
<b>Countries with liberalized capital control regimes</b>												
MC	--	--	--	--	--	.297	13,680	9,693	74,310	23.67	-26.98	.46
	--	--	--	--	--	(.66)	(.77)	(.53)	(.50)	(.25)	(-.01)	
MCEAO	--	--	--	--	--	353.4	15,390	11,980	60,530	28.45	149.1	.50
	--	--	--	--	--	(.79)	(.87)	(.66)	(.41)	(.30)	(.06)	
MCEAOMS	--	--	--	--	--	362.7	16,670	8,006	10,220	33.76	-37.6	.62
	--	--	--	--	--	(.88)	(1.01)	(.47)	(.74)	(.39)	(-.02)	
<b>Industrial countries</b>												
MC	4,790	543	-1,107	3,803	4,311	.332	5,781	-2,923	52,580	-307	-274	.53
	(1.05)	(.11)	(-.21)	(.32)	(.74)	(.99)	(.75)	(-.45)	(.94)	(-.99)	(-.19)	
MCEAO	6,352	-413	-.43	4,066	3,932	.329	6,417	-2,598	38,390	-276	-230	.57
	(1.42)	(-.08)	(-.16)	(.34)	(.68)	(1.00)	(.85)	(-.41)	(.70)	(-.91)	(-.17)	
<b>Restricted capital control regimes</b>												
MC	--	703	-793	-91	7,024	.183	6,526	-3,883	-1,233	-158	637	.51
	--	(.37)	(-.43)	(-.02)	(3.26)	(1.24)	(1.86)	(-1.51)	(-.05)	(-1.27)	(.69)	
MCEAO	--	-592	-442	1,098	6,200	.135	7,163	-3,198	-1,378	-157	248	.50
	--	(-.34)	(-.27)	(-.29)	(3.19)	(1.01)	(2.26)	(-1.38)	(-.06)	(-1.40)	(.30)	
<b>Liberalized capital control regimes</b>												
MC	--	--	--	--	--	1,720	47,490	65,030	29,130	-1,802	926	.51
	--	--	--	--	--	(1.90)	(1.73)	(1.75)	(.16)	(-1.16)	(.33)	
MCEAO	--	--	--	--	--	1,815	51,210	71,900	15,270	-1,522	1,134	.55
	--	--	--	--	--	(2.03)	(1.88)	(1.95)	(.09)	(-.99)	(.41)	
<b>Developing countries</b>												
MC	751	-975	2,418	2,197	-1,682	-.21	2,510	396	26,310	-.06	-231	.29
	(.62)	(-.74)	(2.64)	(.90)	(-1.20)	(-.66)	(2.22)	(2.22)	(2.95)	(-.22)	(-.93)	
MCEAO	703	-697	2,424	2,866	-1,182	-.31	2,000	533	27,710	-.02	-33	.29
	(.59)	(-.54)	(2.72)	(1.20)	(-.87)	(-.97)	(1.82)	(3.07)	(3.19)	(-.09)	(-.14)	
MCEAOMS	-188	1,227	455	4,036	-1,772	-.48	976	642	34,800	.10	63	.38
	(-.12)	(.70)	(.38)	(1.25)	(-.96)	(-1.12)	(.66)	(2.73)	(2.96)	(.28)	(.19)	
<b>Restricted capital control regimes</b>												
MC	--	-1,297	2,109	3,795	-1,742	-.31	3,038	524	24,190	.05	-273	.30
	--	(-.97)	(2.19)	(1.01)	(-1.21)	(-.90)	(2.55)	(2.46)	(2.64)	(.19)	(-1.03)	
MCEAO	--	-890	2,237	4,039	-1,212	-.36	2,304	617	26,260	.05	-52	.29
	--	(-.67)	(2.36)	(1.09)	(-.86)	(-1.07)	(1.96)	(2.93)	(2.91)	(.18)	(-.20)	
MCEAOMS	--	806	653	1,247	-1,320	-.57	1,230	775	33,940	.19	171	.39
	--	(.45)	(.51)	(.25)	(.69)	(-1.23)	(.78)	(2.73)	(2.78)	(.50)	(.49)	
<b>Liberalized capital control regimes</b>												
MC	--	--	--	--	--	-199	-4,604	-2,082	70,810	-.12	-292	.18
	--	--	--	--	--	(-1.65)	(-4.42)	(-3.33)	(1.16)	(-.57)	(-.15)	
MCEAO	--	--	--	--	--	-176	-2,548	-4,228	79,200	-9.04	-819	.63
	--	--	--	--	--	(-1.41)	(-2.22)	(-6.64)	(1.26)	(-.44)	(-.40)	
MCEAOMS	--	--	--	--	--	-204	-1,012	-5,072	100,800	-11.74	-912	.61
	--	--	--	--	--	(-1.89)	(-1.10)	(-8.88)	(1.81)	(-.61)	(-.50)	

