Capital flows and saving in Latin America and Asia: a reinterpretation

Carmen M. Reinhart [a,*], Ernesto Talvi [b,1]

[a] *University of Maryland, College Park, MD 20742, USA*
[b] *Inter-American Development Bank, Washington, DC 20577, USA*

Abstract

Both theory and the empirical evidence for a broad range of countries have identified a negative relationship between domestic and foreign saving. Still, based on the experience of the 1990s, a popular view has emerged that domestic and foreign saving are positively related in Asia and negatively related in Latin America. We argue that this popular discussion does not discriminate between trends in domestic saving (which are very different in the two regions) and the cyclical component of saving, which is linked to capital flows. We show that, when trend and cyclical components of domestic saving and capital flows are properly taken into account, the two regions do not differ in the short-run response of domestic saving to capital inflows. We conclude that the main differences pertain to the long-run behavior of saving rates, which are driven by trends in demographic factors, per capita GDP, and other factors that have little to do with fluctuations in capital flows. © 1998 Elsevier Science B.V. All rights reserved.

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1. Introduction

The resurgence of international capital flows to developing countries in the early 1990s gave rise to an abundant literature on the causes and consequences of

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* Corresponding author. Tel.: +1-301-405-7006; Fax: +1-301-403-8107; E-mail: creinhart@puafmail.umd.edu
[1] Tel.: +1-202-623-2031; Fax: +1-202-623-2481; E-mail: ernestot@iadb.org.

these flows. The widespread nature of the phenomenon led researchers to emphasize the role of external factors, which were found to account for a substantial portion of the surge in capital flows in the early 1990s. [2] Moreover, history had also shown that external factors have an important cyclical component, leading to repeated booms and busts in international capital flows. [3] This body of evidence gave rise to fears about the vulnerability of capital-importing economies to abrupt reversals in capital flows.

In late 1994, the worst fears came true. The devaluation of the peso by Mexican authorities triggered an abrupt outflow of capital from Mexico. The financial turbulence that followed quickly spread to several countries in Latin America. In contrast, large recipients of capital in East Asia remained largely unscathed, as the turbulence there was confined to a couple of days in mid-January 1995. [4]

At that time, the received wisdom held that Latin America was far more vulnerable to shifts in investor sentiment and international capital movements than East Asia and that this greater vulnerability was 'somehow' related to regional differences in how domestic saving responded to an increase in capital inflows. [5] In particular, this view emphasized that widening current account deficits were largely invested in East Asia (in fact, saving increased but by less than investment), but were associated with a large decline in saving rates in Latin America (although investment also increased). These differences in the macroeconomic outcomes provided the basis to the notion that capital inflows were somehow complements to domestic saving in Asia and substitutes in Latin America.

The fact that national and foreign saving appear to be positively correlated in East Asia and negatively correlated in Latin America, however, should be somewhat surprising. For instance, Obstfeld (1995) presents a review of the empirical evidence on the impact of capital flows on saving and concludes that the weight of the accumulated evidence suggests that net foreign resource inflows are negatively related to national saving and positively related to domestic investment. On theoretical grounds, standard intertemporal models show that shocks that temporarily increase capital inflows are unambiguously associated with a temporary decline in domestic saving.

In light of the unresolved conflict between the implications of theory and the empirical evidence at one end of the spectrum and the received wisdom at the other end, this paper re-assesses the relationship between national and foreign saving in East Asia and Latin America. Our approach differs from other papers

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[2] See Montiel and Reinhart (1997) for a review of this literature.

[3] See Díaz-Alejandro (1983) and Eichengreen (1991).

[4] See Calvo and Reinhart (1996). For the purposes of this paper the term East Asia will refer to Indonesia, Korea, Malaysia, Singapore, and Thailand; besides China, Indonesia, Malaysia, and Thailand have been the largest capital importers during the 1990s.

[5] Of course, the Thai currency crisis in the summer of 1997 and its domino effect in East Asia has led to a drastic revision of that view.

that have analyzed this issue in a variety of ways. First, it is highly eclectic, in that we systematically examine whether there are possible regional differences in household preferences, the incidence of liquidity constraints, the prevalence of consumption smoothing, the determinants of saving rates, and the macroeconomic policy response to the surge in capital inflows. Second, unlike most of the papers on these varied topics, our focus is on a narrower East Asia–Latin American comparison, rather than more global in scope. Third, unlike most of the studies that have examined the relationship between domestic and foreign saving in the context of a panel of countries (which we also do) we analyze this link at the individual country level.

The rest of the paper proceeds as follows. Section 2 presents a simple theoretical framework to illustrate how exogenous changes in world nominal and real interest rates and the relaxation of borrowing constraints affect national and foreign saving. Section 3 reviews the empirical literature that may provide an explanation for the possible differences in the relationship between domestic and foreign saving in Asia and Latin America. Section 4 reassesses that relationship by examining the cyclical and secular behavior of the variables of interest while Section 5 concludes.

2. A simple model

In this section we develop a simple monetary model à la Calvo and Végh (1993) to illustrate the impact of a variety of external shocks on the path of consumption, saving, the current account, and the capital account. At the outset it is important to emphasize that this is not a model of economic growth, so that the co-movements among endogenous variables should be thought of as describing cyclical, not secular effects.

2.1. The model

Consider a small open economy with a representative consumer that derives utility from the consumption of a non-storable, tradable good. Lifetime utility is given by,

$$\int_0^\infty q_t U(c_t)\exp(-\beta t),\tag{1}$$

where the instantaneous utility function, $U(\cdot)$ is assumed to be increasing, twice continuously differentiable, and strictly concave; c_t denotes consumption, β is the subjective discount rate and q_t is a preference shock. Consumers can hold two types of assets: domestic non-interest

$$w_t = b_t + m_t\tag{2}$$

bearing money and an internationally traded bond that pays a rate of interest equal to r_t. w_t denotes financial wealth of the representative consumer, where m_t and b_t are real monetary balances and the stock of private bond holdings, respectively.

