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Contents

Abstract	v
I. Introduction	1
II. Effectiveness of Capital Controls: A Literature Survey	4
III. Capital Controls in Emerging Asia	8
IV. Effects of Capital Controls: Evidence from Cross-Country Panel Data	12
A. Data and Methodology	12
B. Estimation Results	13
C. Asymmetric Effects of Capital Controls	17
D. Substitution Effects among Capital Controls	19
E. Endogeneity of Capital Controls	21
V. Conclusion	22
Appendix: Data Sources and Definitions	25
References	27

Abstract

This study examines the effects of capital account restrictions on capital flows in nine Asian economies over the period 1995–2005 using panel regressions with fixed effects. The results show that capital controls significantly affect capital flows when such flows are disaggregated by asset type and direction of flow. Tests for the presence of possible asymmetric effects, substitution effects, and endogeneity of capital controls are conducted.

I. Introduction

In the last 3 decades, debates about the use of capital controls and their role in the economy have periodically ebbed and waned. The recent revival of these debates is not surprising in light of this history and in the context of continuing challenges in the global economic environment spawned by the global financial crisis of 2008. The dilemma faced by policy makers in striking the proper balance between keeping an economy open to greater cross-border trade in financial assets while simultaneously attempting to insulate it from the effects of swings in the international appetite for risk has not changed over time.

In the 1980s, the easing of restrictions on capital was pursued in the context of economic liberalization pushed by multilateral institutions such as the World Bank. The rationale underlying this was that welfare gains could be realized if capital were mobile internationally. Capital-scarce countries could borrow from abroad at lower rates to invest and consume more in the current period; and from greater income, pay back interest on international borrowing. Capital-rich countries could realize the highest returns by lending their savings internationally. Country-specific consumption risks thus could be efficiently allocated and the marginal utility of consumption would equalize across countries (Obstfeld 1994).

In the early 1990s, many Asian economies began to liberalize their capital accounts. The focus then was on the proper sequencing of implementing economic reforms. Capital restrictions were to be relaxed gradually and only after other markets had first been liberalized and certain prerequisites fulfilled. It was recognized that unless an economy had first undergone the necessary structural reforms to make it resilient, free capital mobility could make such an economy vulnerable to external shocks. A gradual process of liberalization and relaxation of capital controls was also seen as allowing policy makers the ability to more effectively use the tools of macro policy to deal with shocks.

On the other hand, critics of capital account liberalization argued that that the gains from unfettered trade in financial assets were not obvious (Bhagwati 1998). Liberalizing trade in financial assets is different from liberalizing trade in goods. The contingent nature of a financial contract meant that there is no guarantee that countries that borrowed from abroad could repay their loans if, for example, the borrowed funds went primarily into consumption rather than into investment, and no increase in future output was forthcoming. Thus, critics of capital account liberalization advocated a limited degree of financial openness to shield countries from external shocks, financial instability, and extreme fluctuations in exchange rates (Krugman 1999, Stiglitz 2000 and 2002, Rodrik

2006). They saw the judicious use of capital controls, either as a stand-alone tool or in combination with other macro policy tools, as helping to insulate the domestic economy from external shocks. These controls, for example, could drive a wedge between domestic and global interest rates to reduce exchange rate pressures. Indeed, even the International Monetary Fund (IMF) Articles of Agreement under Article VIII granted member countries the right to maintain controls over capital transactions, but not over current transactions.

While pursuing an overall strategy in favor of liberalization, policy makers in Asia remained reluctant to completely do away with capital controls. They were afraid that without adequate controls, capital inflows would cause the domestic currency to appreciate in real terms and make their countries' exports uncompetitive. With some degree of capital controls, however, policy makers had an extra degree of freedom that they could use to slow or prevent these large inflows, allow the use of expansionary monetary and fiscal policy to boost employment and stock market values without wreaking worsening external balance, and reduce the prospects of destabilizing capital outflows especially during periods of political instability (Perkins and Woo 2000).¹ Policy makers also worried that capital inflows could suddenly stop and cause financial turmoil, given shallow and underdeveloped domestic capital markets, while unabated and large inflows could wreak havoc on financial stability by creating asset bubbles in the nontradeables sector. Some felt that their economies were simply not ready for capital account liberalization and could not yet safely intermediate capital flows.

These fears were validated when the Asian financial crisis hit in 1997. The apparent success of Malaysia in using capital controls during the crisis resurrected interest in their use along with debates about the wisdom of an open capital account. The IMF, which had been on the verge of amending Article VIII to include capital account convertibility, scrapped this plan all together in light of the crisis (Kawai and Takagi 2008). Since the crisis, many countries in Asia have adopted more flexible exchange rate regimes, some in the context of an inflation-targeting framework. By and large, economies successfully recovered, and growth in Asia remained on track despite the bursting of the information technology bubble in 2001. Capital controls were forgotten for a while.

However, the erstwhile relative calm in the global economic environment was disturbed as external shocks once again impinged on macro stability and growth. A number of emerging economies experienced large capital inflows that led to sharp currency appreciation especially from mid-2006 until mid-2008, reawakening interest in capital controls. Beginning in 2002, some countries in Asia had begun to re-employ capital control measures as foreign bank flows into Asia turned to net inflows from outflows, while both portfolio equity flows and carry trades accelerated and became more volatile and sensitive to developments in global equity markets. Global commodity and fuel prices

¹ In Malaysia, the fear was that the political struggle between Mahathir and Anwar would result in capital flight and a collapse of the Malaysian ringgit and the stock market as had happened in Indonesia in May 1998 right before Soeharto stepped down. Malaysia imposed capital controls the day before Anwar was fired by Mahathir.

rose dramatically as well beginning in late 2006 until about the second quarter of 2008. Policy makers became concerned with both adverse supply-side conditions and renewed inflationary pressures.

This precarious state of affairs was in for an even larger shock with the collapse of Lehman Brothers in September 2008. The ensuing global financial crisis provoked a deleveraging process that saw large capital outflows from Asia as the United States (US) economy went through a recession—one whose effects have been so severe that the Great Depression became its comparator. The collapse of Asia's export trade particularly with the US dramatically reduced growth in the region in 2008 and 2009. Recovery and the revival of growth prospects required large amounts of fiscal and monetary stimulus by countries in the region to fill the loss of demand from the US.

Although Asia has recovered quickly while both Europe and the US still currently face uncertain recovery prospects, there are fears that capital inflows will inundate Asia and threaten macroeconomic and financial stability once again. The IMF itself now appears to be taking a more nuanced position regarding capital controls, explaining that there are conditions under which capital controls may legitimately be used by policy makers to manage capital inflows in addition to both prudential and macroeconomic policy (Ostry et al. 2010). More recently, policy makers in Asia have responded to capital inflows by liberalizing capital outflows ostensibly to prevent sharp currency appreciation. However, it is unclear how effective these policies will be as investors face little incentive to leave Asia today in view of its strong recovery from the global financial crisis and continuing pressures for domestic currencies to appreciate. It is also more difficult to measure capital inflows today because investments into domestic bond markets in Asia are largely virtual investments made using derivative instruments (McCauley 2008).

The recent re-imposition of capital restrictions in the Republic of Korea and Thailand is evidence of attempts by Asian authorities to deal with large capital inflows. It is reminiscent of the period beginning in 2002, when some economies in Asia employed capital control measures as net foreign bank flows to Asia turned positive and portfolio equity flows particularly sensitive to developments in global markets accelerated. Authorities in several economies in Asia have also recently further liberalized capital outflows in response to large inflows.

This study examines the effects of capital control measures on the volume and composition of capital flows. It uses a methodology in Binici, Hutchison, and Schindler (2010) and a panel of nine emerging Asian economies comprising the People's Republic of China (PRC); Hong Kong, China; India; Indonesia; the Republic of Korea, Malaysia; the Philippines; Singapore; and Thailand, covering the period 1995–2005. In contrast with previous studies, this study assesses the extent of *de jure* capital controls using information on capital account restrictions by economy at a more disaggregated level,

and adds to the few available multi-country studies, especially those focused on emerging countries in Asia.