MC = measured net capital flows

MCEAO = measured net capital flows plus errors and omissions

MCEAOMS = measured net capital flows plus errors and omissions plus estimated misinvoicing

t-ratios in parenthesis

Table 3. Estimates of Net Private Capital Flows: Excluding Direct Investment

	D1	D2	D3	D4	D5	i	ln(Y/e)	ln e	B/Y	i-π	i*-π*	R <sup>2</sup>
<b>All Countries</b>												
MC	1,344 (.57)	254 (.10)	1,807 (.87)	4,599 (.87)	423 (.15)	-.09 (-.10)	5,160 (2.09)	293 (.63)	40,760 (1.99)	.01 (.01)	173 (.34)	.27
MCEAO	2,023 (.90)	-25 (-.01)	1,742 (.87)	4,423 (.87)	498 (.18)	-.21 (-.24)	5,119 (2.16)	441 (1.00)	37,060 (1.89)	.04 (.06)	230 (.47)	.34
MCEAOMS	1,769 (.79)	667 (.28)	-196 (-.10)	4,093 (.81)	296 (.11)	-.26 (-.30)	5,933 (2.52)	457 (1.03)	44,530 (2.28)	.12 (.16)	148 (.30)	.47
<b>Countries with restricted capital control regimes</b>												
MC	--	-266 (-.26)	1,738 (2.06)	4,801 (1.85)	1,877 (1.63)	-.44 (-1.15)	3,454 (3.10)	561 (2.48)	21,680 (2.48)	.15 (.49)	162 (.64)	.42
MCEAO	--	-307 (.32)	1,816 (2.28)	5,510 (2.24)	1,789 (1.64)	-.47 (-1.30)	3,277 (3.11)	626 (2.92)	22,090 (2.66)	.13 (.47)	258 (1.08)	.41
MCEAOMS	--	845 (.69)	296 (.29)	3,757 (1.19)	2,029 (1.45)	-.69 (-1.40)	2,931 (2.17)	760 (2.76)	28,670 (2.69)	2,571 (.70)	420 (1.37)	.47
<b>Countries with liberalized capital control regimes</b>												
MC	--	--	--	--	--	316 (.65)	16,000 (.83)	3,390 (.17)	12,660 (.78)	34 (.33)	840 (.32)	.17
MCEAO	--	--	--	--	--	373 (.80)	17,710 (.96)	5,682 (.30)	11,280 (.72)	39 (.39)	1,016 (.40)	.24
MCEAOMS	--	--	--	--	--	382 (.87)	19 (1.09)	1,703 (.10)	154,400 (1.05)	44 (.48)	829 (.35)	.43
<b>Industrial countries</b>												
MC	2,383 (.48)	1,175 (.21)	-1,031 (-.18)	7,702 (.59)	2,275 (.36)	405 (1.12)	8,514 (1.02)	-4,765 (-.69)	79,340 (1.31)	-337 (-1.01)	560 (.37)	.27
MCEAO	3,945 (.84)	219 (.04)	-768 (-.14)	7,965 (.64)	1,896 (.31)	401 (1.15)	9,149 (1.15)	-4,439 (-.67)	65,150 (1.13)	-307 (-.96)	604 (.41)	.34
<b>Restricted capital control regimes</b>												
MC	--	691 (.34)	357 (.18)	3,627 (.81)	5,724 (2.52)	177 (1.14)	5,893 (1.59)	-3,903 (-1.44)	15,510 (.60)	-124 (-.94)	927 (.95)	.47
MCEAO	--	-604 (-.34)	709 (.42)	4,816 (1.23)	4,900 (2.48)	129 (.95)	6,530 (2.02)	-3,218 (-1.36)	15,360 (.68)	-122.7 (-1.07)	538 (.63)	.49
<b>Liberalized capital control regimes</b>												
MC	--	--	--	--	--	1,605 (1.61)	38,170 (1.27)	38,830 (.95)	93,680 (.47)	-1,818 (-1.06)	1,422 (.46)	.24
MCEAO	--	--	--	--	--	1,700 (1.78)	41,890 (1.44)	45,710 (1.16)	79,820 (.42)	-1,539 (-.98)	1,630 (.55)	.31
<b>Developing countries</b>												
MC	825.3 (.73)	-402 (-.32)	2,038 (2.38)	1,180 (.51)	-1,959 (-1.50)	-.25 (-.82)	1,635 (1.55)	425 (2.55)	26,790 (3.21)	-.03 (-.12)	-74 (-.32)	.21
MCEAO	776.8 (.69)	-124 (-.10)	2,044 (2.41)	1,850 (.81)	-1,460 (-1.13)	-.34 (-1.14)	1,124 (1.08)	562 (3.40)	28,190 (3.41)	.01 (.02)	124 (.54)	.24
MCEAOMS	-114 (-.07)	1,800 (1.04)	75 (.06)	3,019 (.94)	-2,049 (-1.11)	-.51 (-1.21)	100 (.07)	671 (2.86)	35,280 (3.01)	.13 (.36)	221 (.68)	.39
<b>Restricted capital control regimes</b>												
MC	--	-790 (-.63)	1,823 (2.02)	1,716 (.49)	-1,879 (-1.40)	-.39 (-1.21)	2,169 (1.94)	586 (2.93)	24,760 (2.89)	.09 (.34)	-76 (-.31)	.23
MCEAO	--	-382 (-.30)	1,951 (2.16)	1,960 (.55)	-1,350 (-1.00)	-.45 (-1.37)	1,431 (1.28)	678 (3.39)	26,830 (3.12)	.08 (.32)	145 (.59)	.25
MCEAOMS	--	1,314 (.73)	367 (.29)	-832 (-.17)	-1,458 (-.76)	-.65 (-1.41)	357 (.22)	836 (2.94)	34,510 (2.82)	.22 (.59)	367 (1.04)	.40
<b>Liberalized capital control regimes</b>												
MC	--	--	--	--	--	-180 (-1.35)	-5,069 (-.42)	-1,816 (-.26)	58,350 (.87)	-11.3 (-.49)	-110 (-.05)	-.33
MCEAO	--	--	--	--	--	-157 (-1.14)	-3,012 (-.24)	-3,962 (-.55)	66,740 (.69)	-8.24 (-.35)	-837 (-.28)	-.55
MCEAOMS	--	--	--	--	--	-185 (-1.64)	-1,476 (-.14)	-4,806 (-.81)	88,320 (1.55)	-10.94 (-.56)	-730 (-.39)	+5.0