The consumer must use money to carry out her or his consumption purchases. Formally, she/he faces a liquidity-in-advance constraint,

$$m_t \geq \alpha c_t, \qquad \alpha > 0 \tag{3}$$

which implies that real money balances are proportional to the value of consumption expenditures. Constraint (3) will hold with equality in equilibrium if the nominal interest rate is positive. The evolution of the stock of private financial wealth is governed by the following,

$$\dot{w} = r_t w_t + y_t - c_t - i_t m_t, \tag{4}$$

where y denotes the endowment flow of the consumption good and i denotes the instantaneous nominal interest rate in terms of domestic currency. We assume perfect capital mobility which implies,

$$i_t = i_t* + \epsilon_t = r_t + \epsilon_t* + \epsilon_t \tag{5}$$

where $i*$, $\epsilon*$ are the world nominal interest rate and inflation rate, respectively. Foreign inflation is assumed to be constant unless otherwise noted.

Using Eqs. (3) and (4), and imposing the appropriate transversality conditions we can derive the intertemporal budget constraint of the representative consumer, which is given by

$$w_0 + \int_0^\infty y_t e^{-\int_0^t r_s ds} dt = \int_0^\infty (1 + \alpha i_t) c_t e^{-\int_0^t r_s ds} dt. \tag{6}$$

This equation says that the present value of consumption purchases cannot exceed the present value of the consumer's endowment stream and its initial level of wealth.

The consumer's optimization problem consists of choosing the path of c_t so as to maximize lifetime utility, Eq. (1), subject to the intertemporal budget constraint, Eq. (6). The first-order conditions for this optimization problem are:

$$U'(c_t) - \lambda \left(\frac{1 + \alpha i_t}{q_t} \right) e^{\int_0^t (\beta - r_s) ds} = \lambda p_t e^{\int_0^t (\beta - r_s) ds} \tag{7}$$

where λ is the (time invariant) Lagrange multiplier associated with the budget constraint (Eq. (6)). Eq. (7) indicates that (when $r_s = \beta$) at the optimum the marginal utility of consumption is proportional to the effective price of consumption, p_t. The effective price of consumption is given by the price of the consumption good plus the opportunity cost of holding money that is needed to purchase goods, deflated by q_t.

2.2. External shocks

First, let us consider a situation in which the effective price of consumption, p_t, is temporarily low due to a temporary reduction in the world nominal interest rate (arising from a temporary decline in the world inflation rate) or a temporary relaxation of borrowing constraints (which in this simple economy we will interpret as an increase in q_t) that allows the economy to borrow on better terms for any given level of r. [6] Formally, assume

$$p_t = p^L \qquad 0 \le t < T$$
$$p_t = \bar{p}_t \qquad t \ge T \tag{8}$$

where $p^L < \bar{p}$. [7]

Let us assume further, that $r_s = r = \beta$ for all t. Then, from the first order conditions of the consumer Eq. (7), it is clear that consumption is constant in both periods, but higher when the effective price of consumption is low. Therefore, for a constant path of income, any external shock that allows to the economy to consume at a temporarily lower cost, triggers an expansion in consumption, a decline in the saving rate and a widening of the current account deficit.

The extent of the decline in saving rates and the resulting current account deficit will depend on the magnitude of the change in p_t and the properties of the utility function. Hence, for instance, if the prevalence of liquidity constraints was greater in Latin America than in Asia, one could conjecture that the change in p_t was larger in the former than in the latter. To assess the role played by preferences, lets assume $U(c)$ takes the *iso*-elastic form,

$$U(c) = \frac{c^{1 - 1/\rho} - 1}{1 - \frac{1}{\rho}}, \tag{9}$$

where $\rho > 0$ is the (constant) intertemporal elasticity of substitution (IES). Specializing the first order conditions Eq. (7) using Eq. (9) we obtain

$$c_t = (\lambda p_t)^{-\rho} = \left(\frac{1}{\lambda p_t}\right)^{\rho}. \tag{10}$$

Eq. (10) says that the magnitude of the response of consumption, saving and the

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[6] The impact of the relaxation of borrowing constraints in an economy with capital is analyzed in Obstfeld (1995). In Obtsfeld's example, the relaxation of borrowing constraints implies that the economy is allowed to borrow a fixed amount per period, not previously available, at an interest rate which is below the subjective discount rate.

[7] A temporary stabilization (a reduction in ϵ), such as the one considered by Calvo and Végh (1993) would generate a similar path for p_t.

current account will be larger, the larger is the IES (for any given change in p_t) and the larger is the change in p_t (for a given ρ). Irrespective of the orders of magnitude, the qualitative predictions of the model imply a negative correlation between national saving and foreign saving.

Let us now consider a situation in which the world real interest rate is temporarily low. Formally assume,

$$r_t = r^L \qquad 0 \leq t < T$$
$$r_t = \beta \qquad t \geq T \tag{11}$$

where $r^L < \beta$. Assuming a constant path for p_t, and differentiating the first order conditions Eq. (7) with respect to time, we obtain the law of motion that governs the path of consumption, which is given by

$$\frac{\dot{c}}{c} = r_t - \beta \tag{12}$$

which implies by Eq. (11)

$$\frac{\dot{c}}{c} < 0 \qquad 0 \leq t < T$$

$$\frac{\dot{c}}{c} = 0 \qquad t \geq T. \tag{13}$$

Because consumption falls in the $[0,T)$ interval and remains constant thereafter, it must be the case that it jumps at the instant when world interest rates fall, for the intertemporal budget constraint to hold. Therefore, for a constant path of income, a temporary decline in world real interest rate also triggers an increase in consumption (a decline in the saving rate), and, as shown in Eq. (14) below, a widening of the current account deficit (i.e., a bigger capital account surplus).

$$\dot{b} = rb + y - c. \tag{14}$$

However, in contrast to the previous exercise, consumption declines from the (initially) high levels until $t = T$. After the initial decline, saving recovers and the current account improves. The correlation between national saving and foreign saving is again predicted to be negative.

