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STOCKS, FLOWS AND VALUATION EFFECTS OF FOREIGN ASSETS AND LIABILITIES: DO THEY MATTER?

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Resumen

La reciente integración financiera internacional se ha caracterizado por el incremento en las posiciones de activos y pasivos externos y una creciente relevancia de los efectos de valorización (ganancias o pérdidas de capital). En este trabajo, evaluamos empíricamente las implicancias de stocks, flujos y ajustes de valorización en crisis externas, en clasificaciones de crédito soberano y en la dinámica de largo plazo del tipo de cambio real (TCR) en economías industrializadas y en desarrollo. Encontramos que los activos y pasivos externos tienen implicancias muy distintas respecto de la ocurrencia de crisis externas. Los ajustes de valorización tienen un impacto sobre la probabilidad de crisis, aunque moderado. El stock de pasivos de inversión de cartera —en particular los de renta variable— incrementa la probabilidad de reversiones de la cuenta corriente, en tanto la probabilidad de detenciones repentinas de la entrada de capitales aumenta con el stock de activos de inversión directa en el exterior. En el caso de las clasificaciones de crédito soberano, encontramos un efecto positivo de los stocks y flujos de inversión directa del exterior. Finalmente, para el TCR, los activos y pasivos brutos se muestran igualmente importantes pero sus componentes evidencian efectos muy disímiles. Mientras la cuenta corriente acumulada se asocia a depreciaciones reales, los efectos de valorización se asocian con apreciaciones reales en economías en desarrollo.

Abstract

Large holdings of foreign assets and liabilities, along with increasing relevance of valuation effects—capital gains or losses—have characterized global financial integration. In this paper, we assess empirically the implications of stocks, flows and valuation adjustments in external crises (current-account reversals, sudden stops and currency crises), sovereign credit ratings and the long-run real exchange rates (RER), in both industrial and developing economies. We find support for the view that foreign assets and liabilities are rather distinctive external holdings with different implications in the occurrence of external crisis. Valuation adjustments have an impact on crises, although quantitatively not very large. Portfolio liabilities (particularly equity) increase the probability of current-account reversals and currency crises, while the likelihood of sudden stops increases with the stock of foreign direct investment (FDI) assets. In the case of sovereign credit ratings, we find a noteworthy effect of the stock and flows of FDI liabilities on improving sovereign ratings. Finally, as for the RER, gross assets and liabilities appear equally important, but components of external holdings have considerably different effects. While the cumulative current account is associated with real depreciation, the valuation effect is strongly linked with real currency appreciations in developing economies.

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1. INTRODUCTION

Globalization has changed the way countries interact along several dimensions. Financial integration and its underpinnings are probably among the most important. Although cross-border capital flows and external debt have been closely monitored, until recently little was known about the stocks of foreign assets and liabilities accumulated by various countries, especially in the developing world. In this respect, Lane and Milesi-Ferretti (2001, 2006) made an important contribution by assembling a comprehensive data set for 145 countries over the period 1970–2004.[1] According to these authors, despite several external crises, financial integration has intensified in recent decades among both industrial and developing countries. This has been accompanied by significant changes in the composition of countries' international investment position. For instance, protracted current account deficits have led a number of countries to reduce their net foreign assets considerably. In other cases, including Chile, financial integration has resulted in substantial and simultaneous expansions of gross international liabilities and assets.