MC = measured net capital flows

MCEAO = measured net capital flows plus errors and omissions

MCEAOMS = measured net capital flows plus errors and omissions plus estimated misinvoicing

t-ratios in parenthesis

Table 4. Estimates of Net Private Capital Flows: Excluding Direct and Portfolio Investment

	D1	D2	D3	D4	D5	i	ln(Y/e)	ln e	B/Y	i-π	i*-π*	R <sup>2</sup>
<u>Industrial Countries</u>												
MC	595	416	494	8,441	-257	42	12,820	-73	31,410	-106	2,691	.08
	(.11)	(.07)	(.08)	(.60)	(-.04)	(.11)	(1.42)	(-.01)	(.48)	(-.30)	(1.64)	
MCEAO	2,157	-540	757	8,703	-636	39	13,450	252	17,220	-75	2,735	.05
	(.40)	(-.09)	(.12)	(.61)	(-.09)	(.10)	(1.48)	(.03)	(.26)	(-.21)	(1.65)	
Restricted capital control regimes												
MC	--	724	-391	2,895	3,194	77	5,611	-1,587	39,300	-33	1,366	.38
	--	(.38)	(-.21)	(.68)	(1.49)	(.52)	(1.61)	(-.62)	(1.61)	(-.27)	(1.48)	
MCEAO	--	-571	-40	4,084	2,370	29	6,248	-902	39,160	-32	978	.40
	--	(-.36)	(-.03)	(1.15)	(1.32)	(.24)	(2.13)	(-.42)	(1.91)	(-.31)	(1.26)	
Liberalized capital control regimes												
MC	--	--	--	--	--	686	48,260	27,820	-248,600	-1,776	6,106	.05
	--	--	--	--	--	(.64)	(1.48)	(.63)	(-1.16)	(-.96)	(1.85)	
MCEAO	--	--	--	--	--	781	51,980	34,690	-262,400	-1,496	6,315	.00
	--	--	--	--	--	(.70)	(1.54)	(.76)	(-1.19)	(-.78)	(1.85)	

MC = measured net capital flows

MCEAO = measured net capital flows plus errors and omissions

MCEOAMS = measured net capital flows plus errors and omissions plus estimated misinvoicing

t-ratios in parenthesis



developing countries than the portfolio balance approach, although the budget balance terms may also be proxying investor confidence, relevant to portfolio decisions. <sup>1/</sup>

For industrial countries, the income and budget balance effects are mostly as expected with some tendency for increased significance when errors and omissions are included, but nearly all the interest rate terms are of the wrong sign. The nominal domestic interest rate is positive and significant in the equations for the broadest measures of capital flows with liberalized capital movements. Thus, it appears that the nominal rate provides a better measure of return than does the real rate, and that industrial country capital movements are more responsive to nominal domestic interest rates when capital flows are liberalized than when they are restricted.

Concerning the effects of controls, F-tests for a structural difference between liberalized and restricted regimes are reported in Table 5. For developing countries, none of the F-statistics comparing the liberalized and restricted regimes with the whole sample and each other are significant for any of the measures of capital flows. Hence, capital controls appear to have had no significant influence on the structure of developing countries' capital flows.

For industrial countries, the F-tests indicate that the elimination of capital controls resulted in a significant structural shift in the explanation of capital movements. This appears to have been true even when direct and portfolio investment flows are excluded from the measure of capital. The results for all countries are similar to those for industrial countries.

The t-statistic on the first dummy variable,  $D_1$ , which identifies the nature of the capital control regime--liberalized or restricted--is a measure of the average structural "shift" impact of the control regimes on net private capital movements. <sup>2/</sup> For the broadest measure of capital (Table 2),  $D_1$  is positive and close to significance at the 10 percent confidence level for all countries and the industrial country subsample for the measure of capital flows including errors and omissions. This suggests that capital controls had some impact in improving these countries' net capital accounts. However, the size and significance of the dummy variable declines with the exclusion of direct investment (Table 3), and direct and

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<sup>1/</sup> The term is highly significant in the restricted regimes, perhaps providing evidence of needed reassurance of the stability of policies.

<sup>2/</sup> The dummies do not therefore distinguish a tendency for the effect to be different in different countries. However, this is a general problem in the use of panel data.