3. Do regional preferences differ?

In Section 2, we showed that whether the cause of the capital inflow was external or domestic, the extent to which changes in domestic and foreign saving were linked to these shocks depended importantly on household preferences—particularly on the extent of intertemporal substitution. Furthermore, the presence of

binding liquidity or borrowing constraints also plays an important role in determining the impact of an increase in foreign saving on domestic saving.

In this section, we review the empirical literature that has estimated preference parameters or gauged the extent of liquidity constraints for developing countries. We also review a related strand of the literature that has focused on the estimation of reduced-form saving equations. Because the main focus of this paper is to compare Asia and Latin America, we restrict our attention to studies that allow us to disentangle regional differences.

3.1. Preference parameters

As Section 2 highlights, the extent to which domestic saving decreases in response to a shock that increases foreign saving depends importantly on the IES. The theoretical framework suggests that the higher the IES, the larger is the increase in consumption (decline in saving) associated with any given temporary decline in domestic interest rates. Unfortunately, relatively few studies have attempted to estimate the IES for developing countries in Asia and Latin America; Table 1 provides a brief synthesis of the relevant studies.

Giovannini (1985) is the first to explicitly estimate the IES for developing countries. He uses a one-good linearized model and the main conclusion that emerges from that study is that in most instances, irrespective of the country or the region considered, the IES is not significantly different from zero. Rossi (1988), who allows for liquidity constraints in a model similar to Giovannini's, reaches similar conclusions. As Table 1 details, Rossi finds that the IES is small and close to zero for the Asian countries as well as for the South American countries; 0.07 and 0.09, respectively. [8] For Central American and Caribbean countries, which includes Mexico, his estimate of the IES is higher (0.37) and statistically significant. Taking these results at face value, it would imply that the kinds of shocks discussed in Section 2 would have little or no impact on domestic consumption patterns except for the Central American group.

However, as shown in Ostry and Reinhart (1992), such restrictive models may suffer from a serious specification bias. [9] Using a two-good CES utility specification, that desegregates among traded and non-traded goods, Ostry and Reinhart (1992) obtain estimates of the IES for a pooled group of five Asian and for four Latin American countries. In both groups of countries the IES is significantly different from zero at standard confidence levels and point estimates fall in the 0.4 to 0.8 range. Indeed, the point estimate of the IES for the Asian countries is higher

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[8] When the early debt crisis years—1982 and 1983—are excluded from the sample, the IES for the South American panel is significantly different from zero; the estimate is 0.09 and the corresponding standard error is 0.04.

[9] Ogaki and Reinhart (1995) show, in the context of a two-good model of durable and non-durable goods, that by ignoring nonseparability of preferences the Hall-type specification introduces a downward bias in the estimator of the IES.

Table 1
Estimates of the intertemporal elasticity of substitution

Rossi (1988): panel data	
Asian countries: Fiji, India, Indonesia[a], Korea, Malaysia[a], Pakistan, Philippines[a], Sri Lanka, and Thailand[a]	
Central America and the Caribbean: Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Mexico[a], and Panama	
South America: Bolivia, Brazil[a], Chile[a], Colombia[a], Ecuador, Paraguay, Peru[a], Uruguay, and Venezuela	
Pooled estimate for the Asian countries	0.07 (0.17)
Pooled estimate for Central America and the Caribbean	0.37 (0.16)
Pooled estimate for South American countries	0.09 (0.07)
Ostry and Reinhart (1992): panel data	
Asian countries: India, Korea, Pakistan, the Philippines, and Sri Lanka	
Latin America and the Caribbean: Brazil[a], Colombia[a], Costa Rica, and Mexico[a]	
Pooled estimate for the Asian countries	0.80 (0.24)
Pooled estimate for the Latin American countries	0.43 (0.14)
Ogaki et al. (1995): panel data	
Asian countries: India, Pakistan, Philippines ∗, and Sri Lanka	
Latin America and the Caribbean: Brazil ∗, Colombia ∗, Costa Rica, and Mexico	
Average for the Asian countries	0.39
Average for the Latin American countries	0.56
Average for the heavy capital inflow Asian countries	0.54
Average for the heavy capita inflow Latin American countries	0.60

Standard errors are in parentheses.
[a] Heavy capital inflow country during 1990s.

than that for the Latin American countries, suggesting that, if anything, the decline in domestic saving due to a temporary decline in interest rates should be higher for Asia. Since the original paper does not formally test for regional differences, we employ their estimates (as well as the corresponding standard errors) to test whether the difference between Asia and Latin America is significant or not. Our null hypothesis is that the IES is equal ($\sigma_A = \sigma_{LA}$) in both groups of countries. The test results, which are reported in Table 1, do not allow us to reject that hypothesis at standard confidence levels.

