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International Capital Flows

Do Short-Term Investment and Direct Investment Differ?

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Empirical support for the conventional notion that short-term investment is "hot money" and direct investment is not: short-term investment appears to respond more dramatically to disturbances in other capital flows and in other countries than does direct investment.

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Summary findings

Chuhan, Perez-Quiros, and Popper examine the behavior of four major components of international capital flows in 15 developing and industrial countries.

Striking differences in the behavior of the component flows arise in general specifications that allow the flows to interact. For example, in each country, the behavior of international short-term investment appears to be sensitive to changes in all the other types of international capital flows, including direct investment, but direct investment appears to be insensitive to such changes.

Among the links across countries, there is further evidence that short-term investment is more sensitive than direct investment. A particularly telling example is found in the response to sudden changes in capital flows to Mexico. A disturbance in Mexican short-term investment appears to be transmitted quickly to the other Latin American countries studied. But there appears to be little response by those countries to a similar change in direct investment. This implies that only short-term investment suffers much from the "tequila hangover."

In finding that short-term investment appears to respond more dramatically to disturbances in other capital flows and in other countries than does direct investment, the authors provide empirical support for the conventional notion that short-term investment is "hot money" and direct investment is not.

This paper — a product of the Development Data Group and the International Finance Division, International Economics Department — is part of a larger effort in the department to study the determinants of capital flows to developing countries. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Tony Nadora, room N2-032, telephone 202-473-3925, fax 202-522-3278, Internet address anadora@worldbank.org. October 1996. (27 pages)

International Capital Flows: Do Short-Term Investment and Direct Investment Differ?

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International Capital Flows: Do Short-Term Investment and Direct Investment Differ?[1]

1. Introduction

The recent, striking changes in the magnitude and direction of international capital flows have been accompanied by equally remarkable changes in the composition of those flows. The importance of those compositional changes ultimately depends on how different the component flows are from one another. This paper examines the behavior of the major components and evaluates the extent of their differences.

The international balance of payments statistics divide international capital flows into four main categories: short-term investment, long-term investment, portfolio investment, and direct investment. Some of these categories are said to be more volatile than others. For example, international short-term investment (STI) often is called "hot money." Extensive reliance on such "hot money" occasionally prompts fears of sudden and destabilizing reversals of capital flows, particularly in developing countries.[2] In contrast, foreign direct investment (DI) often is presumed to represent a more stable flow of capital, one that somehow is linked more closely to the permanence of physical capital. Yet, in principle, the various categories of capital flows merely represent alternative forms of financing of the same underlying economic activity. That the major categories of capital flows represent substitutable forms of financing suggests that they might not behave so differently from one another after all.

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[1]The authors would like to thank Stijn Claessens, Eduardo Fernandez-Arias, Leonardo Hernandez, and Nlandu Mamingi for helpful discussions. This paper was prepared for the International Economics Department (IEC) of the World Bank.

[2]For recent discussions of the prospects for a sudden reversal of capital flows, see: Fernandez-Arias and Montiel (1995), and Hernandez and Rudolph (1995).

With complete capital markets, the differences would be of little importance since the various forms of financing could be exchanged easily for one another. However, it is unclear whether or not capital markets are presently liquid enough for substitution across these assets, which represent very dissimilar sets of claims. On one hand, capital markets are by and large now better developed than they have ever been. Many assets have become tradeable in a broad range of markets. As a result, distinctions based on the terms of the instruments comprising each category of capital flow may have become less meaningful. On the other hand, imperfections exist in even the most well-developed financial markets, let alone the rudimentary financial markets of many developing countries.[3] Heterogeneous information, institutional constraints, and distortions all impede substitution across the categories of flows.[4] Consequently, the various flows may differ in their effects on the ultimate costs and risks associated with external finance.[5,6]

Until now, economists have provided little empirical support for the common perception that the composition of international capital flows does matter. On the contrary, the limited empirical evidence extant seems to support the view that the flows are essentially the same. Specifically, Claessens, Dooley and Warner (CDW, 1993) find numerous similarities in the univariate behavior of the various types of capital flows. In this paper, we also note some univariate similarities. However, we find important

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[3]Perfect substitutability is rejected routinely even for assets that differ in only a single dimension, such as the currency of denomination or maturity. For example, uncovered interest parity and the term structure hypothesis typically are rejected even within the Euromarket.