Table 5. F-Statistics and Tests of Significance of Capital Controls <sup>1/</sup>

Measure of Net Capital Inflows		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Measured Private Net Capital	Plus Errors (1) and Omissions	(2) Plus Mis invoicing	(1) Minus Direct Investment	(2) Minus Direct	(3) Minus Direct Investment	(4) Minus Portfolio Investment	(5) Minus Portfolio
All countries	(a)	20.08**	21.98**	12.23**	24.35**	25.30**	13.62**	--	--
	(b)	16.26*	17.97**	10.04**	20.07**	20.59**	11.56**	--	--
Industrial countries	(a)	15.65**	18.84**	--	16.97**	20.64**	--	22.25**	33.81**
	(b)	14.24**	17.01**	--	14.98**	18.13**	--	19.65**	28.97**
Developing countries	(a)	0.99	1.08	0.46	1.37	1.44	0.48	--	--
	(b)	1.01	0.79	0.82	1.00	0.77	0.74	--	--

<sup>1/</sup> Two F-tests are reported. The first compares the adjusted (for degrees of freedom) residual sum of squares from the subgroup of countries with liberalized capital flows ("liberalized") to that for the subgroup of countries with restricted capital flows ("restricted"). This indicates whether the two subsamples are drawn from different populations. The second test indicates whether the restricted sample is significantly different to the total sample by calculating the proportional difference between the adjusted residual sum of square for the two groups.

$$(a) F = \frac{RSS_L / (n_L - k_L - 1)}{RSS_R / (n_R - k_R - 1)}$$

$$(b) F = \frac{(RSS_T - RSS_R) / (n_T - n_R - 1)}{RSS_R / (n_R - k_R - 1)}$$

Where RSS = residual sum of squares;

n = number of observations;

k = number of explanatory variables;

and subscripts L, R, and T denote the liberalized and restricted subgroups and the total sample respectively;

\* = F-test significant at 5 percent level.

\*\* = F-test significant at 1 percent level.

Each F-test is a two-tailed test. Asterisks note whether the statistics are significant at the upper or lower bound.

portfolio investment (Table 4) from the measure of net capital flows. <sup>1/</sup> This suggests that for industrial countries, capital controls restricted mainly recorded direct and portfolio investment flows, and not shorter-term and unrecorded capital flows. The dummy variable is nonsignificant in the equations for the developing countries and even becomes negative with the inclusion of misinvoicing, suggesting that capital control may have weakened the capital account.

The positive  $D_1$  coefficient would suggest that the capital controls had a permanent effect in restricting certain net capital outflows from the industrialized countries. However, after a period of adjustment to an equilibrium level, it would be expected that the net outflow would decline. Hence, the positive coefficient may be picking up either a stock adjustment effect in those industrialized countries which liberalized their exchange control regimes during the sample period or a portfolio growth effect.

Turning to the other four dummy variables, for developing countries partial liberalizations of outflows ( $D_2$ ) were associated with a weakening of net flows, but the effect was insignificant. Partial liberalization of inflows ( $D_3$ ) was associated with a significant improvement in net flows of measured capital including errors and omissions. However, the dummy is insignificant for the measure of capital including misinvoicing, suggesting that misinvoicing may be used to circumvent the exchange controls.

Partial liberalizations appear to have had no significant impact on the net capital accounts of industrial countries. Nor have tightenings of controls on outflows ( $D_4$ ) significantly affected the net flow. However, a tightening of controls on inflows ( $D_5$ ) appears to have been associated with increased net capital inflows to industrial countries. This may reflect reverse causality, in that these countries introduced measures to restrict capital inflows when faced with surges in capital inflows. <sup>2/</sup>

In summary, the research suggests that:

- (1) capital controls significantly affected the structure of industrial countries' capital accounts and that they impacted to the greatest extent by restricting outflows of recorded direct and portfolio investment; and

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<sup>1/</sup> The difference between the dummy variable test and the F-test is that the F-tests compare the structure of the equations and allow for different parameter estimates, i.e., different slope and shift effects, while the dummy variable test imposes the same parameter estimates, and only tests for a shift in the equation due to the capital regime.

<sup>2/</sup> Industrial countries which tightened controls in inflows during the estimation period include Iceland, Italy, Portugal, Spain, and Sweden.

- (2) the structure of developing countries' net private capital accounts appears not to have been affected significantly by the use of controls on capital movements. There is very little evidence that capital controls effectively prevented capital outflows, and some weak evidence that the controls may have weakened the capital accounts and that partial liberalizations were associated with larger capital inflows.

The impact of the controls mainly on foreign direct and portfolio investment outflows in industrial countries may be because these flows are subject to a number of additional constraints, including the need for enterprises to declare foreign income for domestic tax purposes and to safeguard long-term investments by clearly establishing ownership which could be problematic in the home country if capital is exported illegally. These latter constraints may make residents less likely to circumvent exchange controls where foreign direct and long-term portfolio investments are concerned.

#### V. Issues Raised by the Results

There has long been a debate about the role of controls on capital movements in macroeconomic management and in improving national economic welfare. A summary of the arguments and counter arguments is provided in Table 6. The arguments for controlling capital movements include: (1) that capital controls could be welfare improving by increasing the volume of domestic investment and local tax revenue; (2) that the liberalization of the capital account should be sequenced relatively late in the reform process to allow for the elimination of distortions in the goods markets and the development of the necessary supporting institutional arrangements including indirect monetary controls; (3) that additional freedom would be provided to domestic interest rate and exchange rate policy through capital controls; and (4) that controls on capital movements can help protect a country's reserves and improve its balance of payments.