Ogaki et al. (1995) extended this framework by allowing the IES to vary with level of wealth, along the lines suggested by a Stone–Geary utility function. Their results show important regional differences in the estimates of the IES; however, the key difference occurs among the extremely poor countries, mostly sub-Saharan Africa, and everyone else. Specifically, for countries in which consumption is close to subsistence levels, the IES is close to zero and saving is not responsive to changes in interest rates. However, as Table 1 highlights, Asian and Latin American countries yield estimates of the IES that are fairly similar to one

another. [10] The average IES for the Asian countries at about 0.39 while that for the Latin American countries averages 0.56. Further, when we restrict out attention to the countries of most interest for the purposes of this paper—namely, the heavy capital inflow recipients in both regions in the 1990s (denoted by an asterisk)—the differences all but disappear. The IES estimate for that subset of Asian countries averages 0.54, while the Latin American countries average 0.60. [11]

The previous discussion would suggest that there is little evidence to suggest systematic and important differences in a key preference parameter (the IES) among Asian and Latin American countries. [12] Hence, to capture a different response in Asia versus Latin America of domestic saving to shocks that alter foreign saving, we would have to find grounds on other explanations which do not depend on consumer preferences.

One possibility, discussed by Obstfeld (1995), is that the proportion of the capital inflows that gets consumed depends positively on the incidence of liquidity or borrowing constraints. Next, we ask: Are liquidity constraints more binding in Latin America than in Asia?

3.2. Liquidity constraints

The empirical literature that attempts to gauge the incidence of liquidity constraints or the ability of agents to smooth consumption intertemporally in developing countries is also rather scanty. Table 2 sketches the country coverage and some of the main results of studies that enable us to undertake a comparison among our two regions of interest.

Rossi (1988, 1989) estimates that liquidity constraints are significant in both Asia and South America, but quantitatively more important for the latter among the middle income countries (see Table 2). [13] However, for the Central American countries, which includes the largest capital importer in Latin America in the 1990s—Mexico, liquidity constraints were not found to be significant.

Haque and Montiel (1989) provide country-specific estimates of the share of households that are liquidity constrained. From these estimates one can construct regional averages. For the six Asian countries in their sample, they estimate the share of liquidity-constrained households at about 0.38; the estimated share of households for the Latin American and Caribbean countries in their sample is

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[10] Details on country coverage are provided in Table 1.

[11] See Ogaki et al. (1995) for country-specific estimates.

[12] Using an entirely different approach Carroll et al. (1994) test whether cultural factors influence saving. Using data from the Canadian Survey of Family Expenditures the compare the saving behavior of immigrants from different parts of the world to Canada; they find no evidence of differences.

[13] Liquidity constraints are most important for Asian low-income countries, where the share of households estimated to be liquidity constrained is 0.75.

Table 2

Testing for the preference of liquidity constraints and consumption smoothing

Rossi (1988): panel data	

Asian countries: Fiji, India, Indonesia[a], Korea, Malaysia[a], Pakistan, Philippines[a], Sri Lanka, and Thailand[a]
Central America and the Caribbean: Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Mexico[a], and Panama
South America: Bolivia, Brazil[a], Chile[a], Colombia[a], Ecuador, Paraguay, Peru[a], Uruguay, and Venezuela

Share of households subject to liquidity constraints	
Pooled estimate for the Asian middle-income countries	0.17 (0.14)
Pooled estimate for the Asian low-income countries	0.79 (0.39)
Pooled estimate for Central America and the Caribbean	0.22 (0.21)
Pooled estimate for South American countries	0.65 (0.12)

Rossi (1989): panel data
Same country coverage as above

Share of households subject to liquidity constraints	
Pooled estimate for the Asian countries	0.21 (0.12)
Pooled estimate for Central America and the Caribbean	0.01 (0.29)
Pooled estimate for South American countries	0.75 (0.18)

Haque and Montiel (1989)
Asian countries: India, Indonesia[a], Korea, Malaysia[a], Philippines[a], and Thailand[a]
Latin America and the Caribbean: Jamaica and Peru[a]

Share of households subject to liquidity constraints	
Average for the Asian countries	0.39
Average for the Latin America and the Caribbean countries	0.23
Average for the heavy capital inflow Asian countries	0.44

Vaidyanathan (1993)
Asian countries: Bangladesh, India, Malaysia[a], Pakistan, Singapore, Korea, and Sri Lanka
Latin America and the Caribbean: Argentina[a], Bolivia, Brazil[a], Colombia[a], Costa Rica, El Salvador, Guatemala, Haiti, Honduras, Mexico[a], Nicaragua, Paraguay, Peru[a], Suriname and Uruguay

Share of households subject to liquidity constraints	
Average for all the Asian countries	0.47
Average for the Latin America and the Caribbean countries	0.72
Average for the heavy capital inflow Asian countries	0.45
Average for the heavy capita inflow Latin American countries	0.56

Ghosh and Ostry (1995)
Asian countries: Hong Kong, India, Indonesia[a], Korea, Malaysia[a], Pakistan, Papua New Guinea, Philippines[a], Singapore, Sri Lanka, Thailand[a]
Latin America and the Caribbean: Argentina[a], Bolivia, Brazil[a], Chile[a], Colombia[a], Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico[a], Panama, Paraguay, Peru[a], Uruguay, Venezuela
Tests of consumption smoothing based on the detrended current account

Table 2 (continued)

Results:

Asia: In 5 of the 11 countries the null hypothesis of consumption smoothing
could be rejected by two or more criteria
Latin America and the Caribbean: In 6 of the 16 countries the null hypothesis
of consumption smoothing could be rejected by two or more criteria

Standard errors are in parentheses.
[a] Heavy capital inflow country during 1990s.

noticeably smaller, at 0.22. These results imply that the increase in consumption
due to a rise in foreign saving would be greater in Asia than in Latin America.
However, the problem with the Haque and Montiel (1989) sample is that, while
the Asian sample includes a number of the heavy capital inflow countries of
interest (see Table 2), the Latin American sample is not representative of the large
capital importers of that region.