[4]Calvo (1995) discusses many of these imperfections in the context of capital market crises. Fernandez-Arias and Montiel (1995) catalogue the many distortions affecting financial markets.

[5]For example, in countries with a "debt overhang," the difficulty of constraining new funds to be used for investment rather than consumption may inhibit their provision. DI may provide a measure of control over the use of funds for investment. If so, then DI differs substantively from other forms of flows.

[6]These differences also are linked to the role of the adding up constraint of the balance of payments. As long as the capital flow category itself does not influence domestic saving or investment, a change in one flow must be accompanied by an offsetting change in the remaining flows. However, if the form of the flow can affect investment, the adding up constraint no longer implies such substitution among flows.

differences when we study the interactions among the various flows. By studying the interactions among flows, we are able to examine whether the behavior of one flow, such as DI, seems to govern the behavior of another, such as STI. If one flow responds to another, the two might appear superficially similar, even when they are fundamentally different. Indeed, we find that this is the case for our sample of industrialized and developing countries. We first confirm the earlier results that the types of flows we investigate appear to behave somewhat similarly when investigated individually. Yet, we do not affirm the interpretation that the flows are essentially the same. Instead, we find that STI appears to be sensitive to changes in all the other types of capital flows, including DI, but that DI does not. This suggests that, despite the univariate similarities of the two flows, DI might play a more prominent role in the determination of subsequent capital flows.

We also examine the links across countries for each type of flow. Again, we find evidence that STI is more responsive to changes than is DI. Disturbances in STI appear to be transmitted across countries much more so than do disturbances in DI. A particularly telling example is found in the response to sudden changes in capital flows to Mexico. A disturbance in Mexican STI is followed closely by similar changes in the STI of the other Latin American countries that we study (Argentina and Brazil). However, there is no significant response in the DI of those countries to a similar change in Mexican DI. This implies that only STI suffers much from the so-called "Tequila Hangover."

These results strongly suggest that the composition of capital flows does matter. The similarities among the univariate properties of the flows mask some important underlying differences. The evidence that STI responds more dramatically to disturbances in other capital flows and in other countries than does DI, provides support for the conventional wisdom that STI is "hot money" and DI is not. DI indeed may be a more reliable source of external financing than the other types of capital flows.

The next section of the paper discusses several aspects of the data we examine, including the level of disaggregation of the flows. The subsequent sections of the paper describe some of the similarities and differences we observe among the capital flow categories. Section 3 focuses on the relationships between flows within a country, while Section 4 examines the links across countries. Section 5 provides some concluding remarks.

2. Categories of Capital Flows

Capital flows can be categorized in various ways. In this paper, we focus most closely on the categories of DI and STI, but we also examine two other broad categories of foreign capital flows: portfolio investment (PI) and other long-term investment (LTI).[7] All data come from the International Monetary Fund's Balance of Payments Statistics Yearbook, and Appendix A contains detailed descriptions of the construction of each category. The DI category is intended to include those capital transactions in which a foreign enterprise and a local one have a direct relationship; and it includes some equity investment, reinvested earnings, and intracompany debt. PI represents other corporate equities and bonds. LTI includes other public and private sector debt securities, trade credits, loans, deposits, and other assets with maturities of one year or more. Changes in investment in assets with maturities of under one year are captured under STI.[8]

[7]While the focus here is on categories that are defined by their intended function and by the instrument that is traded, others have segregated capital flows on the basis of the type of transactor involved. We refrain from that additional disaggregation in order to emphasize the hot/cold distinctions discussed in the introduction and because transactor reporting is said to be less reliable.

[8]Although the latest IMF Balance of Payments Manual has broadened the coverage of portfolio debt securities to include both long-term and short-term securities, this modification has not been reflected in the individual countries' balance of payments data, so we retain the classification of portfolio debt securities by maturity.