Another interesting stylized fact that emerges from this data set is the existence of some persistent differences between the change in the net foreign asset position and the current account balance, which highlights the importance of valuation effects—capital gains and losses—as a source of external wealth. This scenario has motivated an increasing number of studies on the consequences and relevance of the two basic components of changes in the net foreign position, namely, cumulative flows and valuation effects of both assets and liabilities. Valuation effects can be substantial. For instance, the United States saw its ratio of net foreign asset to gross domestic product (GDP) improve by 3 percentage points of GDP between 2003 and 2005, despite having a rather large and persistent current account deficit (roughly 6 percent of GDP each year) that cumulatively should have deteriorated its external position by around 12 percentage points of GDP. The difference is due to valuation effects under the traditional accounting rules. Hausmann and Sturzenegger (2005) propose a different set of accounting rules based on the income generated by the financial position for which the external position of the United States appears fairly stable over the last twenty years.[2]

Finally, international assets and liabilities can take very different forms. Changes in debt contracts, portfolio flows (including bonds and equity), foreign direct investment (FDI), and international reserves (foreign liquid assets) all explain changes in net foreign assets, but they are quite different in nature.

The objective of this paper is to empirically evaluate the role of net foreign assets and their different components in specific key outcomes, namely, the probability of an external crisis, the perceived country creditworthiness, and the real exchange rate. For that purpose, we systematically assess the effects of net foreign assets and their alternative decompositions on external crises, such as current account reversals, sudden stops, and currency crises, on countries' sovereign credit ratings (by both Moody's and Standard and Poor's), and on the long-term equilibrium real exchange rate.

We extend previous contributions and consider detailed information on countries' international investment positions from Lane and Milesi-Ferretti's new data set. The previous work on external crises limits the analysis of foreign assets and liabilities to international reserves, the stock and composition of external debt, and the size and composition of capital flows.[3] To our knowledge, the same is true for empirical research on the determinants of credit ratings and the real exchange rate, perhaps reflecting the dearth of available data. Although research on real exchange rates consistently assesses the role of net foreign assets, it makes no distinction between the different components. Such an analysis would have immense practical value, since these medium-term trends

1. Previous contributions include Sinn (1990) and Rider (1994). Rider builds a data set for the period 1970–87, which misses the effect of the significant increase of cross-border capital flows in the last decade. Official data are also scarce. Data on international investment positions have been published by the International Monetary Fund (IMF) in recent years for most industrial countries, but only for a few developing countries. For the latter group, IMF stock data are generally available only for gross external debt and foreign exchange reserves.

2. There is ongoing debate on Hausmann- Sturzenegger's approach, which is beyond the scope of this work.

3. Among the variables that have been considered are foreign direct investments versus portfolio flows, long-term versus short-term external debt, fixed-rate versus floating-rate borrowing, the ratio of short-term external debt to international reserves, the ratio of short-term external debt to GDP, and the ratio of debt services to exports.

in exchange rates are an essential tool in assessing current and future macroeconomic conditions in industrial and developing countries.

The methodology we follow is straightforward: we augment empirical models used and validated by other authors to study determinants of particular outcomes and assess the contribution of the different stocks that make up net foreign assets, as well as the implicit flows that explain their variation. We analyze a large panel of countries, and we merge the data set compiled by Lane and Milesi-Ferretti with a few others commonly used to study the outcomes we focus on.

To supplement this analysis, we also examine the role of net foreign assets' valuation effects in determining the probability of external crises. This could be the case, for instance, if valuation effects are important for the external adjustment process (Gourinchas and Rey, 2006; Lane and Milesi-Ferretti, 2005) or, more generally, if there is cross-sectional variation in the denomination of international liabilities.[4] We empirically assess this issue by evaluating the impact of net valuation adjustments on each of three alternative definitions of external crisis.

Our paper tackles a number of important questions from a policy perspective. First, it assesses whether the size of net foreign assets (a stock beyond current flows) is an important determinant of crisis and creditworthiness. Second, it evaluates whether gross external assets and liabilities have differentiated roles in determining the likelihood of a crisis, the real exchange rate, and creditworthiness. Since global financial integration entails high levels of external assets and liabilities, a differentiated analysis sheds light on the effects of integration and the underlying mechanism. Third, it estimates the effects of different components of net external assets on different outcomes. For instance, we examine whether FDI is safer—or at least perceived as safer—than, say, portfolio investment, or whether it has a different effect on the exchange rate than other components of net foreign assets. If alternative components of net foreign assets have dissimilar effects on the outcomes we analyze, there could be an argument in favor of facilitating some types of flows or of hoarding international reserves as a counterpart. Finally, it evaluates whether valuation effects are different from the impact of accumulated flows along different dimensions.

