

CAPITAL FLOWS & CURRENT ACCOUNT DEFICITS IN THE 1990s:  
Why Did Latin American & East Asian Countries Respond Differently?

by  
Angelos A. Antzoulatos

**Federal Reserve Bank of New York  
Research Paper No. 9610**

May 1996

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**CAPITAL FLOWS & CURRENT ACCOUNT DEFICITS IN THE 1990s**  
**Why Did Latin American & East Asian Countries Respond Differently ?**

ANGELOS A. ANTZOULATOS\*

ABSTRACT.

The return of private capital to highly-indebted L.D.C.s in the late 1980s was accompanied by widening current account (CA) deficits in the recipient countries, which were primarily attributed to a consumption boom in Latin America (L.A.) and an investment surge in East Asia. Interpreting the return as an increase in the external debt ceiling, the maximum amount that can be borrowed, this paper analyzes and compares the different response of the two regions using the conceptual framework of a borrowing-constrained agent. According to it, an increase in the debt ceiling can reduce precautionary savings, and induce higher demand (and widening CA deficits) even when the borrowing constraint does not bind. Moreover, the increase in demand should be decreasing in the original ceiling. The results from a panel of fourteen L.A. and a panel of eight E. Asian countries are consistent with the framework. They also indicate that the different response of the two regions can, to a large extent, be explained by L.A.'s lower ceiling prior to the return. Further, the results identify several developments which have not received sufficient attention in the literature and, among other policy implications, suggest that controls on capital inflows may not be effective in preventing a CA deterioration.

J.E.L. Classification Numbers: E21, F32

\*Research Department – International Macroeconomics Function, Federal Reserve Bank of New York, 33 Liberty Street, New York, N.Y. 10045. Phone: (212) 720-6813, fax: (212) 720-6831.

I thank George Katsimbris for insightful discussions at an early stage of the project, and Nilmini Gunaratne and Kevin Kime for assistance in collecting and interpreting the data. I also thank Leonardo Bartolini, Susan Charrette, Gabriel deKock, Linda Goldberg, Erica Groshen, Matthew Higgins, Juann Hung, Carol Osler, Frank Packer, and seminar participants at the FRBNY for numerous comments and suggestions which helped immensely in improving the theory section, as well as the analysis and interpretation of the econometric results. Of course, none is responsible for any remaining errors.

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# 1 INTRODUCTION

The surprise return of private capital to Less Developed Countries (L.D.C.s) in the late 1980s was at the time regarded as the herald of a new era for the highly-indebted recipient countries, many of which were still suffering from the traumatic experience of the debt crisis. The euphoria did not last for long though. Policy makers and informed observers quickly became apprehensive about the prospect of a sudden capital-flow reversal which could trigger an external financing crisis, threaten the financial systems of the recipient countries and, eventually, lead to another debt crisis (Calvo et al. [1992b and 1993], Dooley [1994], Dooley et al. [1994], Kaminsky and Pereira [1994], Rohas-Suarez and Weisbrod [1995]). The similarities with the macroeconomic developments which preceded the crisis of the 1980s were striking; among them, widening current account (*CA*) deficits, partly financed by capital flows, and real exchange rate appreciation in the recipient L.D.C.s; plus a decline in the U.S. interest rates, widely regarded as a major factor motivating the flows (Calvo et al. [1992b]). Thus, it is not surprising that the return of private capital to L.D.C.s attracted a lot of attention, as indicated by the numerous studies which analyze the determinants (Calvo et al. [1992b], S. Calvo and Reinhart [1995], Chuhan et al. [1993]) and characteristics of the flows (Culpeper [1994], Gooptu [1993], Griffin-Jones [1994]), as well as the policy dilemmas and response of several countries (Carneiro and Garcia [1995], Glick and Moreno [1994], Rosende [1995], Sachs et al. [1995], Spiegel [1995]).

Yet, despite all this collective effort, several pertinent questions have not been fully addressed. Among them, why were the widening current account deficits primarily due to a consumption boom in L.A. and an investment surge in East Asia (Kaminsky and Pereira [1994])? Is there any systematic difference between the two regions, and why? How did other components of domestic demand behave? Could capital flows have not only allowed higher domestic demand, by relaxing a binding external financing constraint, but also induced it in cases where the constraint was not binding? Is the decline in savings in L.A., another major development which accompanied the return of private capital to L.D.C.s, permanent or temporary?

Addressing these questions bears more than academic relevance. It holds the key to designing and implementing effective policies to cope with capital flows, and to evaluating the likely performance of countries which tap the international financial markets for the first time or after a long absence. Serving as a strong reminder of this need, the surge of capital flows to Central and Eastern Europe, which started in 1992, was accompanied by widening current account deficits, increasing consumption, and real exchange rate appreciation, as in the case of L.A. earlier in the decade (Calvo et al. [1995]). Further, addressing these questions may help draw useful lessons for, if the past can be a guide for the future, the cycle of surges and sudden reversals of capital

flows to L.D.C.s will most likely occur again.

Since the flows relax the external financing constraint L.D.C.s usually face, this paper addresses the aforementioned questions using the conceptual framework of a forward-looking borrowing-constrained individual, who tries to smooth consumption over time. Extending the theoretical results of Antzoulatos (1994) and Xu (1995) to the case of an external financing constraint, the paper argues that domestic demand and its components should be increasing in the amount of foreign exchange reserves carried over from the previous period, and in the debt ceiling –the maximum amount L.D.C.s can borrow. Briefly, as in Edwards (1984) and van Wijnbergen (1990), the reserves are interpreted as precautionary savings at the country level, which are used to protect against negative income shocks and against hitting a binding borrowing constraint. Under this interpretation, an increase in the reserves carried over from the previous period is allocated between current and future demand. In addition, an increase in the debt ceiling provides a bigger buffer to protect against hitting a binding constraint and, thus, leads to lower precautionary savings and higher demand even when the constraint does not bind. More important, the increase in demand, caused by an increase in reserves or in the debt ceiling, should be smaller when the original ceiling is high.

The econometric results from a panel of fourteen L.A. and a panel of eight E. Asian countries, over the period 1989 through 1994, are consistent with the conceptual framework. They also indicate that several aspects of the different response of the two regions can be explained by L.A.'s lower ceiling prior to the return, the lower ceiling reflecting the debt crisis of the 1980s and L.A.'s poor macroeconomic performance relative to Asia. Most importantly, the regression coefficients of domestic demand and its components on capital flows and on reserves carried from the previous period are higher for L.A. than for Asia. (In these regressions, actual flows are used as a proxy for the unobservable debt ceiling, while all variables are expressed as fractions of GDP.) The estimated coefficients not only illustrate the capacity of capital flows to induce higher demand even in countries which do not face a binding external financing constraint, but also stress the role of accumulated reserves in supporting it. For Asia, in particular, reserves appear to be the major force behind the investment surge. Further, the results indicate that, contrary to the perceived wisdom, investment and government consumption contributed to L.A.'s widening *CA* deficits more than commonly thought.

Noteworthy, the conceptual framework is in the spirit of the intertemporal optimization models that attempt to explain the consumption boom which is often associated with the stabilization programs in high-inflation countries (Calvo [1986], Reinhart and Végh [1994]), and with credible liberalization (McKinnon and Pill [1994]). It is less restrictive though. Notably, it does not rely on Calvo's assumption of temporary, or *perceived* as such, reforms to explain the boom. In

fact, it predicts that the boom will be bigger when the reforms and the associated increase in the debt ceiling are perceived as permanent. Nor does the paper rely on McKinnon and Pill's assumption of over-optimistic expectations about higher future productivity; the increased ceiling by itself is sufficient to induce higher borrowing and spending. Another advantage of the paper's conceptual framework is that it addresses the aforementioned questions in a unifying framework. Nevertheless, it most likely explains some of the macroeconomic developments associated with the return of private capital to L.D.C.s and, thus, complements the aforementioned studies.

The remainder of the paper is organized as follows. Section 2 discusses the macroeconomic developments in L.A. and Asia which motivate this study. Section 3 presents the conceptual framework and compares its implications with those of the models which analyze the consumption booms often associated with inflation-stabilization programs. Section 4 discusses the testable implications and the econometric problems which arise from the inability to measure the external debt ceiling. Section 5 presents the empirical results, while section 6 concludes with some brief answers to the questions raised above. Finally, an appendix describes the data in detail.

## 2 INDICATORS OF MACROECONOMIC PERFORMANCE

FIGURES 1A through 2B, which summarize several macroeconomic developments in L.A. and East Asia during the period 1985 through 1994, illustrate eloquently the questions this paper addresses. FIGURE 1A exhibits the ratios of private consumption ( $C$ ), government consumption ( $G$ ), and investment ( $I$ ) relative to  $GDP$ , for L.A.. All the major countries for which relevant information is available are included. FIGURE 1B exhibits the same ratios for East Asia. The three series are denoted by the "empty square", "empty diamond" and "filled triangle" symbols, respectively. FIGURES 2A and 2B exhibit national savings ("filled square"), net exports of goods and services ("filled diamond"), and foreign exchange reserves (bar chart) relative to  $GDP$  for the two regions. National savings is calculated as  $S = GDP - C - G$ , and net exports as  $NX = GDP - C - I - G$ .  $NX$  is used instead of the  $CA$  to illustrate the impact of the consumption boom and investment surge, because the  $CA$  additionally includes net factor income ( $NFI$ ).  $NFI$ , which can be substantial due to high debt-servicing payments, may obscure the cause of the  $CA$ 's deterioration.