The remainder of this paper is organized as follows. Section II presents a brief survey of the literature on the effectiveness of capital controls in various countries. Section III shows the patterns of cross-border capital flows and the measures of legal restrictions that have influenced them in emerging Asian economies. Section IV empirically assesses the effects of capital control measures on total volume and asset composition of international capital flows based on the cross-country panel data set. Section V concludes.

II. Effectiveness of Capital Controls: A Literature Survey

The fears associated with capital account opening and an increasing degree of financial integration between emerging economies and the rest of the world are not unfounded. These have been collectively referred to as the “four fears”: fear of appreciation; fear of “hot money”; fear of large inflows; and fear of loss of monetary autonomy (Magud and Reinhart 2007, 647). Capital controls have thus been used to (i) reduce the volume of capital inflows and alter the composition of flows in favor of longer maturities; (ii) reduce the degree of nominal and real exchange rate volatility; (iii) reduce real currency appreciation arising from capital inflows; (iv) give monetary authorities the ability to implement more independent monetary policy; and (v) prevent the occurrence of financial crisis and/or financial instability. Governments are understandably reluctant to completely give up any degree of monetary policy autonomy and the ability to exercise control over the volume and composition of capital flows. The task has become more daunting given surges in capital flows, new financial instruments and greater sophistication of investors, and limits to sterilization and other policy tools with which to respond to capital surges.

A wide variety of restrictions on cross-border capital flows have been used under different conditions. These can be broadly classified as either (i) administrative or direct controls or (ii) market-based or indirect controls (Ariyoshi et al. 2000, ADB 2010). Direct controls involve the use of outright prohibitions on the transfer of funds and associated payments, or explicit quantitative limits or approval procedures. Administrative controls are typically intended to affect the volume of cross-border transactions by imposing administrative obligations on the banking system. Indirect or market-based controls work on the price or volume of a financial transaction or both of these and discourage these transactions by making them more costly to undertake. An example of this is the explicit or implicit taxation of cross-border flows (e.g., so-called Tobin taxes). Explicit taxes may be imposed on financial transactions by type or maturity of asset. A form of implicit taxation is a compulsory reserve or deposit requirement at the central bank by banks and nonbanks engaged in cross-border financial transactions called unremunerated reserve requirement

(URR). Likewise, dual or multiple exchange rate systems attempt to split the market for domestic currency and raise the cost of domestic credit to speculators and prevent them from establishing a net short position in the domestic currency. Other price and/or quantity-based regulatory measures, such as those that discriminate between long and short currency positions or between residents and nonresidents, are also examples of indirect or market-based controls.

In the heady days of capital flows to emerging markets of the 1990s, Brazil (1993–1997), Chile (1991–1998), Colombia (1995–1997), Malaysia (1994), and Thailand (1995–1997) were among the countries that set limits on short-term capital inflows (Ariyoshi et al. 2000). Some form of market-based controls, largely through direct or indirect taxation of inflows and other regulatory measures was used. Additionally, Brazil, Chile, and Malaysia used administrative and direct controls (prohibition of nonresident purchases of money market securities and nontrade-related swap transactions with nonresidents), an explicit entrance tax on certain types of foreign exchange transactions (Brazil), as well as indirect taxation of inflows through a URR (Chile and Colombia) (Ariyoshi et al. 2000).

The macro context in which such controls were imposed by these countries was not the same. Thailand had a pegged exchange rate regime while the rest had heavily managed exchange rate regimes. The ability of financial institutions to safely intermediate large capital inflows was uncertain in some countries (Colombia, Malaysia, and Thailand); while in other countries such as Chile, policy makers assessed that conventional policy tools could not adequately deal with large inflows (Ariyoshi et al. 2000).

In the post-Asian financial crisis period, countries in Asia experienced large capital inflows, which gave rise to unwelcome domestic currency appreciation. There were many similarities in the responses to these inflows and currency appreciation, although the macro context in which the controls were imposed may have differed across countries. Countries used sterilization and direct foreign exchange market intervention, placed some restrictions on capital inflows and a greater emphasis on the liberalization of capital outflows (McCauley 2008), strengthened prudential regulations, and allowed greater exchange rate flexibility. Countries seemed to have used a combination of some or all of these measures rather than using only capital controls to deal primarily with currency appreciation as well as asset bubbles.

Unfortunately, the effects of opening or restricting the capital account are not empirically well established. Part of the problem with empirically verifying the advantages of liberalizing the capital account is measuring the *de facto* openness of a country to cross-border flows. Another problem is the lack of understanding regarding the channels through which capital account restrictions or liberalization operates. This is due to several factors including the inability to measure not only the degree of openness of the capital account, but also the effect of attempting to raise or reduce the intensity of capital restrictions on the degree of openness. In addition, the particular context in which controls

are used, such as whether the exchange rate is being heavily managed, which may lead banks to inadequately assess currency risk, as well as the presence of other macro policy tools, make it difficult to measure and isolate the effects of capital controls on the economy.

Hence, there is no single theoretical framework with which to analyze the effects of capital controls, which have been implemented in different countries using different methods or combinations, over different periods of time, with varying degrees of intensity and length of time that the controls have been in place, and with differing timing of adoption (such as whether the country is already in a crisis or not). Apart from difficulties in measuring the openness of the capital account, when the effectiveness of capital controls is assessed, it is important to keep in mind that ample historical evidence exists to show that there are clear differences between *de jure* and *de facto* capital controls (Edwards 2007).

Legal capital controls have been evaded in many ways. These include the simple overinvoicing of imports and underinvoicing of exports, delay in repayments on trade finance thereby getting a temporary loan, and other more sophisticated methods. The intent of policy makers in imposing controls on capital may thus be undermined, and it may be difficult to measure the extent to which capital controls actually bind.

The ability to evade controls may depend in part on the level of development of domestic financial markets, where the trading of sophisticated instruments such as derivatives as in Brazil and Chile; or the shift from one type of asset flow subject to restrictions to other types of unrestricted flows, e.g., from debt-creating flows to foreign direct investment (FDI), as in Colombia, facilitates evasion of the controls as experienced by these countries in the 1990s (Ariyoshi et al. 2000). The incentive to evade controls increases when the cost of circumventing them declines, for example, by maintaining large interest rate differentials and pegging or heavily managing the exchange rate. Ironically, capital controls being successful at driving a wedge between foreign and domestic interest rates in the context of pegging or managing the exchange rate tends to invite more capital inflows and complicates their management. The administrative burden imposed by new capital control measures is significant as they have to be constantly revised to close loopholes.

Capital controls, of course, are only a single policy instrument, yet there may be multiple policy objectives and macro tools that are simultaneously operative. This makes it difficult to ascertain if the use of capital controls is successful—and if it is, how so. Practically all countries that have used capital controls at any given time have faced large capital inflows under a heavily managed exchange rate regime in an attempt to prevent real currency appreciation because of its detrimental effects on a country's exports. This is a concern that particularly resonates among countries in Asia given their success with export-led growth. The problem is that when policies to manage the exchange rate are in

place with capital controls, it is difficult to assess the independent effects of such controls on the exchange rate and on capital flows themselves.²

In general, the evidence is mixed as regards the effectiveness of capital controls in achieving their intended objectives (Ariyoshi et al. 2000). Capital controls were only temporarily able to drive a wedge between foreign and domestic interest rates and to reduce pressures on the exchange rate in Brazil, Chile, Colombia, Malaysia, and Thailand in the 1990s. In none of these countries were the interest rate differentials between foreign and domestic interest rates and the reduction in exchange rate pressures simultaneously achieved. In fact, all countries experienced significant real appreciations, although less so in Malaysia and Thailand, where capital controls do not appear to have reduced the amount of short-term inflows and lengthened maturities.

In the 1990s, some studies show that capital controls either did not have an independent effect on total net private capital inflows (Cardenas 2007), or only had a temporary effect on net private capital inflows without any significant effects on the real exchange rate (Galindo 2007, Concha and Galindo 2008). However, there is no consensus on this as some studies suggest that net private capital inflows did decline and in that sense, capital controls were effective (Vargas and Varela 2008). Other studies find that capital controls reduced the amount of external borrowing but did not have a significant impact on the volume of non-FDI flows and significantly increased the volatility of the exchange rate (Edwards and Rigobon 2009).