We examine quarterly net flows of these categories in fifteen countries for which such data have been consistently reported. The countries include: the Group of Seven (G-7) industrialized countries -- Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States; two emerging market countries in Europe -- Greece and Portugal; three developing Asian countries -- Indonesia, Korea, and Pakistan; and three developing Latin American countries -- Argentina, Brazil, and Mexico. The sample period we examine extends from 1985 to 1994. While a longer series of recorded flows is available for many of these countries, we restrict our attention to the recent period because of how the widespread financial liberalization of the mid-eighties has changed the behavior of the flows. In earlier periods, the categories sometimes differed markedly from one another solely because of extremely rigid controls. Were we to include that earlier period, we would swamp their recent behavior with the pronounced distinctions that were relevant solely before financial liberalization. Thus, we would reject out of hand the possibility that the various capital flows are now actually the same.

As is well known, integration of the financial markets of the G-7 accelerated in the mid-eighties. Withholding taxes on interest payments to nonresidents were abolished in the United States in 1984, making foreign holdings of U.S. bonds suddenly more attractive. Soon after, France, Germany, and the United Kingdom also abolished withholding taxes and otherwise liberalized their markets.[9] In keeping with its new membership in the European Exchange Rate Mechanism, Portugal also adopted open capital markets. In Japan, an important financial liberalization package, introduced in 1984, brought about the development of new domestic and offshore money markets in subsequent years.[10] Financial liberalization was less synchronized and often less sweeping

[9]In 1985 and 1986, Germany removed restrictions on the form of foreign borrowing in German markets; France lifted its restriction that French residents only purchase foreign assets from other French residents; and the United Kingdom liberalized its security markets with it's "Big Bang."

[10]New short-term markets included the uncollateralized call money market in 1985, the treasury bill market in 1986, and the commercial paper market and the Tokyo offshore money market in 1987. Over the same period, foreign companies were allowed to begin Japanese banking and securities operations.

in the other countries. Although much financial liberalization also occurred in the mid-eighties, it came somewhat later to many Latin American countries and somewhat less uniformly to Asian countries.[11] We choose 1985 as a starting point in order for the sample period to be reasonably representative of the modern post-liberalization age for most of the countries we study.

For the G7 countries, recent capital outflows in the form of DI have been quite large, making up the bulk of their capital outflows. The non-G7 countries included in our sample have been net recipients of international capital flows; and, throughout the sample period, DI has made up a substantial portion of their net inflows. The composition of flows during this period contrasts sharply with the composition observed before the last debt crisis. At that time, most of the international flows to the non-G7 countries took the form of debt; and equity flows, whether through DI or otherwise, were relatively unimportant.[12]

3. Intra-Country Evidence: Some Similarities and Differences among Capital Flows

In this section, we first examine individually the capital flows of the four categories. Some similarities in the univariate characteristics of the four flows seem to emerge. We then examine whether the apparent similarities among the flows persist in a more general specification that allows the different categories of flows to influence one

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Shingehara (1990) provides a succinct summary of these and other Japanese financial market liberalizations occurring in the eighties.

[11]For example, Mexico liberalized many markets in its 1987 *pacto*. As Thorbecke (1992) describes, Indonesia substantially liberalized its treatment of both domestic and foreign capital in 1983, but trade restrictions were not eased until later in the decade. Korea introduced some liberalization measures in 1982 and 1984; and a few years later, interest rate decontrol was accelerated, and a new schedule for liberalization was inaugurated (though some restrictions on ownership remain). Frankel (1991) provides a detailed discussion of the Korean liberalization.

[12]Fernandez-Arias and Montiel (1995) describe the changes in asset composition in more detail.

another. We find that they do not: the similarities apparent in the univariate context break down in the more general framework.

We begin the univariate analysis by examining the stationarity of the capital flow series. We are interested in the stationarity of the series both because stationarity could have its own substantive implications regarding the controversy at hand and because it has technical implications for the remaining work in this study. A finding that the series differ in terms of their stationarity might provide some initial support for the conventional notion that STI and DI are different. Alternatively, a finding that they are similar in terms of their stationarity would better support the notion of their substitutability. We also examine their stationarity because it could have implications for the proper treatment of the series in the remaining work.