The results of this research provide evidence that capital controls have been ineffective in restricting outflows from developing countries while appearing to have had some impact in restricting recorded outflows of longer-term portfolio and direct investment from the industrial countries. Therefore, the results suggest that there is little empirical rationale for developing countries maintaining controls on capital in terms of increasing the volume of domestic investment or protecting their reserves or their balance of payments. Industrial countries may have gained somewhat by constraining outflows of domestic savings through the use of controls in capital movements, but such gains would have to be offset against the potential loss in world welfare from restricting productive international investment flows.

Table 6. Economic Arguments for Controls on Capital Movements and the Counter Arguments

Arguments for Capital Controls	Counter Arguments
1. Macroeconomic arguments	
a. Support for the balance of payments including, protecting foreign exchange reserves by preventing outflows of domestic savings and capital flight.	Because of the scope for avoidance through trade and other channels, capital controls are ineffective in preventing outflows, but can discourage inflows and may not necessarily protect the balance of payments.
b. Insulating domestic monetary policy from external influences, including: (1) Providing greater independence of interest rate policy; and (2) Reducing speculative and destabilizing short-term capital movements, including those that would result in overshooting in interest rates and exchange rates.	Capital controls are particularly ineffective in preventing short-term capital movements, and the degree of insulation of monetary policy is therefore very limited. The initial overshooting in the exchange rate reinforces the stance of monetary policy in achieving disinflationary objectives. Large capital movements tend to occur when interest rates and exchange rates are out of line with economic fundamentals and therefore indicate the need for more timely adjustments in exchange rates and interest rates.
c. Maintenance of an appropriate value of the exchange rate: In the context of tight financial policies, capital inflows could appreciate the exchange rate and undermine the competitiveness of enterprises. With weak financial policies, capital outflows would depreciate the exchange rate and reinforce inflationary pressures.	Apart from the question of the effectiveness of capital controls and the role of capital movements in signaling the need for interest rates or exchange rate adjustments, the appropriate response would be to adjust the macroeconomic policy mix. In the case of capital inflows, fiscal policy could be assigned a greater share of the adjustment burden. In the case of capital outflows, the key element is the weakness of the stabilization effort.
2. Structural and welfare arguments	
a. Sequencing of liberalization: There are a number of arguments which suggest that capital account liberalization should occur late in the reform process. These include: (1) protection of inefficient domestic financial institutions until they can be restructured; (2) introduction of indirect instruments of monetary control and capital markets to facilitate monetary control with market-determined interest rates; and (3) the need to eliminate distortions in the goods markets, through trade, price and enterprise reform before the liberalization of the capital markets.	There are advantages in liberalizing the capital account simultaneously with domestic financial sector reforms. Capital account liberalization will reinforce policies to liberalize domestic interest rates and the domestic economy more generally and to help create a competitive and efficient financial system. The increase in net private capital inflows which tend to accompany the capital account liberalization will help to support the balance of payments during the period of domestic financial sector liberalization.
b. Optimization of social welfare: The arguments for capital controls include the externalities and tax benefits which accrue to the home country when investment are made at home rather than overseas.	Administrative controls are generally less efficient than market processes in the allocation of resources and externalities are better addressed through the tax rather than the exchange system. Restricting foreign investment could slow market development, domestic investment and growth.

There are a number of theoretical arguments for liberalizing the capital account. Apart from the natural desire to avoid interfering with individual freedoms, whether of private persons or legal entities, allowing free capital movements can help promote economic growth and efficiency, and discipline on economic policy. The allocation of resources through market mechanisms is likely to be more efficient than an allocation through administrative means. Administrative systems also involve efficiency costs arising from the diversion of resources to administer the controls and to comply with (or evade) them. Market allocation will tend to promote capital movements that will generally be in the correct direction, i.e., in line with longer- or shorter-term economic fundamentals, exchange rates, and national interest rate differentials. Such capital flows can help reinforce domestic monetary policy in achieving its inflation objectives--e.g., by appreciating the exchange rate in response to higher domestic interest rates during a disinflationary phase of monetary control, or indicate the need for timely measures to correct interest rates or exchange rates which are out of line with fundamentals. 1/

Questions are nevertheless raised about the timing of the liberalization of the capital account in the overall sequencing of reforms. Since capital flows respond to financial signals and provide a ready channel to circumvent direct controls on credit and domestic interest rates, capital account liberalization should be sequenced consistent with domestic monetary reforms. Such reforms would include a freeing up of domestic interest rates, a reliance on indirect instruments for the purposes of monetary control, and a strengthening of domestic financial institutions and markets. 2/

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1/ There is nevertheless a concern that capital movements could cause interest rates or the exchange rate to overshoot their equilibrium values because of the more rapid adjustment in financial compared to goods markets. Concerns about overshooting may be a rationale for the use of controls which seek to slow down or discourage capital flows including through the use of administrative controls on nonresident access to domestic financial markets or discriminatory taxes and reserves requirements. Japan liberalized access to its domestic financial markets relatively gradually and at one time Germany and Switzerland applied discriminatory reserve requirements and interest rate policies to nonresident deposits in an attempt to control inflows. However, given that there are channels for the avoidance of such controls, their role in preventing capital flows is usually temporary and limited.