Insert Figures 1A & 1B Here

As these figures demonstrate, the widening current account deficits reflect primarily a consumption boom in L.A. and an investment surge in Asia. In the former, the consumption-to-GDP

ratio was rising during the 1990s, and, with the exception of Brazil, Chile, Costa Rica, and the Honduras, exceeding significantly its values during the five years leading to 1989. In the latter, the ratio has been either relatively constant (Indonesia, Korea, Malaysia, Philippines), or declining (China, Singapore, Taiwan, Thailand). In addition, the investment-to-GDP ratio rose modestly in L.A. and very significantly in Asia. But, despite the perception of fiscal consolidation in L.A., the government consumption-to-GDP ratio does not seem to have been on a clear downward path, with the notable exception of Chile, Ecuador, the Honduras, Panama and Venezuela. In Asia, this ratio has been declining over the period 1985 to 1994, with the exception of China and Korea, where it has been relatively stable, and the Philippines, where it rose slightly.

Insert Figures 2A & 2B Here

Another vehicle to examine the forces behind the  $CA$  deterioration is the savings-investment identity,  $S = I + CA$ . Relative to the period 1985 through 1988, the savings-to-GDP ratio declined in Argentina, Colombia, Mexico, Peru and Uruguay, increased in Chile, Ecuador and the Honduras, and remained relatively stable in the remaining L.A. countries. In contrast, Asia's savings ratio has been either constant or increasing, with the exception of the Philippines. The rising savings ratio indicates that Asia's  $CA$  deterioration is largely due to an increase in investment.

Further, the fall in  $NX$  (which, presumably, is accompanied by bigger  $CA$  deficits), along with the continuing accumulation of reserves, indicates that total capital flows exceeded the financing needs of many recipient countries. Notable examples are Argentina, Guatemala, the Honduras, Mexico and Peru in L.A.; and Korea, Malaysia, the Philippines and Thailand in Asia. Worth also noting, L.A.'s fall in  $NX$  was more widespread than the fall in savings, as it affected Argentina, Brazil, Colombia, Costa Rica, Guatemala, Mexico and Uruguay. Finally, leaving aside Malaysia, Singapore and Taiwan which are outliers, the reserves-to-GDP ratio is, on the average, approximately equal in the two regions.

### **3 THEORY**

#### **3.1 Conceptual Framework**

The prevailing consumption paradigm, the Life-Cycle/Permanent Income Hypothesis model, postulates that people decide how much to consume out of contemporaneous income based on their expected life-time resources and limited access to borrowing. More formally, a forward-looking

individual maximizes the expected value of a time-separable utility function, equation (1), subject to a borrowing constraint, inequality (2), the asset evolution constraint, equation (3), and the usual life-time budget constraint.

$$Max E_t \left\{ \sum_{t=1}^T \beta^{t-1} u(c_t) \right\} \quad (0 < \beta = \frac{1}{1+\delta} < 1) \quad (1)$$

s.t.

$$c_t \leq x_t + U_t \quad (U_t \geq 0) \quad (2)$$

$$x_t = R(x_{t-1} - c_{t-1}) + y_t = R s_{t-1} + y_t \quad (R = 1 + r \geq 1) \quad (3)$$

$$c_T = x_T \quad (4)$$

The timing and the nature of his decisions are as follows: At the beginning of period  $t$ , he decides how much to consume,  $c_t$ ; in order to maximize his expected utility, equation (1), for the remaining planning horizon, taking into account expected future income,  $E_t y_{t+k}$  ( $k \geq 1$ ). Consumption at any period cannot exceed the individual's total assets,  $x_t$ , plus a debt ceiling,  $U_t$ , as described by inequality (2). Total assets are equal to savings carried over from the previous period,  $s_{t-1} = R(x_{t-1} - c_{t-1})$ , plus realized income,  $y_t$ , as described by equation (3). For a positive debt ceiling, savings can be negative and thus  $x_t$  can be less than  $y_t$ . At the end of the planning horizon,  $T$ , consumption equals total assets, equation (4), thus ruling out Ponzi schemes. The debt ceiling, the interest rate,  $r$ , and the length of the planning horizon—which can be finite or infinite—are assumed to be exogenous. In short, optimal consumption,  $c_t^*$ , is a function of current assets,  $x_t$ , the debt ceiling,  $U_t$ , the time left to the end of the planning horizon  $T - t$ , and expected future income,  $E_t y_{t+k}$  ( $k \geq 1$ ). To simplify notation,  $T - t$  and  $E_t y_{t+k}$  ( $k \geq 1$ ) are dropped from the optimal consumption function; i.e.,  $c_t^* = c_t^*(x_t; U_t)$ .

Despite the lack of an analytical solution for  $c_t^*$  under general debt ceilings and non-quadratic utility function, several of its properties have been explored. These properties are reflected on FIGURE 3 which exhibits  $c_t^*$  as a function of assets and the debt ceiling, all expressed as fractions of contemporaneous income. The consumption profiles in FIGURE 3 have been calculated using Deaton's (1991) two-state income process, as described in Antzoulatos (1994, p. 194). Their shapes, however, can be verified theoretically by combining the results of Antzoulatos (1994) and Xu (1995).<sup>1</sup> Noteworthy, these shapes rely on some very general assumptions regarding the income process and the utility function. The latter, specifically, is assumed to

<sup>1</sup>Antzoulatos (1994) and Xu (1995) have shown respectively the properties expressed by inequalities (7) and (6). Combining them, one can prove the properties expressed by (8) through (10), which, to the best of my knowledge, are analyzed for the first time in this paper. Finally, (5) has been explored by many authors.

be continuous, strictly increasing, three times continuously differentiable with a positive third derivative, and concave. As Zeldes (1989) analyzes, a positive third derivative ensures the existence of precautionary savings.

Insert Figure 3 Here

As illustrated in FIGURE 3,  $c_t^*(x_t; U_t)$  is continuous, strictly increasing, and concave in assets. (Xu's proof for  $U_t = 0$  also applies to  $U_t \neq 0$ ). The 45-degree, straight-line segments of the consumption profiles correspond to the (low) asset levels at which the individual optimally chooses to exhaust his credit line and, thus, face a binding constraint ([2] holds as an equality). At these low asset levels, the desire for higher consumption, determined by his preferences and expected future income, dominates the precautionary savings motive. As a result,  $c_t^*$  increases one-to-one with  $x_t$ . However, above a critical asset level,  $x_t^* = x_t^*(U_t)$ , the individual spends progressively less out of each additional unit of assets (For  $U_t = 0$ ,  $x_t^*$  corresponds to point *A* in FIGURE 3.) Alternatively, for  $x_t > x_t^*$ , he saves progressively more (dis-saves progressively less when  $x_t^* < c_t^* \leq x_t^* + U_t$ ) as assets increase. These properties can be summarized as:

$$0 < \frac{\partial c_t^*(x_t; U_t)}{\partial x_{t-1}} \leq 1 \quad (5)$$

$$\frac{\partial^2 c_t^*(x_t; U_t)}{\partial^2 x_{t-1}} \leq 0 \quad (6)$$

FIGURE 3 also illustrates that  $c_t^*(x_t; U_t)$  is weakly increasing in the debt ceiling (Antzoulatos [1994]). More important,  $c_t^*$  can be strictly increasing in  $U_t$  even when the individual carries high savings and, consequently, does not face the spectre of a binding constraint in the foreseeable future (Compare points *B*, *C* and *D*, which correspond to savings carried from the previous period equal to forty percent of current income  $-x_t = 1.4$ ). It is the possibility of a binding constraint in the distant future—due to possible, but not certain, negative income shocks—that induces him to hold higher precautionary savings (and spend less) at lower debt ceilings. Intuitively, precautionary savings under borrowing constraints can be decomposed into two components (Xu [1995]): one, denoted as *PS1*, that protects against future income downturns, and another, denoted as *PS2*, which is caused by the borrowing constraint. The latter decreases as  $U_t$  increases, leading to higher  $c_t^*$ .

$$0 \leq \frac{\partial c_t^*(x_t; U_t)}{\partial U_t} \leq 1 \quad (7)$$

Eventually, at some high enough  $U_t$ , denoted as  $\bar{U}_t(x_t)$ , the borrowing constraint will become irrelevant, *PS2* will become zero, and  $c_t^*$  will be determined by the individual's expected life-time



resources.<sup>2</sup>  $\tilde{U}_t(x_t)$  is decreasing in  $x_t$ ; as assets increase, so do savings –by (5)– thus providing a bigger buffer to hedge against negative income shocks. In FIGURE 3,  $\tilde{U}_t(x_t = 1.4) \approx 0.10$  (point *D*),  $\tilde{U}_t(x_t = 1.6) \approx 0.05$  (point *E*), and  $\tilde{U}_t(x_t = 1.8) \approx 0.0$  (point *F*).

A notable feature of FIGURE 3 is that the consumption profiles converge as assets increase. In mathematical terms, the slope of  $c_t^*(x_t, U_t)$  with respect to  $x_t$  is (weakly) decreasing in  $U_t$ , (inequality [8]). When  $U_t \geq \tilde{U}_t(x_t)$ , (8) will hold as an equality. This property is a direct implication of *Proposition 4* in Xu (1995, p.681). In essence, it suggests that the difference in the consumption levels of otherwise-identical individuals who differ only in the debt ceilings they face will decrease as assets increase. The reason is that, when the constraint is not binding, savings increase along with assets, thus reducing *PS2*. As a result, the individuals with the lower ceiling, the ones who have to carry higher *PS2*, spend more out of each additional dollar.

$$\frac{\frac{\partial c_t^*(x_t; U_t)}{\partial x_t}}{\partial U_t} \leq 0 \quad (8)$$

From the above properties, it follows that the impact of an increase in the debt ceiling progressively decreases as  $U_t$  increases (The distance *BC* is greater than *CD*). A heuristic proof follows. Let  $\tilde{x}_t(U_t = 0)$  be the asset level at which *PS2* becomes zero for the  $U_t = 0$ -individual (point *F*). Such a level exists as high savings can protect this individual from hitting a binding constraint in the worst-case scenario (Xu [1995]). For  $x_t \geq \tilde{x}_t(U_t = 0)$ , it will be  $c_t^*(x_t, U_t = 0) = c_t^*(x_t, U_t = \infty)$ . Conversely, for  $x_t < \tilde{x}_t(U_t = 0)$ , it will be  $c_t^*(x_t, U_t = 0) < c_t^*(x_t, U_t = \infty)$ . Next,  $\tilde{x}_t(U_t)$  is decreasing in  $U_t$ , as a higher ceiling provides a bigger buffer to protect against hitting a binding constraint. This, along with the properties that  $c_t^*$  is concave in assets and that the consumption profiles converge as assets increase (8), proves the argument.

$$\frac{\partial^2 c_t^*(x_t; U_t)}{\partial^2 U_t} \leq 0 \quad (9)$$

By the same reasoning, the impact of an increase in the debt ceiling decreases as assets increase; i.e.,

$$\frac{\frac{\partial c_t^*(x_t; U_t)}{\partial U_t}}{\partial x_t} \leq 0 \quad (10)$$

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<sup>2</sup>In this case,  $c_t^*(x_t, \tilde{U}_t(x_t)) = c_t^*(x_t, U_t = \infty)$ , where  $U_t = \infty$  corresponds to the debt ceiling of the individual who faces only his life-time budget constraint, equation (4), and whose *PS2* is zero. In other words,  $\tilde{U}_t(x_t)$  is the minimum debt ceiling which will allow the individual to avoid a binding constraint in the worst-case scenario; i.e., when the lowest possible income is realized in every period until the end of the planning horizon. See Xu (1995) for more details.