The adoption by many countries in Asia of inflation targeting as a monetary framework and greater exchange rate flexibility in the post-Asian financial crisis period may have obviated some of the inconsistencies in policy experienced in the past. Some of the constraints to independent monetary policy, such as the desire to peg or manage the exchange rate in the face of large capital inflows that doomed capital control measures in the 1990s, may be relieved especially when taken alongside the liberalization of capital outflows.

Were the various capital control measures in Asia adopted since 2003 effective (McCauley 2008)? In general, they appear to have succeeded in driving a wedge between foreign and domestic interest rates, thereby giving monetary authorities the ability to quell pressures for the domestic currency to appreciate more so than was the case for countries that used them in the 1990s. In some cases, the volume of certain types of inflows was successfully reduced. The restriction on the ability of banks in the PRC to borrow abroad seems to have been successful in reducing such bank inflows for

² Edwards and Rigobon (2009) is an exception. They model the use of capital controls in the context of an exchange rate band and the interactions between them. They find that capital controls were able to shield the nominal exchange rate from vulnerability to external shocks. There is no consensus on their findings. Stiglitz (2002), Eichengreen (2000), Eichengreen and Hausmann (1999), Stallings (2007), and Williamson (2003) generally support Edwards and Rigobon's findings while Calvo and Mendoza (1999), De Gregorio et al. (2000), and Larrain et al. (2000) generally do not.

6 months after the imposition of the controls, and have reduced interest rates on offshore forward transactions in the renminbi–dollar exchange rate below onshore rates, even as bank inflows subsequently grew. There was a sharp decline in fixed-income portfolio flows into Thailand in response to the URR imposed against portfolio inflows in 2003. The restriction on nonresident holdings of baht was also able to maintain the gap between the onshore and offshore exchange rate of the baht to the US dollar. Restrictions on foreign banks' dollar borrowing from abroad appeared to have slowed down funding by foreign banks of their branches in the Republic of Korea. The spread between the offshore won yields from offshore cross-currency swaps and yields in the domestic market widened significantly. Evidently, the Republic of Korea has enjoyed the greatest success in promoting capital outflows, particularly of FDI to the PRC as well as portfolio outflows particularly to the PRC and India (McCauley 2008). In India, the gap between onshore Indian interest rates and offshore yields implied by nondeliverable forwards remained modest.

In summary, the use of capital controls in Asia appears to be generally related to the need to address undesirable currency appreciation due to large capital inflows. In this regard, the evidence is mixed as to its effectiveness. There is also no consistent evidence across time or regions to suggest that capital controls systematically worked to reduce capital inflows. However, even in cases where capital controls were effective, the effects were likely to be contemporaneous and temporary. Other policy tools used in conjunction with capital controls, such as sterilization or exchange rate pegging or management, as well as the monetary framework in place, e.g., inflation targeting, could complicate the channels or undo the intended effects of capital controls.

III. Capital Controls in Emerging Asia

Capital accounts in Asia appear to be fairly open, as suggested by the high and generally rising ratios of flows of foreign assets and liabilities to gross domestic product (GDP) (Kawai and Lamberte 2008). Emerging Asia has been able to attract relatively consistent amounts of direct investment (DI) inflows, although significant differences exist across individual economies. The PRC has been the recipient of more than half of the region's DI flows in recent years. India is also a major recipient of DI flows. Portfolio investment is highly volatile, with the risk of a sudden cut in capital inflows appearing to have substantially increased (Kim and Ryou 2009).

De jure capital account restrictions indexes constructed by Schindler (2009) for various inflow and outflow asset categories (DI, portfolio equity, and portfolio debt) based on data on capital controls obtained from the *Annual Report on Exchange Arrangements and Exchange Restrictions* of the International Monetary Fund are used (IMF 2009). Each index ranges from 0 to 1, with “0” being the least restrictive and “1” being the most restrictive in terms of capital controls.³ As Binici, Hutchison, and Schindler (2010) (hereafter “BHS”) point out, Schindler’s measure of capital control is more finely graded than the IMF’s binary capital controls dummy variable used in other studies. As such, the indexes are helpful in detecting subtle differences across countries and over time in the variety of controls employed.

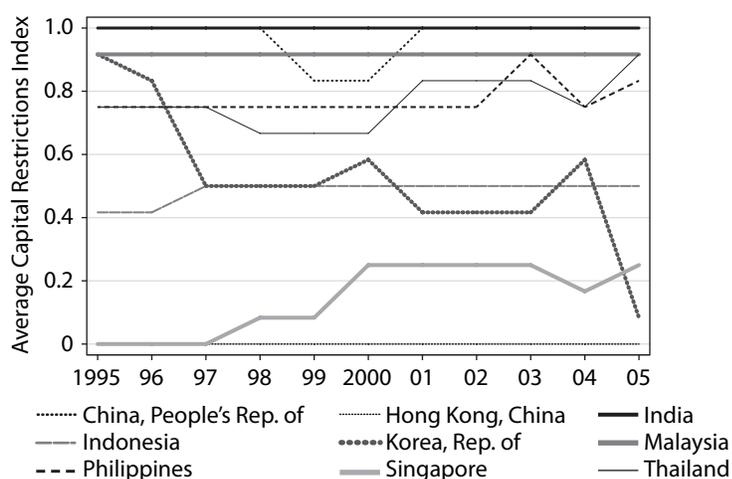
Figure 1a shows that there is substantial heterogeneity in the evolution of *de jure* capital controls among emerging Asian economies. Hong Kong, China; the Republic of Korea; and Singapore have relatively lower levels of restrictions, while the PRC and India have maintained a relatively high degree of capital account restrictions. The general trend before the Asian financial crisis of 1997–1998 had been toward capital account liberalization. Some degree of tightening can be observed right after the crisis especially in severely affected economies such as Indonesia and Thailand.

There are differences in capital account restrictions for total flows across asset categories as shown in Figure 1b. Financial credit restrictions rose dramatically after the 1997–1998 crisis and then declined beginning in 2003. To a lesser extent, the same is true of DI and equity restrictions. Figure 1c shows an increase in the restrictiveness of capital controls on inflows and outflows after the crisis, with control on outflows reaching levels higher than they were prior to the crisis. Controls on inflows, in contrast, are at levels lower than they were prior to the crisis.

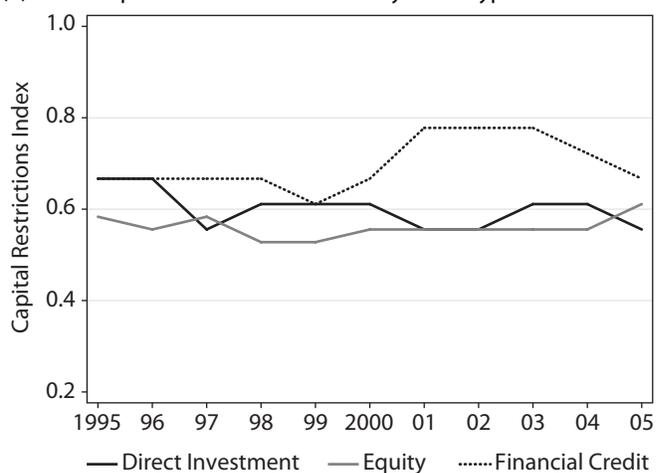
³ See Schindler (2009) for a discussion of the methodology to construct Schindler’s capital control indexes.