Table 1 and Table 2 summarize the stationarity tests. The tables provide augmented Dicky-Fuller unit root test statistics, where the lag length for the tests of each series is chosen through sequential testing beginning with eight lags. Table 1 gives the statistics for the G-7 countries. As shown in the table, the statistics are large enough that we are able to reject nonstationarity in all but seven cases. Of these non-rejections, two are found in each of LTI, PI, and DI, while one is found in STI. These results by themselves are not suggestive of important differences in the persistence of the flows in the various categories. Table 2 presents the results for the non-G7 countries, for which we examine only STI and DI. For many of these countries, the other two categories (LTI and PI) are affected intermittently by debt negotiations and restructuring. Sometimes the effects are substantial. Rather than attempting to alter the series to account for those changes, we focus on the categories of most interest, STI and DI, which typically are affected less by such events. As the table shows, we fail to reject nonstationarity among these flows in only two of the possible cases. Both of the failures to reject occur for DI.[13]

[13]This might be considered to provide weak support for one interpretation of conventional wisdom, namely, that inflows (or outflows) in DI are more permanent than inflows (or outflows) of STI.

Overall, whether for G7 countries or non-G7 countries, there are few differences between the series in terms of their stationarity; and, while there are clearly some exceptions, the assumption of stationarity best characterizes the flows of both groups of countries.[14]

[14]The most notable exceptions occur in Japan, which accounts for one-third of the (G7 and non-G7) failures to reject non-stationarity.

TABLE 1
TESTS OF NON-STATIONARITY
G7 COUNTRIES

	STI	LTI	PI	DI
Canada	-7.51*	-6.33*	-6.83*	-8.63*
France	-5.02*	-3.05*	-2.55	-3.86*
Germany	-4.99*	-3.51*	-3.87*	-5.50*
Italy	-2.87*	-2.10	-3.07*	-5.95*
Japan	-4.01*	-1.52	-2.51	-1.57
United Kingdom	-7.11*	-4.94*	-5.17*	-3.71*
United States	-2.10	-4.87*	-2.03	-1.98

Notes: This table reports the augmented Dickey-Fuller test statistics. The lag length for the test of each series is chosen through sequential testing. An asterisk denotes a test statistic that is significant at the 5 percent critical level.

TABLE 2
TESTS OF NON-STATIONARITY
NON-G7 COUNTRIES

	STI	DI
Southern Europe		
Greece	-6.21*	-1.51
Portugal	-5.84*	-2.96*
Asia		
Indonesia	-3.83*	-1.20
Korea	-5.31*	-3.43*
Pakistan	-5.52*	2.84*
Latin America		
Argentina	-5.97*	-5.52*
Brazil	-5.34*	-2.80*
Mexico	-5.73*	-4.18*

Notes: See Table 1.

The persistence of the various flows can also be examined univariately using simple autoregressive models. To do this, we estimate for each type of flow an autoregressive model with four lags; then, we examine the response implied by the estimated autoregressive model to a disturbance in each flow.[15] Conventional wisdom would suggest that the cumulative responses would differ across the flows and that it would be greatest for DI. Table 3 and Table 4 report the cumulative one-year response to a one-dollar disturbance for each flow. Table 3 reports these responses for each of the four flows in the G7 countries. As the table shows, there is no clear pattern distinguishing one flow from another in the G7 countries. Table 4 shows cumulative effects of the STI and DI categories in the non-G7 countries. In all of these countries, changes in DI seem to have a more lasting effect than do changes in STI. Thus, the non-G7 countries provide some univariate support for the conventional wisdom.

The stationarity tests and the autoregressions both address the issue of persistence in a univariate framework. In most cases, the observed differences in persistence among the flows are not striking. The only exception is the finding among the non-G7 countries that changes in DI seem to have a more lasting effect when modeled as an AR process.

[15]We choose a lag length of four (which captures any seasonal variation) to be consistent with CDW, who also study the flows using a autoregressive model.