In general, a *permanent* increase in the debt ceiling will induce a bigger rise in  $c_t^*$  than a *temporary* one. For the record, the consumption profiles in FIGURE 3 correspond to debt ceilings which remain constant throughout the planning horizon. Let, for the argument's sake,  $U_t$  increase for the period  $t$  *only* to  $U_t = 5$  from  $U_t = 0$ . This temporary increase will affect  $c_t^*$  only at low asset levels at which the  $U_t = 0$ -constraint is binding, that is, at  $x_t < x_t^*(U_t = 0)$ . At  $x_t > x_t^*(U_t = 0)$ ,  $c_t^*$  will not be affected. However, as the duration of  $U = 5$  increases,  $PS2$  will decrease and  $c_t^*$  will rise by more. By the same token, if  $U_{t+k}$  ( $k \geq 1$ ) is expected to be between zero and five,  $c_t^*$  will lie between the consumption profiles which correspond to  $U_t = 0$  and  $U_t = 5$  in FIGURE 3.

The above properties suggest the regression equation below in which consumption, savings carried over from the previous period, and the debt ceiling are expressed as fractions of current income. Savings is used in place of assets, because  $x_t$  is increasing in  $s_{t-1}$  (equation [3]).  $u_t$  is the usual error term.

$$\frac{c_t^*}{y_t} = \alpha + \beta \frac{s_{t-1}}{y_t} + \gamma \frac{U_t}{y_t} + u_t \quad (11)$$

It is expected that  $0 < \beta \leq 1$  (inequality [5]) and  $0 \leq \gamma \leq 0$  (inequality [7]). Unlike  $\beta$ ,  $\gamma$  can be zero as, at high debt ceilings, an increase in  $U_t$  may have no impact on optimal consumption. Also, controlling for  $U_t$ ,  $\beta$  and  $\gamma$  are expected to be lower for individuals who carry high savings (inequalities [6] and [10]). Conversely, controlling for  $x_t$  (and –by [3]–  $s_{t-1}$ ),  $\beta$  and  $\gamma$  are expected to be lower for those who enjoy a higher debt ceiling (inequalities [8] and [9]).

### 3.2 Precautionary Savings, Foreign Exchange Reserves and Capital Flows

This paper interprets foreign exchange reserves as precautionary savings at the country level, and the return of private capital to L.D.C.s as an increase in the external debt ceiling they face. For the first, reserves provide a buffer to smooth domestic demand in case of future declines in foreign currency revenues. A similar interpretation is suggested by Edwards (1984), who treats the reserves-to-GNP ratio as an indicator of international liquidity, and by van Wijnbergen (1990), who suggests that reserves provide insurance to countries against negative shocks. Needless to say, several sample countries held reserves for other reasons as well; such as, to support their currencies during the implementation of exchange-rate based inflation-stabilization programs. Fortunately, however, such country-specific reasons can be accounted for by the panel-estimation technique the paper employs (see next section).

The interpretation of foreign exchange reserves as precautionary savings creates a subtle

problem. In the conceptual framework outlined above,  $x_t$  and  $s_{t-1}$  correspond to total assets and savings. Thus, a positive  $s_{t-1}$  implies that the individual is a net saver. Yet, all countries, net debtors and net savers alike, carry positive reserves. To resolve this problem, one can interpret the borrowing constraint, inequality (2), as a cash-in-advance constraint, and  $E_t y_{t+k}$  ( $k \geq 1$ ) as expected future income net of scheduled payments associated with existing debt. Under this interpretation,  $U_t$  represents the maximum amount a country can borrow in addition to its existing debt. Thus, an increase in  $U_t$  or in reserves relaxes the cash-in-advance constraint and reduces  $PS2$ . Consequently, the conclusions of the previous section are expected to hold when foreign exchange reserves are used in place of  $s_{t-1}$ .

Putting everything together, the return of private capital to L.D.C.s in the late 1980s may have caused an increase in domestic demand via two channels: by allowing the recipient countries to smooth domestic demand in case of a binding external financing constraint, and by inducing higher demand in countries which carried high foreign exchange reserves and were not facing a binding constraint. Noteworthy, the higher demand is entirely rational despite that it leaves a recipient country more vulnerable to negative developments at home and abroad. Prominent examples of such developments are a global recession which may hurt the country's exports, and a reversal of the flows triggered by higher interest rates in the industrial world (the latter being particularly stressed by Calvo et al. [1992b] and [1993]). Moreover, since the life-time budget constraint (equation [4]) is satisfied, the higher demand does not rely on a Ponzi scheme where the debt incurred today will be serviced by future borrowing. Simply, the higher ceiling provides a bigger buffer to smooth the impact of a negative shock, thus weakening the precautionary saving motive – the  $PS2$  component.

### 3.3 Relation to Existing Literature

By allowing or inducing higher demand, capital flows can lead to widening  $CA$  deficits; everything else equal, an increase in domestic demand leads to a decline in the  $CA$ . Further, by supporting an expansion of bank credit to the private sector, foreign exchange reserves and capital flows can induce a consumption boom and an investment surge. By the same token, they can also lead to higher government consumption.

Thus, the model of a borrowing-constrained individual provides an alternative framework to analyze the surge in domestic demand, or components thereof, often associated with inflation-stabilization programs or with capital flows. To begin with, the paper's framework is consistent with Copelman's evidence that capital flows supported a credit expansion to the private sector and, through it, the consumption boom which followed Mexico's stabilization program in the late

1980s (Copelman [1994]). Implicit in her analysis, however, is the assumption that Mexican households were facing a binding constraint. In contrast, the paper's conceptual framework suggests that the increased availability of credit could have had the same effect even when people were not facing a binding constraint. In addition, the paper argues that foreign exchange reserves carried over from the previous period may have supported the credit expansion and the associated consumption surge.

Further, using a cash-in-advance model, Calvo (1986) suggests that a temporary, or *perceived* as such in the case of non-credible reforms, exchange rate-based stabilization program may cause a consumption boom. Briefly, under perfect capital mobility, a temporary reduction in the rate of currency depreciation leads to a temporary reduction in the nominal interest rate. The latter, reduces the opportunity cost of holding money and, through it, the cost of current consumption relative to future consumption. In response, forward-looking individuals substitute current for future consumption. Unlike Calvo's model, however, the present one predicts that the consumption boom will be stronger when the capital flows are perceived as a permanent increase in the debt ceiling. Combining the two models, to the extent that credible reforms increase a country's access to external financing, they can cause a consumption boom even when the cost of current and future consumption is the same.

A related explanation for the consumption boom, associated with inflation-stabilization programs, stresses the expansionary effect of lower real interest rates. According to it, the stabilization program leads to a lower nominal interest rate. But inflationary expectations change slowly, thus leading to a lower real rate and, through it, to higher consumption. This effect is consistent with the paper's framework, as a lower real rate is likely to induce more borrowing and higher demand even in an explicit intertemporal optimizing framework, in which both the income and substitution effects operate. To assess the relative strength of the higher debt ceiling and lower real interest rate, the estimated equation, equation (12) below, is augmented to include the latter as an additional independent variable. However, in further support of the paper's intuition, a consumption boom has occurred even in countries in which the real interest rate rose (Reinhart and Végh [1994]).

A consumption boom could also be triggered by the elimination of restrictions on imports of consumer goods which is perceived as temporary, as people increase their consumption of tradeable goods before the restrictions are re-imposed (Calvo [1988]). Yet, this explanation cannot account for the increased spending on non-tradeable goods, which usually occurs during a consumption boom. Moreover, it is not consistent with the evidence, presented below, that capital flows affected positively not only private, but also government consumption in L.A., unless, of course, governments fool themselves.

Finally, the paper's conceptual framework is related to the descriptively-called "over-borrowing syndrome", which was experienced by several countries –developing and developed alike– in the aftermath of policy reforms (McKinnon and Pill [1994]). McKinnon and Pill's analysis, however, relies on the banking sector's superior information relative to the information of other economic actors, and on the moral hazard created by the expectation that governments will not allow banks to collapse under the burden of bad loans. Briefly, over-optimistic agents want to consume and invest more in anticipation of higher future income, while the banking sector is willing to satisfy their demand for credit even if it does not share the same optimism. Banks act so in the knowledge that they will be bailed out if the over-optimistic expectations do not materialize and their borrowers default. In contrast, this paper does not rely on informational asymmetries or over-optimistic expectations to justify higher borrowing and spending in the event of a surge in capital flows; the perception of a higher external debt ceiling would suffice. In any case, the empirical relevance of the "over-borrowing" syndrome can be assessed by including proxies of income expectations in the estimated equations.