2/ Individual developing country experiences indicate that in several cases domestic monetary reforms preceded capital account liberalization although in a number of other cases, such as Indonesia's liberalization experience, interest rates were liberalized simultaneously with the external liberalization.

There are a number of reasons why it may be desirable to sequence capital account liberalization simultaneous with the liberalization of the domestic financial system. First, freedom of international capital flows reinforces the policies to liberalize domestic interest rates and helps to create a competitive and efficient domestic financial system. The type of institutional reforms which are necessary to support the liberalization of the domestic financial system and the capital account can be mutually supporting, including the creation of efficient money and foreign exchange markets.

Second, to the extent that the capital account liberalization encourages the return of flight capital and eliminates impediments to inflows of foreign investment, the capital account liberalization can help support the balance of payments during the period of domestic financial sector liberalization thereby helping to achieve macroeconomic stabilization. A concern about the liberalization of the domestic financial system is that the elimination of administrative controls on credit often results in an initial rapid credit expansion which tends to weaken the balance of payments. <sup>1/</sup> Therefore, sequencing the liberalization of the capital account to coincide with the elimination of credit ceilings may help provide the necessary external support to allow for a more rapid lifting of the credit ceilings as part of a comprehensive adjustment program.

Third, the sequencing needs to recognize that many developing countries and the transition economies already have a de facto high degree of currency convertibility. Where this has not been provided for through official channels, it has occurred through unofficial ones. The openness of these economies means that even small changes in the invoicing or timing of exports and imports can result in movements of foreign exchange which are large relative to GDP. <sup>2/</sup> The maintenance of the controls in these circumstances serves mainly to result in pronounced balance of payments statistical discrepancies which complicate the interpretation of underlying economic trends, and obscures the interrelationships between the domestic and external financial conditions.

Fourth, the preconditions for capital account liberalization do not seem more onerous than those for domestic financial sector liberalization, therefore, allowing it to occur simultaneously with domestic financial sector reforms. Direct controls on interest rates and credits would have to be replaced by indirect controls primarily because of the scope for the avoidance of the direct controls through capital movements. Hence, the

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<sup>1/</sup> When domestic credit controls are lifted there is an initial tendency for bank credit to grow more rapidly than deposits increasing domestic resource pressure as banks run down holdings of excess liquidity. For a discussion of the domestic resource consequences of financial sector liberalization, see Johnston (1991) and Bisat, Johnston, and Sundararajan (1992).

<sup>2/</sup> For a discussion see Fisher and Reisen (1992).

adoption of indirect monetary controls should either precede or occur simultaneously with the liberalization of the capital account. There are good reasons anyway for sequencing these reforms early in the process of domestic financial sector liberalization. <sup>1/</sup> Interest rates would also need to be adjusted to market levels as part of domestic financial liberalization, and external liberalization may, therefore, have little additional impact on interest rate policy, especially given the scope for avoidance of the controls on capital movements. Similarly, financial institutions would need to be strengthened, institutions restructured and prudential controls enforced as part of the process of domestic financial reform.

There are, nevertheless, potential risks for the capital account from an inappropriate sequencing of the reforms of the domestic financial system. A continued reliance on credit controls or high non-interest-bearing reserve requirements for monetary control purposes rather than indirect instruments, and failure to address sufficiently inefficiencies in the domestic financial system which result in wide spreads between deposit and lending rates, may encourage borrowing abroad rather than domestically. Inappropriate incentives for foreign borrowing may also be provided by the tax system, leading to an overvalued exchange rate and excessive external debt burden. Therefore, it would be desirable to eliminate, as far as possible, the institutional and regulatory incentives to borrow excessively from abroad, or which might encourage a capital outflow, in designing the reforms of the domestic financial systems.

## VI. Conclusions

The main conclusions from the econometric research reported in this paper are that:

- capital controls operated by developing countries have not been effective in insulating these countries' balance of payments; and

- capital controls operated by industrial countries significantly affected the structure of their capital flows, and appear to have done so mainly by inhibiting net foreign direct and portfolio investment outflows.

These results are consistent with other observations, specifically:

- the absence of evidence that capital controls insulate countries' interest rates and exchange rates from monetary developments, or the consequences of national economic policies;

- the significant capital flight from developing countries; and

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<sup>1/</sup> See Bisat, Johnston, and Sundararajan (ibid).



-- larger direct and portfolio investment outflows from industrial countries following liberalization of their capital accounts.

The increasing body of evidence on the ineffectiveness of capital controls in developing countries raises important questions on whether these countries should continue with these controls or eliminate them rapidly. The results of this research suggest that capital controls provide little balance of payments benefit to developing countries, while the circumvention of capital controls complicates macroeconomic management by distorting statistical reports. Moreover, there is some evidence that liberalizations of capital controls can increase measured net capital inflows. This argues for developing countries to proceed more rapidly with liberalizations of their capital accounts.