TABLE 3

CUMULATIVE EFFECT OF A $1 DISTURBANCE AFTER ONE YEAR
G7 COUNTRIES

	STI	LTI	PI	DI
Canada	-0.05	-0.03	-0.37	-0.51
France	0.21	0.76	1.56	0.34
Germany	0.08	0.76	0.71	0.12
Italy	0.55	0.98	0.49	0.28
Japan	0.74	1.82	0.59	3.09
United Kingdom	-0.20	-0.36	-0.08	0.55
United States	0.98	0.51	0.73	0.97

Notes: This table reports the predicted, cumulative, one-year effect of a one dollar disturbance to each flow based on an estimated AR(4) for each flow.

TABLE 4

CUMULATIVE EFFECT OF A $1 DISTURBANCE
AFTER ONE YEAR
NON-G7 COUNTRIES

	STI	DI
Southern Europe		
Greece	-0.20	1.93
Portugal	-0.14	1.21
Asia		
Indonesia	1.01	1.37
Korea	0.00	1.07
Pakistan	-0.20	0.87
Latin America		
Argentina	-0.49	1.09
Brazil	0.62	1.15
Mexico	0.29	0.97

Notes: See Table 3.

Other univariate measures expose few substantial differences among the flows.[16] Are these and earlier univariate results enough to establish the essential similarity of the flows? We argue that they are not. Similar univariate patterns among series can mask substantive differences between them. This is a well-known empirical problem. Below, we briefly discuss the general problem. Then, we examine the role it plays in the behavior of capital flows.

Consider an example in which one variable, y, influences its own future and that of another variable, x, but not vice versa. That is:

$$y_t = \beta_y y_{t-1} + \varepsilon_{y,t} \quad (1)$$

$$x_t = \beta_x y_{t-1} + \varepsilon_{x,t}, \quad (2)$$

where t denotes the time period; $\varepsilon_{y,t}$ and $\varepsilon_{x,t}$ are independently distributed random variables; and, β_y and β_x are constants. The variables y and x will have very similar univariate properties in terms of persistence. However, y_t clearly has more impact on the future than does x_t. The effect of an unexpected disturbance in y_t would persist through its effects both on its own future and on that of x. In contrast, an unexpected disturbance in x_t would not affect the future. One series has a lasting effect, while the other does not, a fact not likely to be revealed in a univariate study.

To examine the possibility that these differences may exist among capital flows, we first examine the flows in pairs. For each pair of variables, we test for Granger causality between them. Table 5 and Table 6 report all cases for which we can reject at the 5

[16]CDW present several related tests with the same result. We also used the alternative R^2 test that was employed by CDW. As one might expect, the results are essentially the same since the R^2 of a univariate regression depends on the degree of persistence.

percent level the hypothesis of no Granger causality from one flow to another using four lags.[17] As shown in Table 5, we find evidence suggesting that STI is Granger caused by at least one other flow in all the G7 countries except Canada. In contrast, there is no evidence that DI is Granger caused by another flow in any country except Japan and the United States; moreover, in Japan, the evidence of Granger causality is countered by the findings of Granger causality running in the opposite direction.[18] Table 6 provides the test statistics for the non-G7 countries. (As before, we examine only STI and DI for these countries.) As the table shows, we strongly reject the hypothesis of no Granger causality from DI to STI for Argentina and for Portugal, while we reject the reverse only for Pakistan. Thus, among both the G7 countries and the non-G7 countries, the results of these Granger causality tests suggest that STI follows other flows, while DI does not.

We next use a vector autoregression (VAR) to examine the relationships among all the flows within a country. For each G7 country, we estimate two separate VARs structured to focus on the distinctions between STI and DI. Each VAR has four equations, one for each type of flow, and four lags of each. The equations express each flow in terms of its own past values and those of the other flows. The two estimated VARs differ only in terms of their attribution of contemporaneous explanations: one VAR allows STI to depend contemporaneously on the other flows, while the other allows DI to depend contemporaneously on the other flows. That is, the two VARs differ only in terms

[17]The Akaike information criterion is maximized for the fourth lag in more cases than for any other lag. So, for consistency, we report the results for four lags for each country. However, the results found using the optimal (Akaike) number of lags do not differ qualitatively.