The paper is organized as follows. Section 1 analyzes the role of net foreign assets and its components in the likelihood of current account reversals, sudden stops, and currency crises, based on a large panel of countries. Section 2 analyzes the determinants of country credit ratings using ordered probit models including the stock of net foreign assets. Section 3 presents cointegrating models of real exchange rate determination for a large sample of countries, also considering splits of the stock of net foreign assets. Section 4 concludes.

2. Foreign Assets and Liabilities and External Crises

Empirical researchers on external crises (namely, current account reversals, sudden stops, and currency crises) have limited their analysis of foreign assets and liabilities to the stock of international reserves, the stock and composition of external debt, and the size and composition of capital flows. Several papers analyze the effect of these variables on the probability of occurrence of these crises. Frankel and Rose (1996) find that low ratios of FDI flows to external debt increase the probability of currency crashes. Both Radelet and Sachs (1998) and Rodrik and Velasco (1999) find that the ratio of external debt to international reserves is a robust predictor of capital flow reversals, highlighting the importance of liquidity problems as precursors of financial crises. Milesi-Ferretti and Razin (1998) examine current account reversal episodes and find that the ratio of external debt to GDP helps predict these events, while the ratio of FDI flows to GDP and the share of short-term debt to total external debt have an effect that is not statistically significant. Edwards (2005a, 2005b) finds that countries with high current account deficits are more likely to suffer a reversal, while the ratio of international reserves to GDP and the ratio of external debt to GDP have no statistically significant effect. Calvo, Izquierdo, and Mejía (2004) highlight the relevance of balance sheet effects

4. With some countries having only foreign-currency-denominated liabilities, a phenomenon known as original sin (Eichengreen, Haussmann, and Panizza, 2003).

in explaining the probability of a sudden stop of capital inflows; they find that a combination of high current account leverage (that is, the ratio of the current account deficit to the absorption of tradable goods) and high domestic liability dollarization increases the likelihood of a sudden stop.

In this section, we consider standard empirical models used in the external crisis literature, augmenting them with partitions of net foreign asset stocks and flows. We analyze three types of crisis indicators: current account reversals, sudden stops, and exchange rate market pressure indexes. Estimations consider maximum-likelihood panel probit models and yearly observations for the period 1975–2004. The whole sample includes more than a hundred countries.[5] Not every country has data for every year, so our panel estimations are unbalanced. For details on data construction, sources, and the sample of economies included, see the appendix.

2.1. Current Account Reversals

Our basic specification for the probability of current account reversal closely follows Milesi-Ferretti and Razin (1998) and Edwards (2005a, 2005b). We consider current account reversal episodes as periods in which the current account deficit records a reduction of at least 4 percent of GDP over one year and an accumulated reduction of at least 5 percent of GDP in three years. Therefore, our dependent variable ($CAR_{i,t}$) takes a value of one if country i experiences a current account reversal in year t, and zero otherwise.

The initial set of explanatory variables includes the following: a measure of regional contagion represented by the relative occurrence of sudden stops in the country's region (SSR); the ratio of imports to GDP as a measure of openness (OPEN); and the percentage change in the terms of trade (TOT).[6] We consider this set of variables as controls and evaluate the effect of the components of alternative partitions of net foreign assets. Because one of the key flow variables for explaining a current account reversal—identified in Milesi-Ferretti and Razin (1998) and Edwards (2005a)—is the first lag of the current account deficit, our estimates include two-year lags of stock variables (STOCK) and one-year lags of the change in stocks (ΔSTOCK); this also helps us identify the effects of flows versus stocks more easily.[7] We consider maximum-likelihood probit estimations and estimate relationships of the following type:

$$\Pr\left(\mathrm{CAR}_{i,t}=1\right)=\Phi\left(\beta_1\mathrm{SSR}_{i,t-1}+\beta_2\mathrm{OPEN}_{i,t-1}+\beta_3\mathrm{TOT}_{i,t-1}+\alpha_1\mathrm{STOCK}_{i,t-2}+\alpha_2\Delta\mathrm{STOCK}_{i,t-1}\right).$$