Figure 1: Capital Control Indexes, 1995–2005

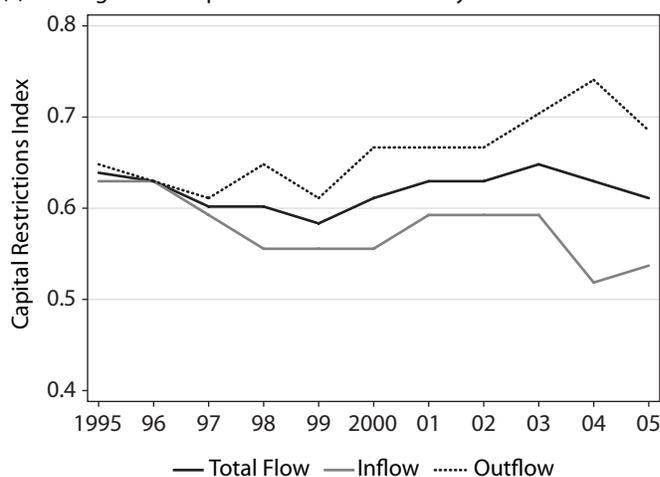
(a) Average Total Capital Restrictions Index by Economy



(b) Total Capital Restrictions Indexes by Asset Type



(c) Average Total Capital Restrictions Index by Direction of Flow



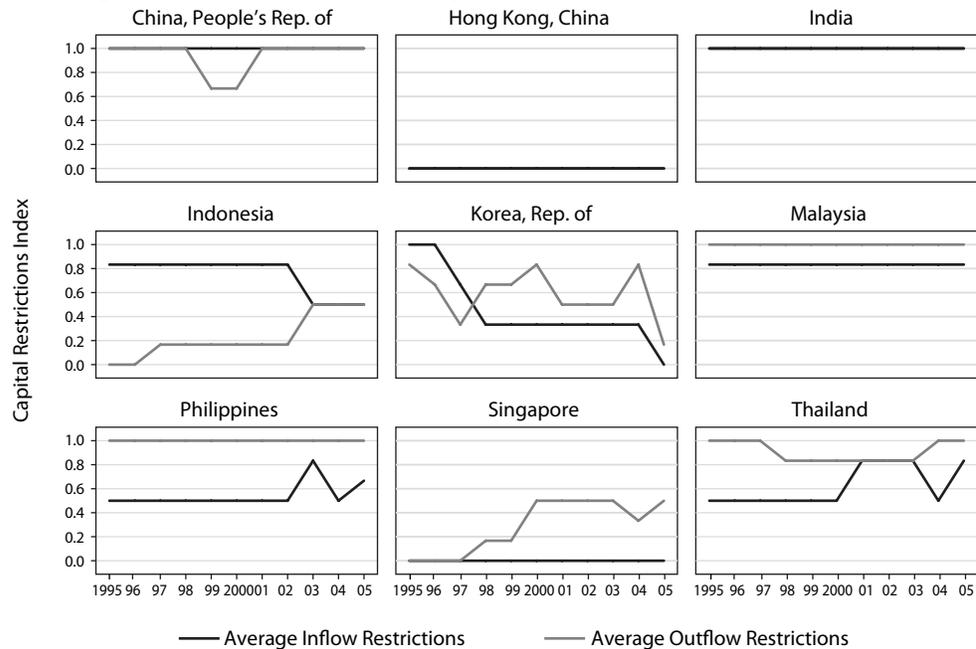
Note: Average total capital restrictions index is the mean of direct investment, equity, and financial credit restrictions indexes for total flows.

Source: Schindler (2009).

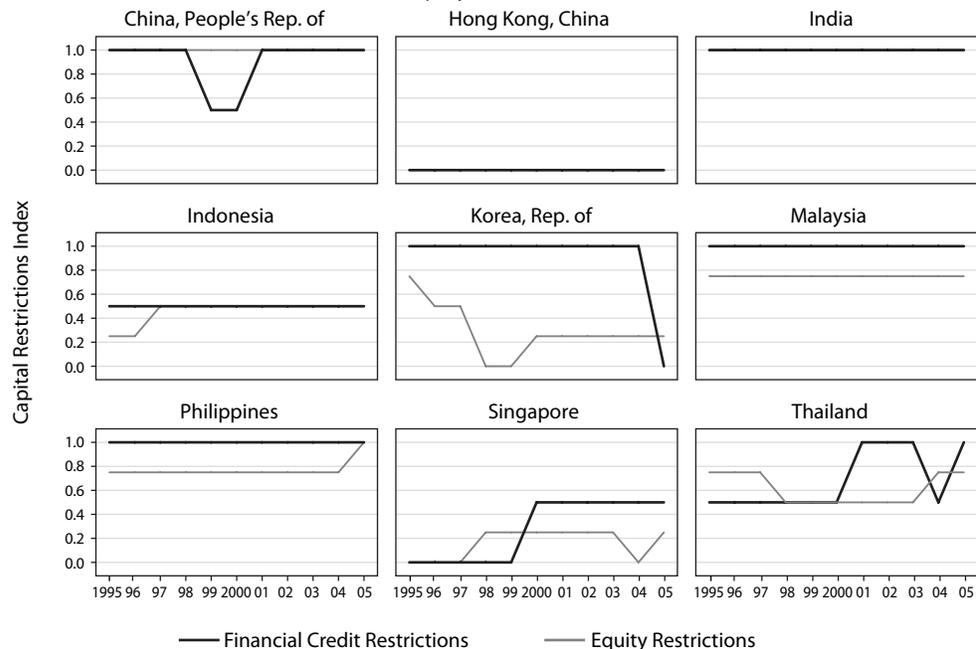
This is shown also in Figure 2a. Except in the PRC and Indonesia, there is a generally higher level of controls on outflows than inflows. Overall, the data suggest that economies have followed different strategies of liberalizing (or, in some cases, tightening) capital account restrictions. Financial credit restrictions have tended to be higher than restrictions on equity in the Republic of Korea, Malaysia, the Philippines, Singapore, and Thailand beginning in 2000 as shown in Figure 2b.

Figure 2: Capital Control Indexes by Economy, 1995–2005

(a) Average Inflow Restrictions versus Average Outflow Restrictions



(b) Financial Credit Restrictions versus Equity Restrictions



Note: Average inflow (outflow) restrictions index is the mean of direct investment, equity, and financial credit restrictions indexes for inflows (outflows).

Source: Schindler (2009).

IV. Effects of Capital Controls: Evidence from Cross-Country Panel Data

A. Data and Methodology

In order to examine the effect of *de jure* restrictions on aggregate flows (volume of capital flows); on particular asset categories (DI, equity, and debt flows); and on capital inflows and outflows in these categories (composition of capital flows), the following baseline regression equation is estimated:

$$\ln\left(\frac{KF}{N}\right)_{it} = \alpha_{0it} + \alpha_1 KC_{it} + X_{it}\theta + \varepsilon_{it} \quad (1)$$

$(KF/N)_{it}$ is capital flows per capita; KC_{it} is the capital controls index; and X_{it} is a vector of control variables. The latter includes the growth of real GDP per capita; the real interest rate differential between country i and the US; the ratio of stock market capitalization to GDP and the ratio of domestic credit to the private sector to GDP as proxies for an economy's level of financial development; the ratio of merchandise trade to GDP as a measure of a economy's openness to trade; the ratio of natural resource exports as a percentage of total merchandise exports as a proxy for the natural resource endowment of a country, which is assumed to make it more attractive as an investment destination the more resource-abundant it is; and an overall business rating index from the Economist Intelligence Unit (EIU) as an indicator of an economy's institutional quality and governance. For more details on the definition and sources of data used in this paper, see the Appendix.

Annual capital flow figures in terms of aggregate flows, direction of flow and type of asset from 1995 to 2005 are derived using the methodology in BHS from an updated and extended version of the database developed by Lane and Milesi-Ferretti (2007) (hereafter "LM"). Using data on capital flows from the IMF's Balance of Payments Statistics (BOP) data including calculations for capital gains and losses, LM generate estimates for stock positions of countries using estimates of their international investment position as a benchmark. These stock data are then converted into flows by taking first differences.

BOP data measure net capital inflows and outflows during a recording period while international investment position data measure the stocks of external assets and liabilities at the end of the period. Capital inflows measure net purchases or sales by nonresidents of domestic assets while outflows measure net purchases or sales of foreign assets by residents. Hence, both capital inflows and outflows can also take on negative values (LM). Negative values for inflows (outflows) can be considered as outflows (inflows). As in

BHS, to construct the best counterpart of inflow and outflow data from the derived flows obtained by taking first differences of the LM stock data, the following formulation is used:

$$\text{Inflows} = -\min(\text{derived flow assets}, 0) + \max(\text{derived flow liabilities}, 0) \quad (2)$$

$$\text{Outflows} = \max(\text{derived flow assets}, 0) - \min(\text{derived flow liabilities}, 0) \quad (3)$$

As BHS point out, the way the data are constructed implies that changes in the stocks can arise from both sales/purchases and from valuation changes. Since capital account restrictions only affect actual transactions and not valuation changes, the effects of capital controls may be underestimated using the LM measure. The estimates obtained can thus be interpreted as lower bounds.