[18]At the 10 percent confidence level, we can reject the hypotheses of no Granger causality from Japanese DI to all other Japanese flows.

TABLE 5
GRANGER CAUSALITY AMONG FLOWS IN EACH COUNTRY
G7 COUNTRIES

Country	Direction	Significance Level
Canada	none	n.a.
France	STI to LTI	0.00
	PI to LTI	0.07
	DI to STI	0.04
Germany	DI to STI	0.05
	to PI	0.01
Italy	LTI to STI	0.04
Japan	LTI to STI	0.03
	to DI	0.03
	DI to STI	0.01
	to LTI	0.06
	to PI	0.01
United Kingdom	STI to PI	0.03
	LTI to STI	0.01
	to PI	0.02
	PI to LTI	0.03
United States	PI to DI	0.03
	DI to STI	0.02

Note: Reported are the joint significance, when less than 0.10.

TABLE 6

GRANGER CAUSALITY AMONG FLOWS IN EACH COUNTRY
NON-G7 COUNTRIES

Country	Direction	Significance Level
Southern Europe		
Greece	none	n.a.
Portugal	DI to STI	0.00
Asia		
Indonesia	none	n.a.
Korea	none	n.a.
Pakistan	STI to DI	0.05
Latin America		
Argentina	DI to STI	0.00
Brazil	none	n.a.
Mexico	none	n.a.

Notes: See Table 5.

of their ordering. One puts STI last, while the other puts DI last. In this way, we can examine how much of the explained variance in STI and in DI can be attributed to the contemporaneous changes in the other flows.

Summary statistics from the two VARs are given in Table 7 for each G7 country.

Table 7

VAR Estimation of Capital Flows
Under Alternative Orderings of STI and DI

G7 Countries

	STI Last		DI Last	
	R^2	Explained by Contemporary non-STI Flows	R^2	Explained by Contemporary non-DI Flows
	(1)	(2)	(3)	(4)
Canada	0.52	0.37	0.57	0.09
France	0.63	0.66	0.51	0.31
Germany	0.52	0.42	0.35	0.27
Italy	0.68	0.70	0.37	0.04
Japan	0.73	0.86	0.90	0.12
United Kingdom	0.53	0.62	0.41	0.19
United States	0.52	0.34	0.65	0.15

Notes: This table reports statistics based on four-equation VARs formed using four lags of all four capital flows in each equation. Columns 1 and 2 report statistics from the VAR in which STI is ordered last: Columns 1 reports the R^2 from the equation explaining STI, and Column 2 reports the percentage of the variance of the residual in that equation that can be explained by its contemporaneous covariance with the remaining VAR residuals. Columns 3 and 4 report comparable statistics from the VAR in which DI is ordered last.

We do not examine comparable statistics for the non-G7 countries since the exclusion of LTI and PI flows renders this test much the same as the bivariate tests reported in Table 7. The first two columns of Table 7 describe the VAR in which STI is

last. Column 1 gives the R^2 of the VAR equation describing STI. Column 2 gives the percent of the explained variance of STI that can be attributed to contemporaneous changes in the other flows. A comparison of Column 2 and Column 4 illustrates the differences between STI and DI most clearly. As shown in Column 2, the explained variance of STI appears to be largely attributable to contemporaneous changes in the other flows; while, as shown in Column 4, that of DI does not.[19] Contemporaneous changes in the other flows account for half to almost three-quarters of the explained variance of STI. Such changes in other flows account for only one-tenth to one-third of the explained variance of DI. These results confirm those of Table 5 and Table 6 -- among the capital flows, DI seems to influence the others, while STI seems to be influenced by them.

In terms of Equations 1 and 2, DI seems to correspond most closely to the variable y, while STI seems to correspond more closely to the variable x. That is, the multivariate results suggest that the univariate similarities mask important differences among the flows. Alone, the univariate results seem to provide some support for the notion that the categories of capital flows were substitutable and that their distinctions were possibly irrelevant. In light of the multivariate results, that support loses ground. Instead, the evidence reinforces the conventional wisdom that the composition of the flows matters.