A more recent paper by Vaidyanathan (1993), which attempts to link the
incidence of liquidity constraints to a country's level of development (proxied by a
variety of social and economic indicators), provides a broader country coverage.
As before, we report regional averages based on the country specific estimates
provided in the original paper. These results suggest liquidity constraints may be
more important in Latin America than in Asia, with 72% of households subject to
liquidity constraints in the former versus 47% in the latter. However, when we
limit our attention to the heavy capital inflow recipients of the 1990s, this gap
narrows substantially; the average share of liquidity-constrained households for the
Asian capital importers is estimated at 0.45, while the comparable share for the
largest inflow recipients in Latin America, is 0.56.

Ghosh and Ostry (1995), offer an alternative strategy to assess households'
ability to smooth consumption intertemporally in developing countries in the
context of an intertemporal model of the current account. They employ three
criteria to test whether the null hypothesis of consumption smoothing is consistent
with the observed data. First, they test whether the detrended current account helps
predict subsequent movements in national cash flow. For example, if agents expect
national cash flow to fall, they would optimally run a current account surplus (an
increase in domestic saving) today. The emphasis on the 'detrended' current
account stems from the desire to abstract from long-term trends in domestic and
foreign saving that stem from demographic and institutional factors and focus on
the consumption-smoothing component. Second, they test the parameter restric-
tions implied by theory and lastly they test for the equality of variances of the
actual and optimal consumption-smoothing current account predicted under the
null hypothesis of consumption smoothing. In five out of eleven Asian countries in
their sample they reject the null hypothesis of consumption smoothing by two or
more criteria; for Latin America, the rejection rate is somewhat lower, with the

null hypothesis rejected only in six out of sixteen cases. For the large capital importers in their sample, the rejection rate is also heavier in Asia.

Taken together these studies suggest liquidity constraints may be empirically important, with either a substantive portion of households subject to borrowing constraints or a rejection in some countries of the implications of consumption smoothing. As discussed in Obstfeld (1995), this tends to amplify the increase in consumption that one should expect when international borrowing constraints are relaxed (i.e., when foreign saving increases). However, the differences across regions are less clear cut. Rossi (1988, 1989) and Vaidyanathan (1993) results show that liquidity constraints may be more (quantitatively) important in Latin America than in Asia. [14] This would suggest that an exogenous increase in foreign saving would lead to a bigger boom in consumption in Latin America than in Asia. However, Ghosh and Ostry (1995) reject the null hypothesis of consumption smoothing in a higher share of the Asian countries (nearly one half of them) than in the Latin American counterparts (about one-third) they examine. As with the IES, it is difficult to decisively posit a different response to a surge in capital inflows in the two regions on the basis of these results.

3.3. Reduced-form saving equations

We now turn our attention to the literature that examined saving behavior by focusing on reduced-form equations. Edwards (1995) focusing on six Asian countries (see Table 3) and eight Latin American countries and finds that demographics, government saving, growth per capita, and foreign saving are important determinants of private saving in both regions. Indeed, the variables that are found to account for the bulk of the markedly higher saving rates in Asia are typically associated with factors that influence the trend, not the cycle. Demographic factors, particularly dependency ratios and the extent of financial deepening, stand out in this list. Evidence of the importance of demographic trends in explaining saving rates in both regions are also found in Doshi (1994).

Faruqee and Husain (1995), who examine the long-run determinants of saving in four key East Asian countries, in the context of a co-integration model reach a similar conclusion on the importance of demographic factors in explaining the trend in the saving rate and to a lesser extent financial deepening and 'forced saving' in the form of compulsory pension plans. Cyclical fluctuations around that trend, they find, are importantly driven by growth. Held and Uthoff (1995), who examine 15 Latin American countries, also conclude demographics play an important role in explaining saving behavior. Collectively, these results would suggest that marked differences in the trends in saving in the two regions can be

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[14] Although Rossi finds that liquidity constraints were not binding in his Central America and Caribbean panel.

Table 3
Reduced-form saving equations

Gupta (1987)

Asian countries: India, Korea, Malaysia[a], Pakistan, Philippines[a], Singapore, Sri Lanka, Taiwan, and Thailand[a].

Latin America and the Caribbean: Bolivia, Brazil[a], Chile[a], Colombia[a], Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico[a], Panama, Paraguay, Peru[a], Uruguay, and Venezuela.

Temporary real income is significant in explaining saving in both regions; financial intermediation is significant in Asia but not Latin America; increases in foreign saving increase domestic saving in Latin America, but is insignificant in Asia.

Doshi (1994)

Asian countries: Bangladesh, Bhutan, China[a], Fiji, India, Indonesia[a], Malaysia[a], Nepal, Pakistan, Papua New Guinea, Philippines[a], Solomon Islands, Sri Lanka, Thailand[a], Vanuatu, and Western Samoa.

Latin America and the Caribbean: Belize, Bolivia, Brazil[a], Chile[a], Colombia[a], Costa Rica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico[a], Nicaragua, Panama, Paraguay, Peru[a], St. Vincent and Grenadian.

Demographic variables significant in both regions; life expectancy has a positive and significant effect on saving in Asia but not Latin America and the Caribbean; real GNP growth and GDP per capita significant in Latin America but not in Asia.

Edwards (1995)

Asian countries: Malaysia[a], Pakistan, Philippines[a], Singapore, Sri Lanka, and Thailand[a].

Latin America and the Caribbean: Bolivia, Brazil[a], Chile[a], Colombia[a], El Salvador, Mexico[a], Paraguay, and Venezuela.

Demographics, government saving, growth per capita, money/GDP ratio, private sector credit, expenditures on social security, and foreign saving are significant determinants of private saving in both regions; GDP per capita is significant in Latin America but not elsewhere; and the proportion of the population living in urban areas, which is expected to reduce the need for precautionary saving, is significant in Latin America but not elsewhere; there are no significant regional differences in the response of domestic saving to foreign saving. Lower growth, higher dependency ratios, and a far slower degree of financial deepening appear to account for the lower saving rates observed in Latin America.