## 4 TESTABLE IMPLICATIONS & ECONOMETRIC CONSIDERATIONS

### 4.1 Testable Implications

The data come mostly from the *International Financial Statistics* (IFS) database and are described in the appendix. Because for many sample countries IFS reports macroeconomic series at an annual frequency only, the paper pools time series and cross section data. The estimated equation is:

$$\frac{X_{i,t}}{Y_{i,t}} = \alpha_i + \beta \frac{S_{i,t-1}}{Y_{i,t}} + \gamma \frac{U_{i,t}}{Y_{i,t}} + u_{i,t} \quad (12)$$

$i$  denotes the country, while  $\alpha_i$  is the country-specific intercept (fixed effect). The common across-regions slopes are expected to be  $0 < \beta \leq 1$  and  $0 \leq \gamma \leq 1$ . Also,  $X$  stands for domestic demand or any of its components, namely, private consumption, investment and government consumption.  $S_{i,t-1}$  corresponds to total foreign exchange reserves minus gold at the end of the  $t-1$  year. The reserves, which are reported in U.S. dollars, are converted to local currency using the average exchange rate for the  $t$  year. In this way,  $\frac{S_{i,t-1}}{Y_{i,t}}$  measures the current purchasing power of the reserves carried over from the previous period. Nevertheless, the conclusions are virtually the same when the end-of-period  $t-1$  exchange rate is used for the conversion. The sample period extends from 1989, the first year private capital returned to L.D.C.s, to 1994, the last year for which relevant macroeconomic data are available.

There is a caveat though which affects the analysis of the results for investment. Namely, the implications of the conceptual framework rely on the assumption that the utility function is concave and has a positive third derivative. The positive third derivative ensures that precautionary savings exists, which, in turn, guarantees that demand can be increasing in the debt ceiling even when the borrowing constraint does not bind. This assumption is widely accepted for private consumption. It can also be justified for government consumption and, in the spirit of intertemporal models of the current account, for domestic demand. But it cannot be readily justified for investment. Still, equation (12) will hold for investment if firms face binding borrowing constraints, while reserves and flows increase the availability of credit to them.

Besides the restrictions  $0 < \beta \leq 1$  and  $0 \leq \gamma \leq 1$ , the model, along with the historical experience of the sample countries, implies that both coefficients should be higher for L.A. than for Asia. Specifically, over the period 1989 through 1994, L.A. and Asian countries carried on the average approximately equal reserves relative to *GDP* (see FIGUREs 2A and 2B). The former, however, were most likely facing a lower debt ceiling before the surge in capital flows. The underlying assumption is that past difficulties in meeting debt-service obligations or outright default, as well as poor macroeconomic management, affect negatively a country's access to the international financial markets.<sup>3</sup> Further, the very high reserves-to-GDP ratios for Singapore, Taiwan and, to a lesser extent, Malaysia suggest that deleting them from the sample should result in higher  $\beta$  and  $\gamma$  for Asia.

Finally, to test the empirical relevance of the "over-borrowing syndrome" and lower real interest rates, equation (12) is augmented as shown below.  $E_t\Delta y_t - \Delta y_t$ , the difference between expected and realized GDP growth for the two regions, is a proxy for "over-optimistic" expectations, while  $r_{i,t}$  denotes the real interest rate. Both variables are described in the data appendix. It should be mentioned, however, that the regional growth rates are used out of necessity. Specifically,  $E_t\Delta y_t$  is taken from the May issue of the IMF's *World Economic Outlook* of the  $t^{\text{th}}$  year. Unfortunately, the *Outlook* does not provide GDP-growth forecasts for many sample countries for the entire sample period.

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<sup>3</sup>Briefly, with the exception of the Philippines, Asian countries avoided in the 1980s the debt-servicing difficulties of their L.A. counterparts. This is documented in Table A1 (p. 41) of the March 1995 *Private Market Financing for Developing Countries*, which lists debt restructuring during the previous decade. In addition, L.A. countries figure prominently in the protracted negotiations which followed the wave of international debt default of the 1930s (Fernandez-Ansola and Laursen [1995]). Finally, if the quality of economic management could be an indicator of perceived creditworthiness, L.A.'s record is much poorer than Asia's: As Mas' witty account of recent currency reforms documents, five L.A. countries experienced hyperinflation in the 1980s (Mas, 1995, TABLE 1, p. 485), and seven embarked on a currency reform since 1980 (Mas, 1995, TABLE 2, pp. 488-489). No Asian country has done either since 1980. Further, the hypothesis that L.A. countries were facing a stricter credit rationing than Asian ones is reflected on the writings of knowledgeable observers (see, for example, Calvo et al. [1993, p.7]).

$$\frac{X_{i,t}}{Y_{i,t}} = \alpha_i + \beta \frac{S_{i,t-1}}{Y_{i,t}} + \gamma \frac{U_{i,t}}{Y_{i,t}} + \zeta(E_t \Delta y_t - \Delta y_t) + \theta r_{i,t} + u_{i,t} \quad (13)$$

In equation (13), a negative  $\theta$  would be consistent with the paper's framework, as higher interest rates are likely to reduce borrowing and consumption. Also, a positive  $\zeta$ , an indication that consumption was positively correlated with the GDP-growth forecast error, would suggest that the "over-borrowing syndrome" was operating along with the reduced precautionary saving motive postulated by the paper. In short, only when the inclusion of  $r_{i,t}$  and  $E_t \Delta y_t - \Delta y_t$  renders  $\beta$  and  $\gamma$  insignificant would the evidence be inconsistent with the framework.

## 4.2 Econometric Considerations

A positive aspect of the panel estimation approach is that country-specific idiosyncratic factors can be captured by the country-specific intercepts, thus allowing  $\beta$  and  $\gamma$  to capture the effect of deviations of  $\frac{S_{i,t-1}}{Y_{i,t}}$  and  $\frac{U_{i,t}}{Y_{i,t}}$  from their means on the same deviations of  $\frac{X_{i,t}}{Y_{i,t}}$ . Examples of such factors are the need to hold high reserves to support a country's currency during the implementation of exchange-rate based inflation-stabilization programs; and the stage of development, time preferences (parameter  $\delta$  in equation [1]) and consumer access to credit, all of which affect the average consumption-to-GDP ratio. Precisely, a country at an early development stage, or with high  $\delta$  or high consumer access to credit will probably be characterized by a high average  $\frac{C}{Y}$  ratio.

But a serious challenge is presented by the measurement of the debt ceiling,  $U_{i,t}$ . Simply, an observer, regardless of how much informed he may be, does not know the maximum amount a country can borrow. He only observes the amounts raised in the international financial markets. Let  $B_{i,t}$  and  $L_{i,t}$  denote the amounts raised in the international bond and loan markets. Leaving aside the severe measurement problems, discussed extensively in World Bank (1988),  $B_{i,t}$  and  $L_{i,t}$  reflect not only the supply of credit to L.D.C.s, but also the demand for credit by them. There is no way to disentangle the two effects and infer  $U_{i,t}$ . The strength of the "supply" effect, however, is manifested in the reserve accumulation by the recipient countries, an indication that total flows exceeded their *CA* deficits.

Yet, despite that the debt ceiling is not observable, the model's implications can be tested and the experience of the L.A. and Asian sample countries can be compared. A sufficient condition is that  $U_{i,t}$  is correlated with either  $B_{i,t}$  or  $L_{i,t}$ , or their sum,  $B_{i,t} + L_{i,t}$ . In more detail, using  $B_{i,t}$  as a proxy of  $U_{i,t}$  would result in biased coefficient estimates  $\hat{\beta}$  and  $\hat{\gamma}$ , given by:

$$\hat{\beta} = \beta + \lambda\gamma \quad (14)$$

$$\hat{\gamma} = \mu\gamma \quad (15)$$

where  $\lambda$  and  $\mu$  denote the (unknown) regression coefficients of  $U_{i,t}$  on  $S_{i,t-1}$  and  $B_{i,t}$ , respectively. As the explanatory value of  $B_{i,t}$  for  $U_{i,t}$  increases,  $\lambda$  and  $\beta$ 's bias decrease. In the unlikely case where  $U_{i,t}$  is proportional to  $B_{i,t}$ ,  $\lambda$  should be zero. Similar analysis applies to using  $L_{i,t}$  and  $B_{i,t} + L_{i,t}$  as proxies of  $U_{i,t}$ .

The sign of  $\lambda$  is not known a priori. On the one hand, high reserves may reflect high precautionary savings because of a low debt ceiling. Provided the low ceiling is manifested in low borrowing,  $\lambda$  would be negative. On the other hand, high reserves may reassure potential lenders about a country's ability to meet its payments obligations on schedule, thus inducing them to be more willing to lend to this country or buy its bonds. In this case,  $\lambda$  would be positive. Some evidence in support of this case is provided by Edwards (1984). In his empirical study of the determinants of the spreads over LIBOR L.D.C.s paid for their Euroloans during the period 1976 through 1980, he finds that the reserves-to-GNP ratio has a negative coefficient; that is, high reserves were associated with low spreads, and vice-versa. Edwards interprets this as evidence that high reserves were associated with lower (perceived) probability of default.

Nor is the sign of  $\mu$  known a priori. High  $B_{i,t}$  may reflect a high  $U_{i,t}$ , in which case  $\mu$  would be positive. Yet, an increase in  $B_{i,t}$  might reflect a decline in expected future ceiling, indicating that  $\mu$  could be negative. By the way,  $\mu$  is likely to be greater than one, as  $U_{i,t}$  exceeds  $B_{i,t}$ .