4. Cross-Country Evidence: Is There a Tequila Hangover?

In this section, we focus on STI and DI, and we examine the cross-country relationships between these flows. If the categories are irrelevant, disturbances in STI and

[19]We find similar results for past flows. The explained variance of DI can be largely attributed to its own past, while the explained variance of STI can be attributed to changes in the other flows.

in DI should be transmitted internationally with equal ease. This would imply correspondingly that the two series should be equally sensitive to changes in their values abroad. On the other hand, conventional wisdom that STI is "hot money," while DI is not suggests that STI should be more responsive to fluctuations abroad than should DI.

We examine the international relationships bilaterally. We estimate the sensitivity of each flow to fluctuations in the same flow of another country. The "hot money" notion implies that STI should be more sensitive than should DI to activity abroad. That is, we should find Granger causality more often from the foreign STI to the domestic STI, and the foreign flows should account for more of the explained variance of STI than of DI. In contrast, if the categories are irrelevant, the differences in the findings should be small. Table 8 and Table 9 present the country pairs for which we could reject at the 10 percent level the hypothesis that there is no Granger causality from the foreign flow to the domestic flow. Column 1 of each table gives the significance level of the rejection, and Column 2 gives the fraction of the explained variance in the flow that is attributable to changes in the foreign flow. As shown in Table 8, we find evidence of Granger causality from foreign STI to domestic STI in twelve of the possible cases -- a rejection rate of about 30 percent at the 10 percent confidence level. For DI, we find evidence of Granger causality in only six cases, which is about 14 percent of the total. The proportion of the explained variance attributable to foreign flows also differs markedly between STI and DI for the G7 countries. For STI, the portion attributable to foreign flows ranges from

Table 8

Sensitivity of STI and DI to Corresponding Flows Abroad
G7 Countries

	Home Country	Foreign Country	Significance Level	Percent Attributable to Foreign Flows
			(1)	(2)
STI				
	France	Germany	0.040	0.21
	Germany	Canada	0.000	0.39
		France	0.002	0.49
		Japan	0.099	0.34
		U.K.	0.063	0.47
	Italy	Canada	0.059	0.26
		France	0.021	0.38
	Japan	U.S.A.	0.018	0.17
	U.K.	Canada	0.023	0.20
	U.S.A.	Canada	0.049	0.19
		Germany	0.010	0.20
		U.K.	0.033	0.14
DI				
	Canada	Japan	0.094	0.05
		U.S.A.	0.090	0.15
	France	Japan	0.006	0.13
	Germany	Japan	0.020	0.14
	Japan	Canada	0.047	0.09
		U.S.A.	0.016	0.09

Notes: Column (1) reports the joint significance, when less than 0.10.:

TABLE 9

Sensitivity of STI and DI to Corresponding Flows Abroad
Non-G7 Countries

	$Country_i$	$Country_j$	Significance Level	Percent Attributable to Foreign Flows
			(1)	(2)
STI				
	Argentina	Brazil	0.030	0.39
		Mexico	0.080	0.24
		U.S.A.	0.040	0.23
	Brazil	Argentina	0.030	0.42
		Germany	0.005	0.46
		Mexico	0.090	0.23
		U.S.A.	0.080	0.31
	Greece	France	0.020	0.29
		Germany	0.030	0.39
		Portugal	0.007	0.42
		U.K.	0.030	0.31
	Portugal	France	0.006	0.36
		Germany	0.002	0.54
		Italy	0.004	0.54
DI				
	Brazil	Argentina	0.090	0.42
	Greece	Germany	0.020	0.41
	Mexico	Argentina	0.030	0.21
	Portugal	France	0.005	0.46

Notes: See Table 8.

14 percent to almost one-half. For DI, the range is much lower: 5 percent to 15 percent. These results suggest that, for the G7 countries, STI appears to be more sensitive to changes in STI flows elsewhere than does DI, as the "hot money" characterization predicts.