Schindler's capital control indexes are differentiated by asset type (i.e., financial credit, equity, collective investment, money market, DI). These capital control indexes are matched with capital flows in the different asset categories in the following way: equity restrictions index for equity flows, the financial credit restrictions index for debt flows, and DI restrictions index for FDI flows.

The data set is a panel composed of nine emerging Asian economies: the PRC; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; and Thailand for the period 1995–2005. The model is estimated by panel regression with fixed country and time effects. Standard errors have been corrected for general forms of heteroskedasticity and uses White's robust standard errors.

B. Estimation Results

1. Total Flows

Total flows are the sum of inflows and outflows. Table 1a presents the results of tests of the effectiveness of capital controls on total flows aggregated by the type of asset shown in each column of the table. The types of assets include FDI, equity, the sum of FDI and equity, debt, and the sum of all three. The rows of each table indicate which type(s) of capital the capital restrictions is (are) considered and the control variables used. The different regression models can be identified by their respective numbers found in the columns under the asset type names in each table.

The coefficient on the variable for capital controls in Table 1a shows that equity restrictions significantly reduce the sum of FDI and equity flows as well as the sum of FDI, equity, and debt flows. Similarly, restrictions on financial credit significantly reduce the sum of FDI, equity, and debt flows. Restrictions on DI are not found to have any statistically significant effect on the different types of total flows.

**Table 1: Panel Regression Results with Country and Time Fixed Effects, 1995–2005
(dependent variable: $\ln(\text{capital flow/capita})$)**

Total/By Direction of Flow Explanatory Variables	Type/Composition of Asset				
	FDI	Equity	FDI + Equity	Debt	FDI + Equity + Debt
(a) Total Flows (Inflow + Outflow)	(1)	(2)	(3)	(4)	(5)
Direct investment restrictions	-0.093 [0.15]		-0.322 [0.80]		-0.324 [0.91]
Equity restrictions		-0.518 [0.80]	-1.338 [2.81]***		-1.596 [3.78]***
Financial credit restrictions				-1.035 [1.43]	0.600 [1.80]*
Real interest rate differential	0.049 [1.28]	0.018 [0.69]	0.012 [0.81]	-0.118 [1.47]	0.015 [1.03]
$\ln(\text{real GDP per capita})$	0.193 [0.13]	3.763 [2.20]**	0.308 [0.31]	-6.722 [0.46]	-0.340 [0.38]
Stock market capitalization/GDP	0.157 [0.60]	0.452 [1.58]	0.286 [1.59]	-1.931 [1.03]	0.278 [1.48]
Domestic credit to private sector (percent of GDP)	0.009 [0.91]	0.012 [1.50]	0.013 [2.43]**	-0.049 [0.80]	0.012 [2.62]**
Merchandise trade (percent of GDP)	-0.006 [1.21]	0.005 [0.68]	-0.006 [1.54]	0.006 [0.44]	-0.010 [2.28]**
Natural resources (percent of merchandise exports)	0.103 [2.06]**	0.040 [0.52]	0.063 [2.06]**	0.263 [1.41]	0.029 [0.96]
Overall business rating, EIU	-0.482 [1.57]	-0.156 [0.42]	-0.626 [3.04]***	0.442 [0.19]	-0.555 [2.75]***
Observations	99	99	99	40	99
Number of countries	9	9	9	9	9
R-squared	0.39	0.52	0.58	0.54	0.61
(b) Inflow	(6)	(7)	(8)	(9)	(10)
Direct investment restrictions	-1.842 [4.83]***		-1.053 [2.44]**		-0.508 [0.96]
Equity restrictions		-0.187 [0.32]	-0.333 [0.45]		-0.929 [1.09]
Financial credit restrictions				-3.221 [1.19]	0.288 [0.57]
Real interest rate differential	0.062 [2.19]**	0.114 [1.65]	0.066 [2.28]**	-0.115 [0.28]	0.070 [2.05]**
$\ln(\text{real GDP per capita})$	-0.016 [0.01]	4.439 [1.94]*	-1.022 [0.58]	32.403 [0.45]	-1.498 [0.83]
Stock market capitalization/GDP	0.115 [0.39]	0.603 [1.05]	0.215 [0.62]	-17.879 [2.15]	0.275 [0.76]
Domestic credit to private sector (percent of GDP)	0.006 [0.50]	-0.004 [0.24]	0.012 [1.01]	0.017 [0.09]	0.011 [0.94]
Merchandise trade (percent of GDP)	-0.003 [0.49]	-0.013 [1.31]	-0.005 [0.83]	0.210 [2.38]*	-0.010 [1.32]
Natural resources (percent of merchandise exports)	0.075 [1.23]	0.006 [0.08]	0.063 [1.16]	0.337 [0.34]	0.028 [0.46]
Overall business rating, EIU	-0.209 [0.53]	0.189 [0.40]	0.238 [0.54]	5.555 [0.88]	0.225 [0.42]
Observations	92	79	94	26	94
Number of countries	9	9	9	8	9
R-squared	0.47	0.62	0.56	0.94	0.54

continued.

Table 1: *continued.*

Total/By Direction of Flow Explanatory Variables	Type/Composition of Asset				
	FDI	Equity	FDI + Equity	Debt	FDI + Equity + Debt
(c) Outflow	(11)	(12)	(13)	(14)	(15)
Direct investment restrictions	1.170 [2.40]**		0.813 [1.73]*		0.953 [1.88]*
Equity restrictions		2.499 [1.93]*	0.657 [0.90]		0.402 [0.50]
Financial credit restrictions				-5.018 [0.70]	-0.492 [1.28]
Real interest rate differential	-0.021 [0.31]	-0.037 [1.05]	-0.010 [0.41]	-0.187 [0.30]	-0.011 [0.49]
ln(real GDP per capita)	2.383 [1.14]	4.583 [1.40]	3.680 [1.92]*	50.130 [0.40]	3.809 [1.71]*
Stock market capitalization/GDP	0.288 [0.71]	0.129 [0.22]	0.182 [0.68]	-17.855 [1.30]	0.086 [0.32]
Domestic credit to private sector (percent of GDP)	0.012 [1.00]	-0.003 [0.13]	0.009 [0.73]	-0.005 [0.02]	0.001 [0.06]
Merchandise trade (percent of GDP)	-0.007 [0.83]	0.029 [2.19]**	0.002 [0.29]	0.183 [1.76]	-0.001 [0.13]
Natural resources (percent of merchandise exports)	0.150 [2.43]**	0.063 [0.68]	0.112 [2.00]**	0.352 [0.30]	0.075 [1.13]
Overall business rating, EIU	-1.341 [3.15]***	-0.514 [0.64]	-1.137 [2.98]***	3.342 [0.46]	-0.964 [2.66]***
Observations	95	91	98	26	98
Number of countries	9	9	9	8	9
R-squared	0.26	0.35	0.34	0.93	0.32

* significant at 10%; **significant at 5%; *** significant at 1%.

EIU = Economist Intelligence Unit, FDI = foreign direct investment, GDP = gross domestic product.

Note: Robust t-statistics in brackets. All specifications include time dummies and a constant but not reported. Data on debt flows are unavailable for earlier years.

Source: Authors' estimates.