It should also be noted that, over the sample period, L.D.C.s received significant amounts of foreign currency in the form of foreign direct investment (F.D.I.) and equity flows. Both relax the external financing constraint but, unlike bonds and loans, do not create external debt obligations. Asian countries received a much higher proportion of total capital flows in the form of FDI than their L.A. counterparts. As Calvo et al. (1993, pp. 11-12) document, 44 percent of the flows to Asia in the early 1990s was in the form of FDI; in L.A. the FDI share was only 17 percent. Similar figures for Asian countries are also reported in Glick et al. (1994). Further, L.A. countries received a larger proportion of debt-creating flows in the form of bonds, while their Asian counterparts in the form of syndicated loans. In fact, most Asian sample countries tapped the international bond market in 1993 when it was booming, buoyed by historically low interest rates. This pattern in the composition of capital flows suggests that  $B_{i,t}$  may be a better proxy for L.A.'s  $U_{i,t}$ , and  $L_{i,t}$  for Asia's—an expectation supported by the empirical results.

Finally, using total capital flows,  $FLOW S_{i,t}$ , as a proxy of  $U_{i,t}$  may, under some strict conditions, cause a serious identification problem in the estimation of equation (12). These con-



ditions are  $FLOW S_{i,t} = -CA_{i,t}$  and  $CA_{i,t} = NX_{i,t}$ . The first implies that capital flows are equal to the  $CA$  and, consequently, there is no change in reserves over time. The second implies that net factor payments are zero. Thus, given that  $GDP_{i,t} = DD_{i,t} + NX_{i,t}$ , it will be  $\frac{DD_{i,t}}{GDP_{i,t}} = 1 - \frac{NX_{i,t}}{GDP_{i,t}} = 1 - \frac{CA_{i,t}}{GDP_{i,t}} = 1 + \frac{FLOW S_{i,t}}{GDP_{i,t}}$ . As a result, the estimated coefficients should be  $\alpha_i = \gamma = 1$  and  $\beta = 0$ . These conditions do not apply to the sample countries. First, all experienced substantial variations in their reserves, an indication that  $FLOW S_{i,t} \neq -CA_{i,t}$ . Second, bonds and syndicated loans are only a part of total flows; i.e.,  $B_{i,t} + L_{i,t} < FLOW S_{i,t}$ . Third, net factor payments are substantial, making  $CA_{i,t} \neq NX_{i,t}$ .

## 5 RESULTS

### 5.1 Base Model

TABLE 1 summarizes the empirical evidence for equation (12), which largely confirms the paper's hypotheses. Starting from the left, the first two columns report the dependent variable and the proxy for the debt ceiling. The next six columns report the estimated  $\hat{\beta}$  and  $\hat{\gamma}$  coefficients, the  $R^2$  and  $D.W.$  statistics, the degrees of freedom ( $DF$ ) and the autocorrelation coefficient of the residuals ( $\rho$ )—where applicable—for L.A.. The last six columns report the same information for Asia. The cells for  $\hat{\beta}$  and  $\hat{\gamma}$  report the estimated coefficients and their  $t$ -statistics. The latter are calculated using a heteroscedasticity-consistent covariance matrix. Nevertheless, the OLS results are qualitatively the same. One, two and three asterisks (\*) denote significance at the ten, five and one percent significance level, respectively. When the residuals exhibit autocorrelation, the estimation method is non-linear least squares, in which the error term is assumed to follow the process  $u_{i,t} = \rho u_{i,t-1} + \epsilon_{i,t}$ .

TABLE 1 is also subdivided into four panels; one for domestic demand, and three for its major components; namely, private consumption, investment and government consumption. Each panel has three entries, one for each proxy of  $U_{i,t}$ . The entry with the highest  $R^2$ , presumably corresponding to the best proxy, is highlighted by bold face. For brevity, the discussion for the components is less extensive than the discussion for AD.

Insert Table 1 Here

*Domestic Demand.*

In summary, L.A.'s domestic demand was very sensitive to capital flows and foreign exchange reserves. According to the paper's conceptual framework, this indicates that the region was close to facing a binding constraint prior to the return of private capital. In contrast, East Asia was seemingly enjoying an external debt ceiling so high that the flows did not affect perceptibly its demand.

In greater detail, using  $B_{i,t} + L_{i,t}$  as a proxy for L.A.'s debt ceiling gives  $\hat{\beta} = 0.890$  and  $\hat{\gamma} = 1.113$ , which are significant at the 1 percent and 5 percent levels, respectively. The positive  $\hat{\gamma}$  suggests that  $B_{i,t} + L_{i,t}$  and  $U_{i,t}$  are probably positively correlated. Thus, provided that  $\lambda$  is positive,  $\hat{\beta}$  is likely to be a positively biased estimate of  $\beta$ . Taking into account equation (15) and that bonds and loans account for most of the flows to the region, the high  $\hat{\gamma}$  implies that L.A. countries borrowed and spent almost as much as they could.

Using  $B_{i,t}$  and  $L_{i,t}$  reinforces the above conclusions and, additionally, suggests that  $B_{i,t}$  may be the best proxy for L.A.'s  $U_{i,t}$ . With  $B_{i,t}$ , both  $\hat{\beta}$  and  $\hat{\gamma}$  are positive and significant at the 1 percent level. The  $R^2$  also rises from 0.752 to 0.795, an indication that  $B_{i,t}$  is a better proxy of the debt ceiling than  $B_{i,t} + L_{i,t}$ . Thus, according to equation (14), the decline in  $\hat{\beta}$  from 0.890 to 0.719 is consistent with the conceptual framework, while  $\hat{\beta} = 0.719$  is closer to the true  $\beta$ . Still, a  $\beta$  in the neighborhood of 0.70, which implies that 70 cents of each additional dollar of reserves was spent, is high. With  $L_{i,t}$ ,  $\hat{\beta}$  rises to 0.900 and is significant at the 1 percent level,  $\hat{\gamma}$  becomes negative but insignificant, while  $R^2$  drops to 0.726.<sup>4</sup>

For Asia, both  $\hat{\beta}$  and  $\hat{\gamma}$  are insignificant for all three proxies. The first is positive though, as expected, but the second is negative. As equation (5) implies, an insignificant  $\beta$  is not fully consistent with the model. However, this may be the product of a negative bias in  $\hat{\beta}$ .

Comparing the two regions, L.A.'s  $\hat{\beta}$  and  $\hat{\gamma}$  far exceed those of Asia, both in magnitude and significance. Thus, even though  $\hat{\beta}$  and  $\hat{\gamma}$  are biased estimates of the true coefficients, one could reasonably expect that L.A.'s  $\beta$  and  $\gamma$  are higher than those of Asia, as suggested by the conceptual framework and the historical experience of the two regions.

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<sup>4</sup>The negative sign of  $\hat{\gamma}$  is consistent with the hypothesis that  $B_{i,t}$  is a better proxy for  $U_{i,t}$  and with the fact that bond and loan financing are complementary. Thus a decrease in  $U_{i,t}$ , manifested on lower  $B_{i,t}$ , may have induced L.A. countries to a) reduce demand and b) turn to bank loans for their external financing needs. This is supported by the observation that, when the international bond market collapsed in the second quarter of 1994, following the Federal Reserve's tightening of monetary policy in February 1994, L.A. countries borrowed more in the syndicated loan market. But when the bond market recovered in the third quarter, they borrowed again more in the bond market. More precisely, the value of new international bonds declined by approximately 45 percent from the first to the second quarter of 1994, and recovered by almost 20 percent in the third. Following this trend closely, the volume of new international bonds issued by L.A. countries declined by approximately 60 percent in the second quarter and recovered by 25 percent in the third.

### *Private Consumption, Investment, and Government Consumption.*

The results for private consumption, investment and government consumption are qualitatively the same with those for domestic demand. Thus, it appears that the return of private capital affected L.A. more profoundly than Asia across the board. Specifically, both  $\hat{\beta}$  and  $\hat{\gamma}$  are higher in L.A. than in Asia for all components of domestic demand. The only exception applies to private consumption when  $L_{i,t}$  is used, in which case L.A.'s  $\hat{\gamma}$  is more negative than Asia's. But in this particular case,  $\hat{\gamma}$  is insignificant.

In particular, for all three components of domestic demand,  $\hat{\beta}$  in L.A. is positive and significant at the 5 percent level or higher, the only exception being government consumption when  $L_{i,t}$  is used as a proxy of  $U_{i,t}$ . On the other hand,  $\hat{\gamma}$  is always positive when significant. In fact, it is negative only for private consumption when  $L_{i,t}$  is used. Further,  $\hat{\gamma}$  attains its highest significance when  $B_{i,t}$  is used, another indication that  $B_{i,t}$  may be the best proxy for L.A.'s  $U_{i,t}$ . For Asia's investment,  $\hat{\beta}$  is positive and significant at the 1 percent level, while  $\hat{\gamma}$  is marginally significant at the 10 percent level only when  $L_{i,t}$  is used, an indication that  $L_{i,t}$  may be the best proxy of Asia's  $U_{i,t}$ . The equation for government purchases has been estimated in differences, as the residual's autocorrelation coefficient  $\rho$  was very close to one. In it,  $\hat{\beta}$  is positive and significant at the 1 percent level, while  $\hat{\gamma}$  is negative and significant at the 10 percent level.

Several results, however, do not fully conform with the perceived wisdom. First, it seems that investment and government consumption contributed more to L.A.'s widening *CA* deficits than commonly thought; both  $\hat{\beta}$  and  $\hat{\gamma}$  are positive and significant (and higher than in Asia), with the exception of investment when  $L_{i,t}$  is used. Also, L.A.'s investment appears more sensitive to accumulated reserves than consumption; its  $\hat{\beta}$  is higher when  $B_{i,t}$  is used. Further, contrary to the perception of fiscal consolidation in L.A., capital flows have contributed both directly and indirectly to government consumption;  $\hat{\beta}$  is positive and significant at the 5 percent, 10 percent and 1 percent levels for  $B_{i,t} + L_{i,t}$ ,  $B_{i,t}$  and  $L_{i,t}$ , respectively, while  $\hat{\gamma}$  is significant at the 5 percent level for  $B_{i,t}$ . Finally, the flows contributed to Asia's *CA* deficits mostly indirectly through the accumulation of reserves;  $\hat{\beta}$  is significant for investment and the change in the *G-to-GDP* ratio, but  $\hat{\gamma}$  usually is not.