The non-G7 countries are grouped by region. The bilateral estimates are restricted to within region pairs and to the additional influence of the G3 countries (Germany, Japan, and the United States) within those regions. As shown in Table 9, at the 10 percent significance level we find evidence of Granger causality from foreign STI to domestic STI in fourteen cases, which is more than half of the possible cases. For DI, we find such evidence in only four cases, about 15 percent of the total. As shown in Column 2, the portion of the explained variance of STI that is attributable to foreign flows ranges from 23 percent to 54 percent. For the few DI pairs for which we find evidence of Granger causality, the range is only slightly lower: 21 percent to 41 percent. While the difference between the two ranges is small, the strong evidence of Granger causality among the STI flows leads us to conclude that STI is more sensitive to foreign flows than is DI in these countries also.

The importance of the sensitivity of STI relative to that of DI perhaps can be understood best by considering an example: the response to a sudden outflow of capital from Mexico.[20] As shown in Table 9, we find evidence of Granger causality from Mexican STI to the STI of both of the other Latin American countries included in our sample, Argentina and Brazil. In contrast, we find no evidence of Granger causality from

[20]Calvo and Reinhart (1995) describe the extent of such "contagion" and "spillover" effects found for the overall flows within Latin America.

Mexican DI to either country. This transmission of a Mexican disturbance to the other Latin American countries is what is commonly called the "Tequila Hangover." The behavior of STI and DI contrast starkly in this regard. While innovations in STI appear to be transmitted swiftly from Mexico to the other Latin American countries we study, DI appears to be unaffected by the Tequila Hangover.

5. Conclusions

Recent dramatic changes in the magnitude and direction of international capital flows have been accompanied by major shifts in the composition of those flows. The importance of those shifts depends on whether the categories do in fact represent economically meaningful distinctions. If the categories differ as conventional wisdom suggests they do, then the increasing role of DI in capital flows to many developing countries may offer some reassurance that the new round of capital inflows need not necessarily end as abruptly as did the last round. On the other hand, if the categories are uninformative, then DI is just as "hot" as any other form of capital inflows. In that case, the shifts in composition offer no indication that those countries are any less susceptible to destabilizing reversals than they have ever been.

The results presented here show that the composition of international capital flows indeed may matter. While we confirm earlier findings of similarities among the univariate properties of the flows, we show that those univariate findings mask some important underlying differences among the flows. In finding that STI appears to respond more dramatically to disturbances in other capital flows and in other countries than does DI, we provide support for the conventional wisdom that STI is "hot money," and DI is not.

Differences involving PI and LTI are less pronounced. In part, this may reflect inappropriate classifications of some international debt and equity transactions. Nevertheless, these results imply that the capital flow categories we examine here provide meaningful distinctions between movements of capital with different properties. The financial instruments represented by these different categories do not appear to be perfect substitutes. The existence of differences among the flows suggests that it may be useful to maintain some level of disaggregation in the treatment of capital flows in further research. For example, studies of the determinants of capital flows may benefit from maintaining the distinctions the categories provide.[21] Such research into the determinants of the various flows should provide insight into the sources of the differences that we uncover here.

[21] Chuhan, Claessens, and Momingi (1993) , and Fernandez-Arias (1994) provide examples of such studies. Many other studies focus exclusively on DI. Some prominent examples include Froot (1993) and Eaton and Tamura (1994). More recently, Frankel and Rose (1995) provide some evidence that the composition of capital flows helps to explain exchange rate crises in emerging markets.

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APPENDIX A

CATEGORIES OF INTERNATIONAL CAPITAL FLOWS

Flow Category	IMF BOP Yearbook Line Numbers
Direct Investment	
Equity capital reinvestment of earnings, other long-term capital, short-term capital	
Inflows	45-48
Outflows	49-52
Portfolio Investment	
Public sector bonds, other bonds, equities	
Inflows	54, 55, 57, 58, 60, 61
Outflows	53, 56, 59
Other Long-Term Investment	
Loans, bank deposits, other assets and liabilities	
Inflows	65-68, 72-76, 80-83
Outflows	62-64, 69-71, 77-79
Short-Term Investment	
Loans, debt securities, bank deposits, other assets and liabilities**	
Inflows	86-88, 90-92, 95-97
Outflows	84, 85, 89, 90, 93, 94

*Excludes Reserves
**Includes resident official sector, deposit money banks, and other sectors.
Source: IMF, Balance of Payments Statistics Yearbook

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