External liberalizations can be mutually supporting of domestic financial reforms both in terms of institutional and market development and macroeconomic flows. However, the sequencing of domestic financial liberalization should avoid the creation of inappropriate incentives for foreign borrowing.

The results of the research also suggest that capital controls did not help countries protect their balance of payments against short-term capital flows, but that such controls may have inhibited capital flows which were long-term in nature.

Misinvoicing

The IFS Yearbook on Direction of Trade Statistics (DOTS) contains data for nearly all member countries. For any one country, the data in Part A represent the exports (Xa) and imports (Ma) of other countries to and from that country, as reported by the other countries in total. The data in Part B represent the exports (Xb) and imports (Mb) of each country as reported by the country itself.

For a particular country,  $(Xb - Ma)$  is the difference between what that country has recorded as its exports to the rest of the world and what the rest of the world has recorded as its imports from that country. A positive difference suggests that either domestic exporters have overstated their export receipts or that the rest of the world has understated imports payments to that country. Assuming only the former has occurred implies there have been disguised capital inflows to that country.  $(Mb - Xa)$  is the difference between what that country says it imports from the rest of the world and what the rest of the world says it exports to that particular country. A positive difference suggests that either domestic importers have overstated their imports or that the rest of the world has understated their exports to that country. Again, it is assumed that only the former has occurred and there have been disguised capital outflows. Hence,  $(Xb - Ma) - (Mb - Xa)$  is assumed to measure the contribution of misinvoicing to actual net capital inflows for a particular country.

Exports data are reported in DOTS on an f.o.b. basis while the imports data are reported on a c.i.f. basis. To bring the import and export data to the same basis for comparison, the imports data have been converted to a f.o.b. basis using either (1) the ratio of IFS data for imports on an f.o.b. and c.i.f. basis, or (2) where IFS does not contain data for both measures, an assumption that freight and insurance have added 10 percent to the f.o.b. cost.

One problem with this approach is that misinvoicing, particularly of imports, reflects avoidance of regulations concerning trade, as well as capital transactions. Hence, disguised outflows of capital, as estimated by an excess of Mb over Xa, could be understated because of offsetting instances of understating of imports so as to avoid tariffs/taxes. Indeed, a negative difference probably reflects the latter more than disguised inflows of capital.

A second problem with this approach is that misinvoicing by one country will also be interpreted as misinvoicing by its trading partners. To see this, suppose country i records its exports to country j as US\$1.0 million but country j accurately records them as US\$0.8 million. The calculation of misinvoicing will indicate, appropriately, that country i has overstated its exports by US\$0.2 million, and also, inappropriately, that country j has understated its imports by US\$0.2 million. Consequently, the estimate of unrecorded capital inflow in the two countries combined will be double the

true amount. In terms of the expression  $(X_b - M_a) - (M_b - X_a)$ , the problem is that the data  $M_a$ ,  $X_a$  are assumed to be correct, whereas they contain incorrect data in every instance where the counterpart misinvoiced.

To see that global estimated misinvoicing ( $MIS^E$ ) is double global true misinvoicing ( $MIS^T$ ), let:

$X_i^R$ ,  $M_i^R$  denote the exports and imports of country  $i$  as recorded by country  $i$ ;  $X_{ij}^R$ ,  $M_{ij}^R$  denote the exports to, and imports from, country  $i$  as recorded by country  $j$

$$MIS_i^E = (X_i^R - \sum_j M_{ij}^R) - (M_i^R - \sum_j X_{ij}^R)$$

(Since  $M_{ii} = X_{ii} = 0$  implies one can sum over all  $j$  rather than  $j \neq i$ )

$$= (X_i^R - M_i^R) + (\sum_j X_{ij}^R - \sum_j M_{ij}^R)$$

$$\therefore \sum_i MIS_i^E = \sum_i (X_i^R - M_i^R) + \sum_i \sum_j (X_{ij}^R - M_{ij}^R)$$

$$= \sum_i (X_i^R - M_i^R) + \sum_j (X_j^R - M_j^R)$$

$$= 2 \sum_i (X_i^R - M_i^R)$$

$$= 2 \left\{ \sum_i (X_i^T - M_i^T) + \sum_i [(X_i^R - X_i^T) - (M_i^R - M_i^T)] \right\}$$

But  $\sum_i (X_i^T - M_i^T) = 0$  since total, true (f.o.b.) exports = total true (f.o.b.) imports

$$\therefore \sum_i MIS_i^E = 2 \sum_i [(X_i^R - X_i^T) - (M_i^R - M_i^T)]$$

$$= 2 \sum_i MIS_i^T$$

Under the assumption that industrial countries correctly report trade data and that developing countries' trade is predominantly with industrial countries, the estimate of misinvoicing for developing countries will be a reasonable measure of unrecorded capital flows to and from developing countries, and this estimate is included in the measures of net capital flows investigated for developing countries.

Nonetheless, it appears that industrial countries may not be entirely accurate in correctly distinguishing between their smaller trading partners. Hence, the results for developing countries need to be interpreted with some caution. No estimates of misinvoicing have been examined in the case of the industrial countries, since, under the above assumption, they would not add information on the net capital movements of the industrial countries. True misinvoicing by industrial countries is in any case likely to be small relative to recorded flows.