Faruqee and Husain (1995)

Asian countries: Indonesia[a], Malaysia[a], Singapore, and Thailand[a].

Percent of population that is working age is the most important determinant of the trend in private saving; financial deepening and compulsory saving plans have an important effect on the trend in some cases. Short-run dynamics are affected by growth.

Held and Uthoff (1995)

Latin American countries: Brazil[a], Colombia[a], Costa Rica, Chile[a], Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico[a], Panama, Paraguay, Peru[a], Uruguay, Venezuela.

Per capita income, inflation, growth, the dependency ratio, terms of trade, and foreign saving significantly affect national saving. Foreign and domestic savings are substitutes.

Testing for cultural effects
Carroll et al. (1994)

Using data from the Canadian Survey of Family Expenditures, the study tests whether cultural factors influence saving by comparing the saving patterns of immigrants from different parts of the world to Canada. They find no evidence of differences.

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[a] Heavy capital inflow country during 1990s.

traced to secular developments affecting demographics and the stability and growth of the financial sector.

As to the link between domestic and foreign saving, Eichengreen (1991) and Calvo et al. (1993) have argued that capital flows have been shown to have an important temporary or cyclical component—this is precisely the 'cyclical' link examined in Section 2. Edwards (1995) concludes that there are no statistically significant differences in the response of domestic saving to changes in foreign saving among the Asian and Latin American countries. He finds that in both regions domestic and foreign saving are substitutes—a 1% increase in foreign saving is associated with about a 0.50 to 0.63% decline in domestic saving. Held and Uthoff (1995), who examine 15 Latin American countries, reach a similar conclusion about the degree of substitutability between domestic and foreign saving—their estimates are clustered around -0.40 to -0.45. [15] Schmidt-Hebbel et al. (1992) also find significant evidence of substitutability, although in their specification an increase in foreign saving of 1% only reduces domestic saving by about 0.20%. Gupta (1987), however, concludes that increases in foreign saving increase domestic saving in Latin America but have no effect on Asian countries' domestic saving. Taken together, these results would imply that a temporary increase in foreign saving in both Asia and Latin America would either: (i) have a similar negative effects on domestic saving (Edwards, 1995; Held and Uthoff, 1995; Schmidt-Hebbel et al., 1992) or (ii) increase saving in Latin America relative to Asia (Gupta, 1987). Neither scenario would appear to predict that Latin America will consume more of its capital inflow than Asia.

3.4. Could different policy responses account for the varied macroeconomic outcome?

While it is beyond the scope of this paper to provide a detailed description of the macroeconomic policy response to the surge in capital inflows during the 1990s, the most common policy response in both regions was to initially engage in sterilized intervention; as this policy became too costly to sustain or the high interest rates it produced stimulated further inflows, other measures were intro- duced. [16] Measures to curb inflows (sometimes explicit, other times in the form of prudential regulation) were often accompanied by efforts to increase exchange rate flexibility. Greater fiscal restraint was sought by a number of countries. As Reinhart and Dunaway (1996) conclude and on the basis of the 'typical' policy profile just described, it would be difficult to explain regional differences in the

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[15] For a recent survey of this literature see Schmidt-Hebbel et al. (1996).

[16] See Reinhart and Dunaway (1996) for a detailed account on this issues.

macroeconomic outcome on the basis of a different policy response to the capital inflow.

3.5. Some evidence for the 'received wisdom'

Some empirical support for the received wisdom is presented in Antzoulatos (1996), who regresses domestic demand (or its individual components) as a share of GDP on capital inflows (also as a share of GDP). For the Latin American countries, the coefficient on capital inflows is positive and significant in the domestic demand equation as well as in the consumption equation (which would imply a negative relationship with saving). For the Asian countries, the coefficient is negative although not significantly different from zero. Hence, these results would appear to accord well with the popular view.

However, the regression analysis of Antzoulatos (1996) is likely to suffer from specification bias. As Section 4 illustrates, in the overwhelming majority of cases, saving rates and (on occasion) capital flows as a share of GDP are nonstationary variables. [17] If either series (or both of them) are nonstationary, then standard estimation strategies are not the adequate vehicle for drawing inference. Under these conditions, if we wish to draw conclusions about the effects of capital flows on domestic saving, then we must either ensure we identify a co-integrating vector among the variables of interest, or we must work with the stationary, temporary or cyclical components of the variables.

Many of the recent studies reviewed in the previous subsection found that demographic trends, financial deepening, and levels of per capita GDP systematically affect saving—indeed these variables usually identify the long run behavior of saving—in other words, they are associated with the stochastic trend. [18] Omission of these variables, in a specification such as Antzoulatos (1996), is likely to result in a failure to obtain co-integration, limiting our ability to draw inference from these results.

3.6. Synthesis

The preceding review of the literature offers little empirical basis for the view that capital inflows are negatively correlated in Latin America and positively correlated in Asia. Estimates of the IES are similar in magnitude in the two regions; studies that have tested for the influence of cultural factors on saving have

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[17] On theoretical grounds one could establish both saving as a share of GDP and the capital account balance–GDP ratio are bounded variables. However, boundedness does not insure stationarity.

[18] See Faruqee and Husain (1995) for a discussion.

found little evidence suggesting these are significant; liquidity constraints are present in both regions, although these may affect a somewhat larger share of the population in Latin America—yet consumption-smoothing models appear to fit the data better in Latin America; and reduced form estimates of the degree of substitutability between domestic and foreign saving suggest that domestic saving should respond similarly to a surge in capital inflows in both Asia and Latin America.