## **5.2 Alternative Specifications**

Table 2 reports the results of instrumental variable (IV) estimation for L.A., to hedge against the simultaneity bias, and of excluding Malaysia, Singapore and Taiwan from the sample, to provide an intra-region test of the paper's conceptual framework. Table 2 has the same structure as

Table 1, the only difference being that Asia's results are placed below L.A.'s. Also, for brevity, Table 2 reports only the results with the best proxy for  $U_{i,t}$ ; i.e.,  $B_{i,t}$  for L.A. and  $L_{i,t}$  for Asia.

Insert Table 2 Here

Briefly, both  $\hat{\beta}$  and  $\hat{\gamma}$  remain positive and highly significant for L.A., and are close to their OLS point estimates in Table 1. Thus, the simultaneity bias does not seem to have driven the significance of the two coefficients. Also, the exclusion of the three high-reserve Asian countries provides further evidence in support of the paper's conceptual framework: Both  $\hat{\beta}$  and  $\hat{\gamma}$  are positive and significant at the 1 percent level for domestic demand. Also,  $\hat{\beta} = 0.715$  is very close to L.A.'s  $\hat{\beta} = 0.719$ . This indicates that the low-reserve Asian countries behaved similarly to the L.A. countries. For investment, both  $\hat{\beta}$  and  $\hat{\gamma}$  rise relative to their values in Table 1. Additionally,  $\hat{\gamma}$  becomes significant at the 1 percent level. Comparing the two regions, investment for the low-reserve Asian countries is more sensitive to reserves and flows than for L.A. countries. For private and government consumption, the results are essentially the same as in Table 1.

Insert Table 3 Here

Table 3, which has a similar structure with Table 2, summarizes the evidence from equation (13). For L.A.,  $\zeta$  and  $\theta$ , the coefficients of the "over-borrowing syndrome" proxy and of the real interest rate, are insignificant for domestic demand. Dropping  $r_{i,t}$ , whose coefficient is virtually zero, does not increase  $\zeta$ 's significance. For private consumption,  $\zeta$  and  $\theta$  are significant at the 1 percent level, while  $\hat{\beta}$  and  $\hat{\gamma}$  decline both in magnitude and significance. For investment,  $\hat{\beta}$  and  $\hat{\gamma}$  decline by less,  $\zeta$  is positive and significant at the 10 percent level, while  $\theta$  is insignificant. For government consumption, neither  $\zeta$  nor  $\theta$  is significant. For Asia's domestic demand and investment, the results are similar to those for L.A.: For the first,  $\zeta$  and  $\theta$  are insignificant, but  $\hat{\beta}$  turns significant at the 5 percent level. For the second,  $\hat{\beta}$  and  $\hat{\gamma}$  decline slightly in magnitude and significance, and only  $\zeta$  is significant at the 10 percent level.

In summary, the "over-borrowing syndrome" influenced significantly L.A.'s private consumption and investment, and, to a lesser extent, Asia's investment. But the expansionary effect of lower real interest rates is significant for L.A.'s private consumption only. These results, however, are not surprising, as L.A. countries are those which embarked on significant reforms in the late 1980s-early 1990s and, thus, those for which the two effects should be bigger.

## 6 CONCLUSION

The econometric results suggest that the conceptual framework of a borrowing-constrained individual can account for several macroeconomic developments associated with the return of private capital to L.D.C.s in the late 1980s. Thus, it holds the promise of providing not only credible answers to the questions raised in the introduction, but also important lessons for similar episodes in the future. Further strengthening this optimism, it appears that the return had a very strong effect which could not be masked by the differences among the recipient countries. Such differences pertain, but are not restricted, to stage of economic development, political and economic institutions, policy response to the surging capital flows, and stage of economic reforms (mainly in L.A.).

To summarize the answers, the return of private capital, being interpreted as an increase in the external debt ceiling, may have contributed to the widening *CA* deficits in two ways: by easing a binding external financing constraint, and by inducing higher demand through lower precautionary savings in countries which were not facing a binding constraint. Thus, for as long as the perception of a higher ceiling lasts, it is unlikely that L.A.'s savings ratio will recover. Comparing the two regions, the higher sensitivity of L.A.'s domestic demand (and components thereof) to foreign exchange reserves and capital flows can, to a large extent, be explained by the region's lower external debt ceiling prior to the return of private capital.

The results also identify several other developments which have not received sufficient attention in the literature, despite their economic and statistical significance. First, the flows contributed to the widening *CA* deficits both directly and indirectly, the latter through the accumulation of foreign exchange reserves. In fact, the reserve accumulation is the primary channel of influence for Asia. Second, contrary to the perceived wisdom, the flows contributed significantly to L.A.'s widening *CA* deficits via government consumption and investment. They also affected investment in L.A. more than in Asia. Third, and in accordance with the paper's conceptual framework, the low-reserve Asian countries behaved similarly with their L.A. counterparts. Lastly, the "over-borrowing syndrome" and the real exchange rate influenced significantly L.A.'s consumption.

What remains to be addressed is why L.A.'s private consumption was more sensitive to capital flows than investment (their respective  $\hat{\gamma}$ 's are 1.275 and 0.707 when bond flows are used as a proxy for the external debt ceiling). A possible explanation is suggested by Kaminsky and Pereira (1994), who draw on the political economy literature to explain the collapse of growth in L.A. after the onset of the debt crisis in the early 1980s. They argue that great income inequality made it almost impossible for L.A. countries to reduce spending and allocate more resources to

investment, a policy that might have enabled them to cope with the reversal of capital flows in the 1980s as successfully as their Asian counterparts. By the same token, the income inequality may have made it impossible for L.A. governments to prevent a big share of the flows being diverted to finance consumption.

An alternative explanation is suggested by the intertemporal trade-off between current and future consumption. Higher current consumption implies lower investment—due to limited resources—and, in turn, lower capital and income increases in the future. Since L.A.'s investment was severely curtailed during the 1980s, the region probably entered the 1990s with a lower capital base than Asia. It is possible then that L.A. expected a higher marginal product of capital and, thus, higher future income increases with lower investment. In short, L.A.'s behavior could be welfare maximizing. In support of this explanation, the investment-to-GDP ratio has a negative coefficient when included as an additional explanatory variable for L.A.'s consumption in equation (12). For Asia, the investment ratio is insignificant.

Finally, the results, to the extent they can be viewed as a confirmation of the paper's conceptual framework, imply an important policy lesson. That is, a consumption boom can occur even in countries which impose restrictions on capital inflows. This is so because lower precautionary savings and higher demand are induced not by the actual flows, but by the perception of higher access to external credit. Thus, as long as people believe that the government will allow sufficient inflows to cover a  $CA$  deficit, they may spend as if the controls did not exist. Such a policy, i.e.,  $FLOWS_{i,t} = -CA_{i,t}$ , is consistent with the goal of avoiding the adverse side-effects of excessive growth in domestic money supply and appreciation of the country's currency, which may occur when the flows exceed the  $CA$  deficit. Yet, it may not prevent a surge in domestic demand and a worsening  $CA$  deficit.

## 7 APPENDIX: Data Description

Aggregate data come mostly from the *International Financial Statistics* database (IFS). Consumption corresponds to private consumption (line 96f in IFS), while income corresponds to GDP (line 99b). Government consumption (line 91f) and gross fixed capital formation, i.e., investment, (line 93i) are also used. For Brazil, private consumption includes the change in stocks (line 93e), while for Argentina it further includes government consumption. The composition of GDP for the People's Republic of China (China), for which there is no information in IFS, is taken from the *China Statistical Yearbook 1994*, a publication of the country's State Statistical Bureau. In it, the main components are personal consumption, government consumption, and "accumulation", the latter closely corresponding to IFS' gross fixed capital formation. For Taiwan, which is not included in IFS, all data come from the *Industry of Free China* and the DATASTREAM database. The sample period extends from 1989, the first year private capital returned to L.A., to 1994, the last year for which information is available.

Total foreign exchange reserves minus gold (line 11d in IFS) at the end of the  $t - 1$  year are converted to local currency using the average exchange rate for the  $t$  year (line  $rf$ ). For China, prior to July 1992, line 11d comprises the foreign exchange holdings of the People's Bank of China and the Bank of China. Beginning July 1992, foreign exchange holdings at the Bank of China are not included anymore. Thus, the post-1991 IFS figures have been adjusted with the FRBNY staff estimate of the reserves held at the Bank of China. Noteworthy, currency fluctuations should not affect the interpretation of the results, despite that they affect the reserves-to-GDP ratio,  $\frac{S_{i,t-1}}{Y_{i,t}}$ . Consider the two cases below. First, let real GDP be the same at  $t - 1$  and  $t$ , and dollar-reserves—denoted as  $S_{i,t-1}^{\$}$ —does not change between  $t - 2$  and  $t - 1$ . Further assuming that PPP holds and the U.S. inflation is zero, it follows that the nominal exchange rate  $e$ [National Currency/\$] depreciates by the same rate as inflation  $\pi_{i,t}$ , the latter measured by the GDP price deflator. In this case, the reserve-to-GDP ratio does not change between  $t - 1$  and  $t$ :

$$\frac{S_{i,t-1}}{Y_{i,t}} = \frac{S_{i,t-1}^{\$} e_{i,t}}{Y_{i,t}} = \frac{S_{i,t-2}^{\$} e_{i,t}}{Y_{i,t}} = \frac{S_{i,t-2}^{\$} e_{i,t-1} (1 + \pi_{i,t})}{Y_{i,t-1} (1 + \pi_{i,t})} = \frac{S_{i,t-2}^{\$} e_{i,t-1}}{Y_{i,t-1}} = \frac{S_{i,t-2}}{Y_{i,t-1}}$$

Next, consider the case where the nominal exchange rate depreciates by less than the inflation rate. The same calculations as above show that the reserves' purchasing power increases, even though the dollar-reserves have not changed. Yet, this exchange-rate driven increase can lead to higher consumption.

$$\frac{S_{i,t-1}}{Y_{i,t}} > \frac{S_{i,t-2}}{Y_{i,t-1}}$$

The data on bond flows,  $B_{i,t}$ , and syndicated loans,  $L_{i,t}$ , are collected from several issues of the *International Capital Markets and Private Market Financing for Developing Countries*.  $B_{i,t}$

and  $L_{i,t}$  are converted to local currency using the average exchange rate for the year  $t$ .