Data and Sources

Frequency: Annual  
Period: 1985-92  
Units: Monetary units are millions of U.S. dollars  
Sample size: 52 countries

Sources:

International Financial Statistics (IFS)  
Direction of Trade Statistics (DOT)  
World Economic Outlook (WEO)

List of Variables:

Domestic income: Gross Domestic Product; WEO.

Domestic interest rate: Money market rate; IFS line 60b, or treasury bill rate (60c), or deposit rate (60l), or lending rate (60p), or WEO short-term interest rate.

Foreign interest rate: Eurodollar rate in London; IFS line 60d.

Domestic inflation: Percentage change in consumer price index; WEO.

Foreign inflation: Percentage change in consumer price index for United States.

Budget surplus: WEO.

Dummies for capital controls: Exchange Arrangements and Exchange Restrictions: Annual Reports 1989-93 and various OECD publications.

Direct investment: IFS line 77bad.

Portfolio investment: IFS line 77bbd.

Other private investment: IFS line 77g.d minus line 77gad.

Net errors and omissions: IFS line 77e.d.

Exports as recorded by own country: DOTS Exports, Part B.

Exports as recorded  
by rest of world: DOTS Exports, Part A.

Imports as recorded  
by own country: DOTS Imports, Part B.

Imports as recorded  
by rest of world: DOTS Imports, Part A.

Imports f.o.b.  
and c.i.f.: IFS lines 71.v, 71.vd and lines 71, 71.d,  
respectively.

List of Countries:

Industrial

Australia  
Austria  
Belgium-Luxembourg  
Canada  
Denmark  
Finland  
France  
Germany  
Greece  
Iceland  
Ireland  
Italy  
Japan  
Netherlands  
New Zealand  
Norway  
Portugal  
Spain  
Sweden  
Switzerland  
Turkey  
United Kingdom

Developing

Argentina  
Bolivia  
Brazil  
Chile  
China  
Colombia  
Czechoslovakia  
Ecuador  
Egypt  
El Salvador  
Gabon  
Honduras  
Hungary  
Indonesia  
Jamaica  
Malawi  
Malaysia  
Mexico  
Morocco  
Nigeria  
Paraguay  
Peru  
Philippines  
Poland  
Romania  
Singapore  
Thailand  
Trinidad & Tobago  
Uruguay  
Venezuela

Notes:

In the case of Belgium-Luxembourg, missing values were replaced by data for Belgium.

Classifying Controls on Capital Movements

Capital controls may take the form of either exchange controls or controls that are applied to the underlying capital transaction. Since the Fund's jurisdiction does not extend to capital movements, it generally has not focused on this distinction with regard to capital transactions. (Moreover, the Fund has not set out any standards by which to judge the degree of convertibility of members' currencies with regard to capital movements.) Nonetheless, the criteria applied by the Fund in its assessment of the current account convertibility of members' currencies provide a possible framework for the assessment of capital account convertibility.

The convertibility of members' currencies for current international transactions requires the absence of restrictions and multiple currency practices with respect to payments and transfers for current international transactions. Extending this to capital transactions, the approach which could be applied in assessing currency convertibility for capital movements is the absence of restrictions or multiple currency practices with respect to payments and transfers for the purposes of international capital transactions. Under this approach, the following could be considered as exchange restrictions that apply to capital movements and which would give rise to capital account inconvertibility, or discriminatory currency practices as related to capital transfers:

- (1) Specific restrictions or requirements for approval to purchase foreign exchange for the purpose of acquiring assets abroad;
- (2) Limits on the amount of foreign exchange that can be transferred for the purposes of investment abroad;
- (3) Requirements, authorizations or restrictions on the repatriation of capital or foreign exchange holdings; and
- (4) Multiple currency practices that apply to the purchase or surrender of foreign exchange related to capital transfers.

The information provided in the Fund's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)--which is the only ongoing, comprehensive source of information available to address this question for all Fund members--makes it easy to identify arrangements of type (3) and, to an arguably lesser extent, type (4). <sup>1/</sup> Also, any use of "bona fide" tests of the validity of current payments and transfers is usually identified in the AREAER and is a reliable indication that restrictions/limits of types (1) and (2) exist. Moreover, the AREAER identifies any restrictions on remittances of income and dividends, which almost certainly imply there are also restrictions on the remittance of capital. Hence, it

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<sup>1/</sup> Multiple currency practices specific to capital transactions appear to be relatively uncommon.

is possible in most cases to identify the above four categories of inconvertibility. Usually, but not always, controls on capital outflows fall within these categories, and hence, can be said to take the form of exchange controls limiting access to, or the rights to transfer, foreign exchange for the purpose of acquiring or holding assets abroad.

Concerning inflows, controls on direct investment for example are usually in the form of authorizations, limits, or complete prohibition on the share of foreign participation in all or some sectors of the economy, and--to a lesser extent--restrictions on investors of certain nationalities. But these controls usually do not involve a restriction on the access to foreign exchange per se and hence are not connected here as giving rise to capital inconvertibility. In general, controls on capital inflows take the form of controls on the underlying capital transaction. Prudential limits on banks' open foreign exchange position are usually not intended to interfere with banks' freedom to buy and sell foreign exchange or to transfer it abroad or to acquire foreign assets and thus are not considered here as giving rise to inconvertibility of the capital account.



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