Among the control variables, the ratio of domestic credit to the private sector to GDP, natural resource exports as a percentage of merchandise exports, and the EIU overall business rating index are those that are generally statistically significant in the regressions. A higher ratio of domestic credit to the private sector as a proportion of GDP gives rise to larger total aggregate flows of FDI and equity, as well as of total aggregate FDI, equity, and debt flows. As expected, a larger ratio of natural resources to merchandise trade increases FDI, the sum of FDI and debt, and the sum of all three types of capital flows, but not equity flows alone nor debt flows. The coefficient on the EIU overall business rating index, a proxy for institutional quality and governance, is significantly positive in the regressions for the sum of FDI and equity flows and the sum of all three types of flows. This suggests that good governance and institutional quality tend to increase aggregate FDI and equity flows as well as the aggregate of all three types of flows, another intuitively appealing result. A higher level of real GDP per capita also significantly increases total equity flows. Similarly, a higher ratio of merchandise

trade as a percentage of GDP or greater trade openness also significantly increases total aggregate flows of FDI, equity, and debt.

Since the available data on debt flows are limited as there are many observations with missing values, the effectiveness of capital controls on debt flows is tested using a panel Tobit regression model with country and time dummies. As in the earlier panel regression results shown in Table 1a, the panel Tobit regression results show that financial credit restrictions have no statistically significant effect on total debt flows.⁴

2. Inflows

Table 1b presents the results of tests of the effectiveness of capital controls on total inflows aggregated by type. As seen from the table, capital controls on DI inflows significantly reduce FDI inflows as well as the sum of FDI and equity inflows. Financial credit restrictions also reduce debt inflows but this effect is significant only when panel Tobit regression is used.⁵

In general, it appears that FDI is the main type of inflow affected by capital controls on FDI inflows alone. In contrast with the earlier results, the sum of the three types of flows is not affected by capital restrictions on capital inflows.

Among the control variables, it is the real interest rate differential that is significant in most regression models and affects capital inflows of different types, except debt and equity inflows considered separately. An increase in the real interest rate differential in favor of the domestic country significantly increases capital inflows to the country. This seems to imply that real interest rates are higher in the recipient country because the marginal productivity of capital is likewise relatively higher there and is thus attractive to investment. In one regression model, a higher level of real GDP per capita is found to significantly increase equity inflows while in another, the proportion of merchandise trade in GDP is found to increase total debt inflows.

3. Outflows

Table 1c shows that capital controls have a statistically significant effect on almost types of total outflows except total debt outflows.⁶ Direct investment restrictions significantly affect FDI outflows, the sum of FDI and equity outflows, and the sum of FDI, equity, and debt outflows. Restrictions on equity outflows also significantly affect equity outflows. However, the sign on the coefficients of the capital control restrictions is positive in all cases in which it is statistically significant. The findings imply that capital outflows actually increase when countries impose restrictions to try and prevent capital outflows. This

⁴ Data for other total flows are also fitted using the same panel Tobit regression model. Results using panel Tobit regression and panel regression model for other total flows are similar.

⁵ The coefficient on financial credit restrictions is -3.22 with a p-value of <0.001 .

⁶ The coefficient of capital restrictions is significant for the sum of FDI and equity flows when using least squares panel regression model only but not when the panel Tobit model is used.

may be so because a country that restricts capital outflows sends a signal to market participants that it is worried about loss of confidence and the possibility of capital flight and financial instability, and may signal difficulties in repatriating profits, any of which could precipitate capital outflows. The results suggest that capital controls may not be the best instrument to use to reduce the volume of capital outflows or engineer a shift in the type of capital outflows.

The idea that restrictions on capital outflows may affect perceptions about confidence in the recipient country are further bolstered by the finding that the frequently significant control variable for capital outflows is evidently the EIU overall business rating. Real GDP per capita is also significant in the regressions as are the fraction of natural resources in merchandise trade and merchandise trade as a proportion of GDP.

C. Asymmetric Effects of Capital Controls

The possibility of asymmetric effects, in which the effect of tightening capital controls may be different from relaxing controls, is tested by estimating the following equation:

$$\ln\left(\frac{KF}{N}\right)_{it} = \alpha_{0it} + \alpha_1 KC_{it} + \alpha_2 (KC_{it} \cdot D^+) + \alpha_3 (KC_{it} \cdot D^-) + X_{it}\theta + \varepsilon_{it} \quad (4)$$

In equation (4), D^+ is a dummy variable that takes on a value of 1 when capital controls are tightened from the previous period and 0 otherwise, while D^- is the dummy used to represent loosening of capital controls from the previous period. The results of estimating equation (4) for the presence of asymmetric effects are presented in Tables 2a, 2b, and 2c.

Table 2a shows that there are generally no statistically significant asymmetric effects on total flows with one exception. In Model (2), a reduction in restrictions on equity flows leads to a statistically significant increase the amount of equity flows. However, tightening restrictions on equity flows does not have a statistically significant effect on such flows.

Table 2b shows that there are no significant asymmetric effects on capital inflows.

Table 2c shows that there are generally no statistically significant asymmetric effects on capital outflows except in the case of tightening equity restrictions that reduce the sum of FDI, equity, and debt outflows. However, loosening equity restrictions do not have a statistically significant effect on these outflows.

Table 2: Panel Regression Results with Asymmetric Effects, 1994–2005
(dependent variable: $\ln(\text{capital flow/capita})$)

Total/By Direction of Flow Explanatory Variables	Type/Composition of Asset				
	FDI	Equity	FDI + Equity	Debt	FDI + Equity + Debt
(a) Total Flow (Inflow + Outflow)	(1)	(2)	(3)	(4)	(5)
DI restrictions	-0.216 [0.24]		-0.548 [0.91]		-0.298 [0.58]
DI restrictions x Reduced restriction dummy	-0.493 [1.03]		0.092 [0.26]		0.318 [0.84]
DI restrictions x Increased restriction dummy	-0.050 [0.09]		0.145 [0.44]		0.217 [0.85]
Equity restrictions		-0.539 [0.57]	-1.499 [2.14]**		-1.599 [2.26]**
Equity restrictions x Reduced restriction dummy		-0.628 [1.82]*	0.080 [0.36]		-0.019 [0.10]
Equity restrictions x Increased restriction dummy		-0.102 [0.28]	-0.093 [0.43]		-0.077 [0.35]
FC restrictions				-2.016 [0.85]	0.611 [1.32]
FC restrictions x Reduced restriction dummy				-0.747 [0.50]	-0.071 [0.18]
FC restrictions x Increased restriction dummy				0.091 [0.12]	0.052 [0.18]
Observations	90	90	90	40	90
Number of countries	9	9	9	9	9
R-squared	0.39	0.49	0.57	0.54	0.60
(b) Inflow	(6)	(7)	(8)	(9)	(10)
DI restrictions	-2.053 [2.52]**		-1.448 [1.11]		-1.475 [1.09]
DI restrictions x Reduced restriction dummy	-0.112 [0.20]		-0.142 [0.27]		-0.498 [0.77]
DI restrictions x Increased restriction dummy	0.119 [0.11]		0.722 [0.49]		1.402 [0.90]
Equity restrictions		0.000 [.]	0.000 [.]		0.000 [.]
Equity restrictions x Reduced restriction dummy		1.773 [1.55]	1.628 [1.38]		1.498 [1.25]
Equity restrictions x Increased restriction dummy		0.482 [0.81]	0.434 [0.64]		0.575 [0.66]
FC restrictions				-5.819 [1.23]	-0.024 [0.03]
FC restrictions x Reduced restriction dummy				3.457 [1.18]	0.061 [0.09]
FC restrictions x Increased restriction dummy				5.106 [0.98]	0.719 [0.98]
Observations	83	71	85	26	85
Number of countries	9	9	9	8	9
R-squared	0.45	0.63	0.59	0.98	0.58

continued.

Table 2: *continued.*

Total/By Direction of Flow Explanatory Variables	Type/Composition of Asset				
	FDI	Equity	FDI + Equity	Debt	FDI + Equity + Debt
(c) Outflow	(11)	(12)	(13)	(14)	(15)
DI restrictions	0.249 [0.27]		1.169 [1.21]		1.411 [1.48]
DI restrictions x Reduced restriction dummy	-0.973 [1.45]		-0.195 [0.21]		-0.620 [0.61]
DI restrictions x Increased restriction dummy	0.407 [0.52]		-0.596 [0.75]		-0.730 [0.85]
Equity restrictions		3.971 [2.02]**	1.223 [1.02]		1.271 [1.16]
Equity restrictions x Reduced restriction dummy		-0.016 [0.01]	-0.176 [0.25]		-0.330 [0.46]
Equity restrictions x Increased restriction dummy		-0.113 [0.15]	-0.711 [1.19]		-1.133 [1.89]*
FC restrictions				-5.999 [0.67]	-0.245 [0.51]
FC restrictions x Reduced restriction dummy				0.000 [.]	0.932 [1.07]
FC restrictions x Increased restriction dummy				1.245 [0.33]	-1.025 [0.99]
Observations	86	82	89	26	89
Number of countries	9	9	9	8	9
R-squared	0.25	0.38	0.34	0.93	0.36

* significant at 10%; **significant at 5%; *** significant at 1%.