The real interest rate,  $r_{i,t}$ , is calculated as the annual average of the monthly lending rate (line 60p in IFS) adjusted for CPI inflation. More precisely,  $r_{i,t}$  is set equal to  $\frac{1}{12} \sum_{k=1}^{12} [i_{i,t,k} - \frac{P_{i,t,k} - P_{i,t,k-1}}{P_{i,t,k-1}}]$ , where  $i_{i,t,k}$  corresponds to the lending rate for the  $k^{th}$  month of the  $t^{th}$  year, and  $P_{i,t,k}$  corresponds to CPI. When the lending rate is not available, a close substitute is used; that is, the deposit rate (line 60l) for Argentina, the bank rate (line it 60) for Brazil, the average cost of funds (line 60n) for Mexico, and the money market rate (retrieved from the DATASTREAM database) for Taiwan. For China, information on interest rates is scarce and highly unreliable, as interest rates are set administratively and do not change very often. In fact, interest rates are not an instrument of monetary policy in China and have little influence on the allocation of credit, since most credit in the formal financial system is allocated administratively. For this reason, China is not included in the estimation of equation (13). Finally, as hyperinflation renders  $i_{i,t}$  meaningless and causes wild fluctuations in  $r_{i,t}$ ,  $r_{i,t}$  is assigned a missing value for Argentina in 1989 and 1990, Brazil for the whole sample period, and Peru for 1989 through 1991.



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TABLE 1.

## Regression Results - Base Model

$$\frac{X_{i,t}}{Y_{i,t}} = \alpha_i + \hat{\beta} \frac{RES_{i,t-1}}{Y_{i,t}} + \hat{\gamma} \frac{FLOWS_{i,t}}{Y_{i,t}} + u_{i,t}$$

Variables		Latin America						East Asia					
$X_{i,t}$	$FLOWS_{i,t}$	$\hat{\beta}$	$\hat{\gamma}$	$R^2$	D.W.	DF	$\rho$	$\hat{\beta}$	$\hat{\gamma}$	$R^2$	D.W.	DF	$\rho$
Domestic Demand	$B_{i,t} + L_{i,t}$	0.890 (5.13)***	1.113 (2.51)**	0.752	2.01	64		0.154 (1.15)	-0.363 (-0.95)	0.938	2.08	28	0.256 (2.06)**
	$B_{i,t}$	0.719 (5.02)***	2.499 (5.84)***	0.795	2.21	64		0.133 (0.85)	-0.304 (-0.47)	0.937	2.14	28	0.269 (1.93)*
	$L_{i,t}$	0.900 (6.55)***	-0.328 (-0.43)	0.726	1.80	64		0.116 (1.07)	-0.547 (-0.94)	0.938	2.05	28	0.237 (1.84)*
Private Consumption	$B_{i,t} + L_{i,t}$	0.296 (2.12)**	0.230 (0.48)	0.960	1.55	45	0.244 (2.20)**	-0.010 (-0.15)	-0.174 (-0.60)	0.988	2.27	28	0.557 (4.28)***
	$B_{i,t}$	0.259 (1.99)**	1.275 (2.51)**	0.926	1.61	59		0.016 (0.27)	-0.345 (-1.22)	0.989	2.27	28	0.607 (4.61)***
	$L_{i,t}$	0.219 (2.13)**	-0.844 (-1.00)	0.962	1.51	45	0.227 (2.21)**	-0.033 (-0.63)	-0.107 (-0.22)	0.988	2.26	28	0.560 (4.50)***
Investment	$B_{i,t} + L_{i,t}$	0.430 (3.37)***	0.342 (1.94)*	0.860	2.22	49	0.567 (3.81)***	0.195 (4.64)***	0.349 (1.47)	0.943	1.61	37	
	$B_{i,t}$	0.381 (3.12)***	0.707 (3.38)***	0.865	2.24	49	0.589 (4.02)***	0.224 (4.31)***	0.225 (0.65)	0.941	1.62	37	
	$L_{i,t}$	0.411 (3.26)***	0.068 (0.19)	0.854	2.15	49	0.581 (4.08)***	0.213 (6.29)***	0.626 (1.90)*	0.944	1.66	37	
Government Consumption	$B_{i,t} + L_{i,t}$	0.104 (2.41)**	0.185 (1.64)	0.976	2.15	45	0.372 (3.79)***	0.033 (1.73)*	-0.019 (-0.29)	0.456	2.01	30	Estimated in
	$B_{i,t}$	0.082 (1.87)*	0.306 (1.97)**	0.976	2.11	45	0.364 (3.66)***	0.011 (0.58)	0.242 (2.70)***	0.489	2.03	31	Differences Time
	$L_{i,t}$	0.106 (2.35)***	0.103 (0.50)	0.975	2.06	45	0.399 (4.11)***	0.033 (2.15)**	-0.109 (-1.68)*	0.482	1.93	30	Dummies included

Notes:

1. Sources:

- (a) Macroeconomic variables: *International Financial Statistics*, plus *China Statistical Yearbook 1994* for China; *Industry of Free China* and DATASTREAM database for Taiwan.
- (b) Bond flows,  $B_{i,t}$ , and syndicated loans,  $L_{i,t}$ : *International Capital Markets* and *Private Market Financing for Developing Countries*.

2. Sample: 1989 through 1994, annual data.

- Brazil, Mexico, Panama, Paraguay, China: missing data for 1994.

3. For Brazil, private consumption also includes change in stocks. For Argentina, it additionally includes government consumption.

4. Definitions:

- (a)  $Y_{i,t}$ : gross domestic product of  $i^{th}$  country, for  $t^{th}$  year.
- (b)  $RES_{i,t-1}$ : foreign exchange reserves of  $i^{th}$  country, for  $t-1$  year, converted to local currency using the average exchange rate for the  $t^{th}$  year.
- (c)  $DF$ : degrees of freedom.
- (d)  $\rho$ : first-order autocorrelation in the residuals. The error term is assumed to follow the process  $u_{i,t} = \rho u_{i,t-1} + \epsilon_t$ .

5. Estimation method: OLS. When  $u_{i,t}$  exhibits autocorrelation, non-linear least squares (NLLS).

6. The  $t$ -statistics have been calculated with a heteroscedasticity-consistent covariance matrix, using the ROBUSTERRORS option in RATS.

7. One, \*, two, \*\*, and three asterisks, \*\*\*, denote significance at the ten, five and one percent levels, respectively.

8. **Bold face** denotes the best model which, presumably, corresponds to the best proxy of the debt ceiling.

TABLE 2.

Regression Results - Variations of the Base Model

$$\frac{X_{i,t}}{Y_{i,t}} = \alpha_i + \hat{\beta} \frac{RES_{i,t-1}}{Y_{i,t}} + \hat{\gamma} \frac{FLOWS_{i,t}}{Y_{i,t}} + u_{i,t}$$

$X_{i,t}$	$FLOWS_{i,t}$	$\hat{\beta}$	$\hat{\gamma}$	$R^2$	D.W.	DF	$\rho$
<b>Latin America - IV Estimation</b>							
Domestic Demand	$B_{i,t}$	0.892 (4.52)***	1.986 (2.14)**	0.788	2.16	63	
Private Consumption		0.270 (1.78)*	1.496 (2.14)**	0.924	1.67	58	
Investment		0.460 (3.47)***	1.142 (2.44)**	0.859	2.34	49	0.523 (2.94)***
Government Consumption		0.110 (1.75)*	0.263 (1.23)	0.976	2.21	45	0.422 (3.00)***
<b>E. Asia - Sample Restriction: High-Reserve Countries Excluded</b>							
Domestic Demand	$L_{i,t}$	0.715 (2.63)***	0.903 (3.04)***	0.958	1.51	19	
Investment		0.579 (3.54)***	1.143 (2.93)***	0.934	1.96	19	

Notes:

1. See TABLE 1 for Data Sources and Variable Definitions.
2. Estimation method: OLS. When  $u_{i,t}$  exhibits autocorrelation, non-linear least squares (NLLS).
3. The  $t$ -statistics have been calculated with a heteroscedasticity-consistent covariance matrix, using the ROBUSTERRORS option in RATS.
4. One, \*, two, \*\*, and three asterisks, \*\*\*, denote significance at the ten, five and one percent levels, respectively.
5. The instrument set for L.A. includes: country-specific intercepts;  $\frac{S_{i,t-k}}{Y_{i,t-k}}$ ,  $\frac{B_{i,t-k}}{Y_{i,t-k}}$ ,  $\frac{L_{i,t-k}}{Y_{i,t-k}}$  ( $k = 1, 2$ ), plus the growth rate between  $t - 1$  and  $t$  of total international bond issues worldwide.

TABLE 3.