4. Trends and cycles in domestic and foreign saving

The theoretical model sketched in Section 2 stressed the link between temporary consumption booms (declines in domestic saving) and temporary increases in foreign saving. Yet, as noted, much of the popular discussion regarding the behavior of domestic saving in Asia and Latin America during the capital inflow surge of the early 1990s have focused on the level of domestic saving in those two regions. In what follows, we turn our attention to disentangling trend from cycle in order to refine our understanding about how domestic saving in Asia and Latin America responded to the surge in capital inflows in the 1990s and to assess to what extent the received wisdom is an accurate description of their response.

Our analysis focuses on domestic and foreign saving for nineteen countries in the Caribbean and Latin America (listed in Table 4). Among the Asian countries we focus on the fast-growing newly-industrialized economies (see Table 4). With the exception of China, this group includes the largest capital importers in the region. The data used is annual and the period spans 1970 to 1995. Particular emphasis is given to developments during the 1990s.

To decompose domestic and foreign saving into its trend (or permanent) and temporary (or cyclical) component, we first establish the basic time series properties of the variables in question. If a series is stationary, a simple deterministic trend captures the permanent component; if the series is integrated of order one ($I(1)$), then there are alternative approaches to model the stochastic trend and the cyclical fluctuations around that trend. A nonstationary series can be decomposed by a variety of filtering methods, such as the Hodrick–Prescott (HP), the Beveridge–Nelson (BN), or the structural time series approach of Harvey (1985)—the Kalman filter (KF). In what follows, we adopt an eclectic approach to decompose domestic and foreign saving into its stochastic trend and cyclical component and rely on a variety of filtering methods to assess the robustness of the results. We then revisit the issue of the substitutability of domestic and foreign saving by examining simple pairwise correlations between the cyclical components of the two variables and compare the results of the Asian and Latin American countries. The analysis is conducted both on a regional and country-by-country basis. An analysis of the co-movement in regional cyclical patterns concludes our results.

Table 4
Saving and capital flows, 1970–1995: East Asia and Latin America (as a percent of GDP, cyclical components)

Country or region	HP filter		Kalman filter		BN filter	
	Correlation coefficient	t-Statistic	Correlation coefficient	t-Statistic	Correlation coefficient	t-Statistic
East Asia[a]	−0.14	−1.75	−0.25	−1.89	−0.20	−1.97
Indonesia	−0.37	−1.96	−0.46	−2.07	−0.32	−2.11
Korea	−0.61	−3.77	−0.56	−3.02	−0.72	−4.06
Malaysia	−0.06	−0.28	−0.15	−1.22	0.02	0.13
Singapore	−0.03	−0.17	−0.14	−1.84	−0.16	−1.77
Thailand	0.06	0.28	−0.25	−0.10	−0.12	−0.32
Latin America[b]	−0.08	−1.88	−0.12	−2.01	−0.19	−1.98
Argentina	−0.28	−1.47	−0.32	−1.76	−0.19	−1.89
Bolivia	0.12	0.61	−0.03	−0.54	0.21	0.14
Brazil	0.03	0.16	0.08	0.60	−0.02	−0.04
Chile	0.20	1.01	0.12	0.76	0.23	0.86
Colombia	−0.50	−2.88	−0.64	−3.01	−0.69	−3.21
Costa Rica	−0.37	−1.96	−0.50	−2.56	−0.42	−2.13
Dominican Republic	−0.45	−2.51	−0.48	−2.16	−0.60	−3.14
Ecuador	−0.39	−2.08	−0.47	−2.67	−0.32	−1.99
El Salvador	−0.06	−0.30	0.03	0.04	−0.10	−0.23
Guatemala	0.12	0.61	0.10	0.43	−0.01	−0.14
Haiti	−0.60	−3.64	−0.47	−2.93	−0.56	−3.44
Honduras	−0.06	−0.29	−0.26	−1.68	−0.19	−1.73
Nicaragua	−0.51	−2.94	−0.62	−3.12	−0.55	−3.02
Mexico	−0.25	−1.28	−0.32	−1.65	−0.36	−1.69
Panama	−0.13	−0.65	0.12	0.30	−0.04	−0.33
Peru	−0.10	−0.48	−0.08	−1.02	−0.15	−0.46
Paraguay	−0.51	−2.90	−0.65	−3.02	−0.56	−3.01
Uruguay	0.06	0.32	−0.02	−0.14	0.04	0.12
Venezuela	−0.27	−1.37	−0.35	−1.89	−0.22	−1.69
Asia and Latin America correlations:						
Domestic Saving	0.44	2.17	0.51	2.03	0.40	1.92
Foreign Saving	0.36	2.34	0.42	2.77	0.46	2.32

Standard errors are estimated using Hansen's GMM estimator and allowing for heteroscedastic disturbances.
[a] Based on a panel of 130 observations (i.e., five countries 26 years each).
[b] Based on a panel of 494 observations (i.e., 19 countries 26 years each).

4.1. Time series preliminaries

We begin our analysis by establishing the time series properties of the various variables of interest indices via the standard Augmented Dickey–Fuller (ADF) and the Phillips–Perron (PP) unit root tests. The form of the ADF test used allows for

both the presence of a constant (nonzero mean) and a constant deterministic drift. As suggested by Campbell and Perron (1991), we begin by including a generous number of lags; if the past differences do not enter significantly, these are dropped sequentially. The PP test, which allows for general forms of heteroscedasticity, also included a constant and drift terms.

The results of the unit root tests uniformly indicate that the null hypothesis of a unit root could not be rejected at standard confidence levels in the overwhelming majority of cases. [19] Of course, caution must be exercised in interpreting these results as the low power of these tests is a well known drawback.