DI = direct investment, FC = financial credit, FDI = foreign direct investment.

Note: The asymmetric effects are with country and time fixed effects. Robust t-statistics in brackets. All specifications include time dummies and a constant but not reported. Data on debt flows are unavailable for earlier years. All specifications include all control variables, namely, real interest rate differential, $\ln(\text{real GDP per capita})$, stock market capitalization/GDP, domestic credit to private sector, merchandise trade, natural resources, and EIU's overall business rating; time dummies; and a constant but not reported.

Source: Authors' estimates.

D. Substitution Effects among Capital Controls

The possibility of substitution effects—whether a particular type of capital flow is significantly affected by capital controls imposed on other types of assets—is tested. To test for the presence of substitution effects, a particular type of capital flow is regressed against its own capital restriction as well as all the other different types of capital restrictions entered as separate explanatory variables individually per regression model:

$$\ln\left(\frac{KF_j}{N}\right)_{it} = \alpha_{0it} + \alpha_1 KC_{jt} + \alpha_2 KC_{kt} + \alpha_3 KC_{lt} + X_{it}\theta + \varepsilon_{it} \quad (5)$$

where KF_j is j -type of capital flow and KC_k and KC_l are the capital controls for other types of capital flows (i.e., type k and type l).

The results are presented in Table 3. Table 3a shows that equity restrictions and financial credit restrictions have a statistically significant effect on total FDI flows. When equity restrictions are imposed, FDI flows decline. Surprisingly, equity restrictions seem to have a greater effect on FDI flows than on equity flows. In the case of financial credit restrictions, however, there is a statistically significant positive effect on total FDI flows. This latter finding seems to suggest that FDI flows and debt flows, the latter being the type of flows for which financial credit restrictions are designed to affect, are substitutes of each other. Note also that DI restrictions have a positive but statistically insignificant effect on debt flows. This may be because restrictions on financial credit may be seen as a prudential measure to prevent asset bubbles from being created. Financial credit restrictions may not be harmful to FDI as FDI may not generally depend on the availability of local credit nor be financed by debt.

Table 3: Panel Regression Results with Substitution Effects, 1995-2005
(dependent variable: $\ln(\text{capital control/capita})$)

	FDI	Equity	Debt
(a) Total (Inflow + Outflow)	(1)	(2)	(3)
	Total	Total	Total
Direct investment restrictions	0.045 [0.08]	-0.643 [1.15]	0.430 [0.62]
Equity restrictions	-2.656 [4.32]***	-0.263 [0.38]	2.070 [0.79]
Financial credit restrictions	1.444 [4.31]***	-0.154 [0.27]	-1.130 [1.22]
Observations	99	99	40
R-squared	0.52	0.53	0.56
(b) Inflow	(7)	(8)	(9)
	FDI Inflow	FDI Inflow	Equity Inflow
Direct investment restrictions	-2.221 [4.51]***	-0.488 [1.37]	-1.860 [0.25]
Equity restrictions	0.698 [1.14]	0.008 [0.01]	-2.125 [0.09]
Financial credit restrictions	0.251 [0.48]	1.590 [1.99]*	-3.235 [0.69]
Observations	92	79	26
R-squared	0.48	0.67	0.95
(c) Outflow	(13)	(14)	(15)
	FDI Outflow	FDI Outflow	Equity Outflow
Direct investment restrictions	1.063 [1.98]*	0.404 [0.52]	0.912 [0.67]
Equity restrictions	-0.848 [0.92]	2.854 [2.28]**	-1.196 [0.44]
Financial credit restrictions	0.194 [0.34]	-1.604 [3.24]***	-0.442 [0.25]
Observations	95	91	36
R-squared	0.27	0.41	0.74

* significant at 10%; **significant at 5%; *** significant at 1%.

FDI = foreign direct investment.

Note: The substitution effects are with country and time fixed effects. Robust t-statistics in brackets. All specifications include time dummies and a constant but not reported. Data on debt flows are unavailable for earlier years. All specifications include all control variables, namely, real interest rate differential, $\ln(\text{real GDP per capita})$, stock market capitalization/GDP, domestic credit to private sector, merchandise trade, natural resources, and EIU's overall business rating; time dummies; and a constant but not reported.

Source: Authors' estimates.

Table 3b shows that financial credit restrictions tend to increase equity inflows, suggesting the presence of a substitution effect as well between equity inflows and debt inflows.

In terms of outflows, however, Table 3c shows that restrictions on financial credit reduce equity outflows. This suggests that debt and equity outflows are more complements of each other than substitutes.

In general, therefore, financial credit restrictions appear to be effective in affecting FDI flows, and equity inflows and outflows. Total FDI and debt flows as well as equity and debt inflows appear to be substitutes of each other, while equity and debt outflows appear to be more complements of each other.

E. Endogeneity of Capital Controls

It is possible that capital controls may be endogenous if policy makers react to the effects of capital flows, such as currency appreciation or the accumulation of reserves, by imposing or withdrawing capital controls, or by changing the degree of restrictiveness of capital controls. To test for endogeneity, a set of panel instrumental variable (IV) regressions by direction of capital flow and by asset category is estimated, all with country and time fixed effects.

Tests are performed to determine whether capital flows influence the use of capital controls or their degree of restrictiveness. Cardoso and Goldfajn (1998) use expected returns as an instrument for capital flows. In their paper, total private capital flows are assumed to depend on expected returns and changes in capital controls.⁷ Changes in capital controls, in turn, depend on total net capital flows. By substitution, the reduced form equation has changes in capital controls depending on both expected returns and capital flows as shown in equation (6) below. In this study, the real interest rate differential between a country's and that for the US is used as a proxy for expected returns. Specifically, the following reduced form functional relationship is used:

$$\Delta KC_{it} = f \left(\ln \frac{KF}{N_{it}} g((i - i_{US})_{it}) \right) \quad (6)$$

where $(i - i_{US})$ is the differential in real interest rates between country i and the US. The results are shown in Table 4a. None of the coefficients on capital flows are statistically significant. Hence, no evidence of an endogeneity problem is found.

An alternative test of endogeneity is also implemented. In Table 4b, the two-period lag of capital flows is used as an alternative instrument. As can be seen from the table, none of the coefficients on the capital control variables are statistically significant. Again, no evidence of an endogeneity problem is found.

⁷ In this study, the log of capital flows per capita, by direction of flow and asset type, is used in lieu of net capital flows in Cardoso and Goldfajn (1998).

Table 4: Test for Endogeneity, 1996–2005

	Type/Composition of Asset				
	FDI	Equity	FDI + Equity	Debt	FDI + Equity + Debt
(a) Dependent Variable: Change in Restrictions	(1)	(2)	(3)	(4)	(5)
ln(total capital flow)	0.023 [0.35]	-0.003 [0.02]	0.024 [0.31]	0.269 [0.90]	-0.022 [0.28]
Observations	90	90	90	40	90
	(6)	(7)	(8)	(9)	(10)
ln(Capital inflow)	-0.016 [0.27]	-0.044 [0.86]	-0.033 [1.04]	-0.033 [1.04]	-0.057 [1.53]
Observations	83	71	85	26	85
	(11)	(12)	(13)	(14)	(15)
ln(capital outflow)	0.199 [0.25]	-0.086 [0.76]	0.824 [0.20]	-0.177 [1.30]	-0.177 [1.30]
Observations	86	82	89	36	89
(b) Dependent Variable: Change in Restrictions	(16)	(17)	(18)		(19)
ln(total capital flow)	0.040 [0.19]	0.010 [0.14]	0.000 [0.00]	— —	-0.079 [0.36]
Observations	81	81	81		81
	(20)	(21)	(22)		(23)
ln(capital inflow)	0.084 [0.43]	0.030 [0.48]	-0.262 [0.37]	— —	-0.097 [0.33]
Observations	67	46	71		71
	(24)	(25)	(26)		(27)
ln(capital outflow)	-0.006 [0.05]	0.099 [1.38]	-6.072 [0.01]	— —	-0.246 [0.27]
Observations	73 9	66 9	79 9		79 9

* significant at 10%; ** significant at 5%; *** significant at 1%.