## Regression Results - Extended Model

$$\frac{X_{i,t}}{Y_{i,t}} = \alpha_i + \hat{\beta} \frac{RES_{i,t-1}}{Y_{i,t}} + \hat{\gamma} \frac{FLOWS_{i,t}}{Y_{i,t}} + \zeta (E_t \Delta y_t - \Delta y_t) + \theta r_{i,t} + u_{i,t}$$

$X_{i,t}$	$FLOWS_{i,t}$	$\hat{\beta}$	$\hat{\gamma}$	$\zeta$	$\theta$	$R^2$	$D.W.$	$DF$	$\rho$
<b>Latin America</b>									
Domestic Demand	$B_{i,t}$	0.611 (3.66)***	2.346 (5.38)***	0.872 (1.59)	-0.093 (-0.48)	0.844	2.19	52	
Private Consumption		0.170 (1.94)*	0.576 (1.89)*	1.164 (3.11)***	-0.380 (-2.02)**	0.979	2.14	34	0.584 (5.99)***
Investment		0.296 (2.52)**	0.494 (1.76)*	0.737 (1.98)**	0.026 (0.14)	0.878	2.30	37	0.584 (3.79)***
		0.324 (2.80)***	0.549 (2.12)**	0.647 (1.98)**		0.873	2.22	48	0.580 (4.10)***
<b>E. Asia</b>									
Domestic Demand	$L_{i,t}$	0.234 (2.24)**	0.121 (0.25)	-1.197 (-0.63)	-0.240 (-1.11)	0.860	1.53	27	
Investment		0.184 (5.81)***	0.497 (1.31)	1.762 (2.32)**	0.041 (0.29)	0.958	1.55	27	
		0.181 (6.44)***	0.538 (1.74)*	1.406 (1.87)*		0.948	1.52	36	

Notes:

## 1. Variable definitions:

(a)  $E_t \Delta y_t$  and  $\Delta y_t$ : expected and realized GDP growth for L.A. and Asia. Source: *IMF World Economic Outlook*.

(b)  $r_{i,t}$ : real interest rate. For details, see data appendix.

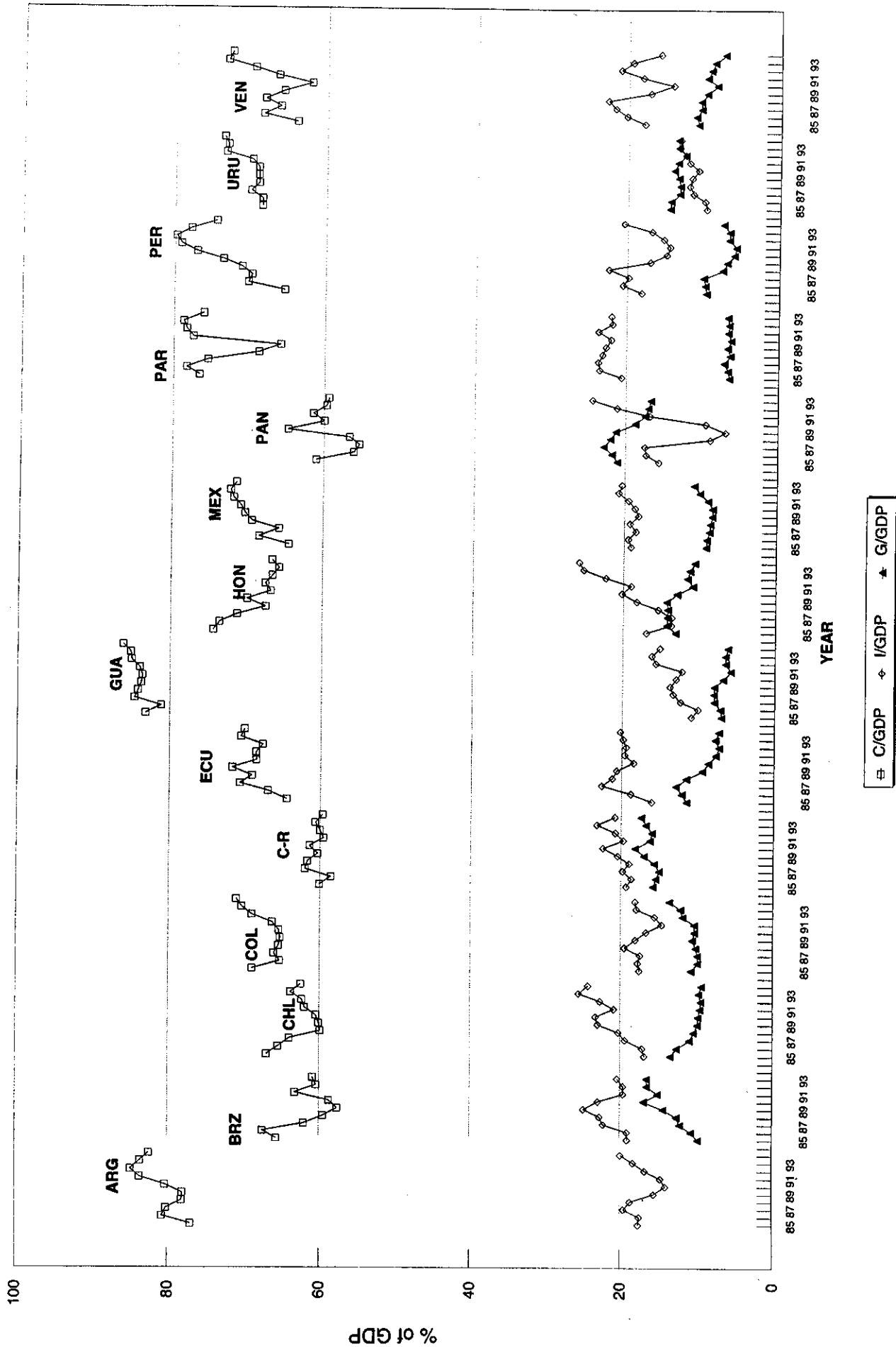
## 2. See TABLE 1 for other Data Sources and Variable Definitions.

3. Estimation method: OLS. When  $u_{i,t}$  exhibits autocorrelation, non-linear least squares (NLLS).4. The  $t$ -statistics have been calculated with a heteroscedasticity-consistent covariance matrix, using the ROBUSTERRORS option in RATS.

## 5. One, \*, two, \*\*, and three asterisks, \*\*\*, denote significance at the ten, five and one percent levels, respectively.



L.A. -- SELECTED MACROECONOMIC RATIOS  
FIGURE 1A

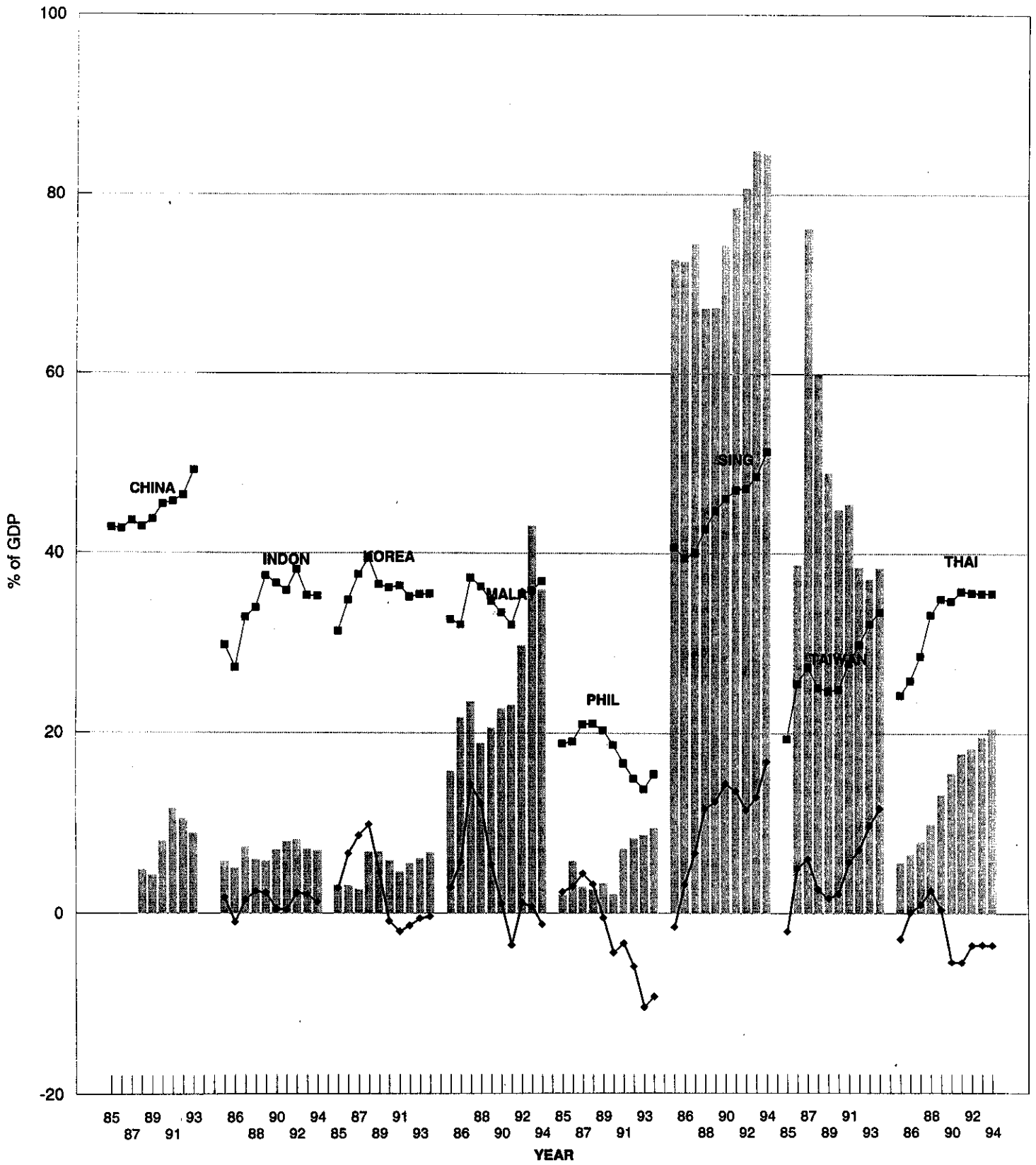


ARGENTINA: Government Consumption included in Private Consumption





ASIA -- SELECTED MACROECONOMIC INDICATORS -- 2  
 FIGURE 2B



■ RESERVES/GDP   ■ (GDP-C-G)/GDP   ◆ (GDP-C-I-G)/GDP

OPTIMAL CONSUMPTION AS FUNCTION OF ASSETS AND THE DEBT CEILING

Figure 3