Given that in the majority of cases the variables of interest are nonstationary, we next apply all three filtering methods (BN, HP, and KF) to decompose the saving rate and the capital account–GDP ratio into its 'permanent' (or steady-state) component and 'temporary' (or cyclical component). As discussed above, the identifying criteria for this technique is that the former captures the nonstationary component of the variable, while the latter captures its stationary element.

The BN method models the change in the permanent component as an ARMA process while the cyclical component is calculated residually as the difference between the estimated permanent component and the actual values of the variables. [20] In our application, we use the Box–Ljung Q statistic as a guideline for selecting the ARMA process so as to whiten the error. In general, the longer ARMA processes provided the best fit. For the KF decomposition we employed the trend plus cycle model (with no irregular component). The estimates of the KF present a similar scenario to the HP filter and the BN decompositions.

4.2. Domestic and foreign saving

Table 4 examines the link between domestic and foreign saving by presenting the pairwise correlations of their respective cyclical components, which are stationary by construction, so standard inference tests apply. Some observations stand out.

First, the overwhelming majority of countries the correlations between domestic and foreign saving are negative. Of the 24 countries in our sample 18 to 20 of them show a negative correlation, depending on the filtering method used. Among the remaining handful of countries with positive correlations, none are statistically significant. These results accord well with those found in Edwards (1995), Held and Uthoff (1995), Schmidt-Hebbel et al. (1992), which point to the substitutability of domestic and foreign saving.

Second, there is no evidence of sharp regional differences, as suggested by the popular view. The results presented in Table 4 do not support the view of sharp

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[19] These are not reported but are available upon request.
[20] For additional details see Beveridge and Nelson (1981) and Miller (1988).

regional notion that foreign saving is a substitute for domestic saving in Latin America and a complement in Asia. In four out of the five Asian countries, the cyclical relationship between domestic and foreign saving is negative—in three of those instances it is significantly so; in 14–16 (depending on the filtering method) of the Latin American countries the correlation is negative and in over half that number it is statistically significant. The order of magnitude of the correlation is low in both regions and is quite similar, ranging from -0.25 to -0.14 for Asia and -0.19 to -0.08 for Latin America—in both cases the correlation is significant at the 10% level. Indeed, we used a Z-test to test for the significance of the difference between the correlation coefficients of a pair of variables. We cannot reject the null hypothesis that the difference is zero. [21]

Third, correlations between the cyclical component of domestic saving for the Asian countries and the Latin American countries are positive ranging from 0.40 to 0.51 and are statistically significant (see Table 4). The same applies to foreign saving correlations for the two regions, which range from 0.36 to 0.46. Taken together, these results provide further evidence of co-movement and the importance of common external shocks in driving cross-border capital flows.

5. Concluding remarks

We have argued that the marked differences in saving behavior in Asia and Latin America during the capital inflow surge of the 1990s do not stem from systematic regional differences of how domestic saving responds in the short run to changes in foreign saving. None of the evidence we have reviewed here suggests: that preferences in the two regions significantly differ; that the prevalence of liquidity constraints is markedly different across regions (although this is the most promising of the hypotheses); that the macroeconomic policy response to the inflow of the 1990s was consistently different in Asia than in Latin America; or that the cyclical components of capital inflows and domestic saving are

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[21] Let ρ_A and ρ_{LA} denote the correlation for Asia and Latin America, respectively, we define

$$Z_A = \frac{1}{2}\log_e \frac{(1+\rho_A)}{(1-\rho_A)}$$

$$Z_{LA} = \frac{1}{2}\log_e \frac{(1+\rho_{LA})}{(1-\rho_{LA})}.$$

The null hypothesis of no regional differences can be tested using Z (below); this yields a value of 0.206, which is not significantly different from zero.

$$Z = \frac{(Z_1 - Z_2) - 0}{\sigma}$$

$$\sigma = \left(\sigma_A^2 + \sigma_{LA}^2\right)^{1/2}.$$

positively correlated in Asia and negatively correlated in Latin America. Indeed, we find domestic saving and foreign saving are inversely, significantly, and similarly correlated in both regions. Furthermore, the cyclical components of domestic saving and foreign saving exhibit a significant degree of co-movement across regions.

The key difference in saving behavior during the surge in capital inflows of the 1990s between East Asia and Latin America does not appear to have a 'short-run' explanation. It is rooted in the fact that the trend in the saving rate in East Asian economies has been significantly positive in the past two decades, whereas for most Latin American countries saving ratios have stagnated. Hence, even when saving falls below trend, as it did in Asia during the early 1990s, measured saving rates do not decline in absolute terms.

Based on these results, we argue that the emphasis popular opinion has placed on the short-run response of domestic saving to a surge in capital inflows and the role accorded to this in insulating economies from the vagaries of international capital flows is misplaced. Setting aside the demographic factors, which are largely beyond the domain of stabilization policy, saving rates fell in Latin America and not in Asia in the 1990s, not because of recent policy mistakes or differences in the private sector response, but due to the cumulative effects of past policy mistakes. Some of the literature we have reviewed here suggests that financial deepening plays a significant role in stimulating saving; financial deepening in Asia far outpaced the Latin American experience, where high and chronic inflation often fuelled an acute disintermediation process. The trends in per capita income, which have also been shown to influence saving, mimic the trends in saving in the two regions, with a sharp upward trend in Asia and a much flatter profile in Latin America. Consistent with the previous observation, a recent literature has suggested that growth causes saving and not the other way around. In this regard, the performance during the past 15 years has also differed markedly in favor of the East Asian economies. To the extent that this highly differentiated track record largely reflects a series of past poor policy choices in many Latin American countries, where failed inflation stabilization plans and chronic credibility problems have abounded, one can conclude that the decline in saving rates in many Latin American countries in the 1990s had secular, not cyclical, causes.

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