“—” denotes insufficient observations.

FDI = foreign direct investment.

Note: With country and time fixed effects. Absolute value of z-statistics in brackets. Instrument for ln(capital flow) in (a) is real interest rate differential between country *i* and the US; 1-year lagged ln(capital flow) for (b).

Source: Authors' estimates.

V. Conclusion

This study examines the effects of capital account restrictions on capital flows in nine emerging Asian economies over the period 1995–2005 using panel regressions with fixed effects. The type of capital restriction imposed matters for capital flows by both type of asset and direction of capital flows.

In terms of total flows, the results show that capital restrictions on equity flows reduce the sum of total volume of FDI and equity flows as well as the sum of FDI, equity, and debt flows. Financial credit restrictions reduce the sum of FDI, equity, and debt flows. Total flows are significantly affected by the openness of the economy, the natural resource endowment of an economy, and by perceptions about the ease doing business in an economy, which in this study is regarded as a proxy for the quality of an economy's institutions and governance.

In terms of capital inflows, restrictions on DI inflows reduce FDI inflows as well as the sum of FDI and equity inflows. Financial credit restrictions likewise reduce debt inflows, but this effect is only detected when panel Tobit regression is used. In general, the results suggest that controls on capital inflows largely impact FDI inflows. The real interest rate differential was the most important control variable found, consistent with the idea that the relative marginal efficiency of investment and profitability of investment matter for FDI inflows. A general policy prescription, therefore, is for policy makers to be encouraged to find ways to improve the profitability of investment, rather than resort to capital controls to affect the type of asset flows their economies receive.

In terms of capital outflows, capital restrictions affect most asset types (with the exception of total debt outflows) but in a perverse way, as the use of controls on capital outflows actually increases the amount of these outflows. This finding suggests that it is not possible for policy makers to prevent capital outflows, reduce their volume, or target particular types of capital outflows through the use of capital controls on outflows. Hence, it may be best for economies to liberalize rather than constrain capital outflows if they want to prevent such outflows.

The results here stand in contrast to those in BHS in which both debt and equity controls reduce capital outflows with little effect on capital inflows. The findings in this study also suggest that debt outflows are not generally affected by capital controls on debt while the effect on debt inflows is only detected when a panel Tobit regression is used. Financial credit restrictions seem to be the most effective type of capital control.

Tests for the possible endogeneity of capital controls are conducted using panel IV regression with fixed effects and the real interest rate differential or the second lag of capital flows as alternative instruments. No statistically significant endogeneity problem is detected. The presence of asymmetric effects is also tested by using dummy variables that distinguish between episodes of tightening versus relaxing capital controls. Loosening equity restrictions increases the amount of total equity flows but tightening such restrictions has no statistically significant effect on equity flows. Also, tightening equity restrictions reduces the sum of FDI, equity, and debt outflows, while loosening such restrictions do not have a statistically significant effect on these outflows.

The possibility of substitution effects in which imposing capital controls on one type of asset flows leads to statistically significant effects on the volume of other types of asset flows is likewise tested. The results suggest that total FDI flows and total debt flows are substitutes of each other as are debt inflows and equity inflows. However, debt outflows and equity outflows appear to be more complements of each other than substitutes. Financial credit restrictions affect FDI flows, equity inflows, and equity outflows. They reduce equity outflows and do not reduce total FDI flows and equity inflows.

Why capital controls work, which types of capital flows they work on, under what circumstances they work in, and for what purpose they are employed in a particular country are questions not addressed by this study. These questions need to be examined in a country-specific context and are the subject of future research.

Appendix: Data Sources and Definitions

Variables/Frequency/ Period Covered	Notes and Definitions	Sources of Data
Dependent Variables		
Investment flows (total, inflow, outflow) per capita (\$M/'000 population)/annual/1995–2005	Following Binici et al. (2010), flows data are derived by taking the first difference of Lane and Milesi-Feretti (2007) stock data. Flows data are divided by working age population ('000).	Lane and Milesi-Feretti (2007), downloaded 25 November 2010.
Equity	Includes equity securities issued by monetary authorities, general government, banks, and other sectors.	Population data from the World Bank's World Development Indicators, downloaded 2 December 2010
Debt	Includes bonds and notes; and money market instruments issued by monetary authorities, general government, banks and other sectors.	
Foreign direct investment	Includes equity capital, reinvested earnings, and other capital.	
Explanatory Variables		
Capital restriction indexes (total/average, inflow, outflow)/annual/1995–2005	Index of financial openness (Range: 0 to 1, from least to most regulated). Total/average restriction index is a simple average of the inflow and outflow capital restriction index by asset category.	Schindler (2009), downloaded 25 November 2010
Financial credit	Covers restrictions on credits other than commercial credits granted by all residents, including banks, to nonresidents or vice versa.	
Equity	Refers to shares and other securities of a participating nature and bonds, securities, and other securities with an original maturity of more than 1 year.	
Direct investment	Covers restrictions on investments for the purpose of establishing lasting investment economic relations both abroad by residents and domestically by nonresidents. These investments are essentially for the purpose of producing goods and services, and, in particular, in order to allow investor participation in the management of an enterprise.	
Growth in real GDP per capita (percent)	Derived using GDP per capita data (constant 2000 US\$).	World Bank World Development Indicators Database, downloaded 25 November 2010
Real interest rate differential (percent)	Domestic real interest rate minus US real interest rate.	
Merchandise trade (percent of GDP)	Total trade (exports + imports)/GDP.	
Natural resources (percent of merchandise exports)	Exports of natural resources (including agricultural raw materials, fuel, and metals and ores) as a proportion of total merchandise exports.	
Domestic credit to private sector (percent of GDP)	Refers to financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, which establish a claim for repayment.	

Variables/Frequency/ Period Covered	Notes and Definitions	Sources of Data
Stock market capitalization (percent of GDP)/ annual/1995–2005	“Value of listed shares to GDP, calculated using the following deflation method: $\{(0.5) * [F_t/P_{et} + F_{t-1}/P_{et-1}]\} / [GDP_t/P_{at}]$ where F is stock market capitalization, P_e is end-of-period CPI, and P_a is average annual CPI.”	Beck and Demirgüç-Kunt (2009) revised as of March 2010, downloaded 25 November 2010
Overall business rating, EIU/annual/1995–2005	EIU’s overall business environment rating (Range: 1 to 10 from low to high or most favorable environment) is an average of EIU’s rating for the following: market opportunities, macroeconomic environment, political environment, infrastructure, policy toward private enterprise, labor market, tax regime, financing, foreign trade and exchange, and policy environment for foreign investment.	Economist Intelligence Unit World Investment Services Database, downloaded 2 December 2010

CPI = consumer price index, EIU = Economist Intelligence Unit, GDP = gross domestic product.

Note: Investment flows per capita are available only for countries and years for which national authorities report their international investment position. Missing observations: People’s Republic of China (1995–2004); Hong Kong, China and the Republic of Korea (1995–2000); India (1995–1996); Indonesia; Malaysia; the Philippines; and Singapore (1995–2001); Thailand (inflow for 1995, outflow and total for 1995–2000).

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About the Paper

Maria Socorro Gochoco-Bautista, Juthathip Jongwanich, and Jong-Wha Lee find that capital controls significantly affect total capital flows, as well as inflows and outflows. Restrictions on financial credit appear to be more effective than other forms of controls. Results also show that liberalizing capital outflows may be a better policy than imposing controls on them, because the latter results to even larger capital outflows.

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