To evaluate alternative partitions of the net foreign asset position, we estimate five different specifications. The first one includes the one-year lag of overall NFA position, while the remaining four specifications breakdown this variable into its stock component (two-year lags of NFA position components) and its recent variation (one-year lags of current account deficit and valuation adjustments). We consider four alternative partitions of the NFA position: (i) the overall net foreign asset position; (ii) total gross assets and total gross liabilities; (iii) gross FDI assets, gross portfolio equity assets, gross portfolio debt assets, gross FDI liabilities, gross portfolio equity liabilities, gross portfolio debt liabilities, and international reserves; and (iv) cumulative current account balance and cumulative valuation adjustments.

Table 1 presents the results. Because probit coefficients are not easy to interpret, we report the marginal effects of one-unit changes in regressors on the probability of CAR (expressed in percentage points), evaluated at the mean of the data. The estimated coefficients for our initial set of explanatory variables are in line with findings by Milesi-Ferretti and Razin (1998) and Edwards (2005a, 2005b). As expected, the lagged current account deficit is a very important determinant of the likelihood of a current account reversal. The evidence also confirms the importance of regional contagion. In this respect, a higher incidence of sudden stops in a country's region increases the

5. The appendix provides a list of economies included in each group.

6. We considered a number of other covariates that did not turn out to be statistically relevant. These included per capita GDP, the fiscal deficit, domestic credit growth, the U.S. interest rate, and OECD output growth.

7. Change in stocks is divided into transaction flows (current account deficit) and valuation adjustments.

probability of reversal. An increase in the terms of trade also increases the probability of a reversal with a small marginal effect. The effect of openness (imports to GDP) on the probability of a reversal seems positive, but it is not robust to different specifications.

Column 1 shows that a higher stock of net foreign assets (first lag) decreases the probability of a current account reversal. This result changes completely, however, if we consider net foreign assets (second lag) and the current account deficit simultaneously (column 2): having larger net foreign assets seems not to affect the likelihood of a current account reversal once we control for the current account deficit. The result in column 1 thus appears to be driven by the lagged current account deficit implicit in net foreign assets. Recall that, by definition, $NFA_t = NFA_{t-1} + CA_t + VA_t$, where NFA is net foreign asset stocks at the end of the year and CA and VA are the current account balance and valuation adjustments, respectively. The basic conclusion is that transaction flows, represented by the current account deficit, are the most significant determinant of current account reversals. Its marginal effect on the probability of reversals is much higher than the other explanatory variables.

Despite the significant role of the current account deficit, other components of net foreign assets show up as quite relevant. In particular, the composition of gross assets and gross liabilities seems important (columns 3 and 4). A higher stock of portfolio equity assets and a lower stock of portfolio equity liabilities are statistically significant in reducing the probability of a reversal. Ceteris paribus, countries that accumulate more portfolio equity investment from abroad face a higher probability of current account reversal. Quantitatively, the effect of an increase in the current account deficit by 1 percent of GDP on the probability of a current account reversal is more than three times the effect of a 1 percent of GDP increase on the stock of portfolio equity liabilities.

The analysis by gross components also shows that the stock of FDI liabilities reduces the probability of a current account reversal. Having accumulated FDI flows decreases the likelihood of a current account reversal.

We also find a statistically important role for valuation effects. When we disaggregate the stock of net foreign assets into cumulative financial transactions (cumulative current account balance) and cumulative valuation adjustments, the latter component reduces the probability of reversal (column 5). Unexpectedly, the lagged valuation adjustment (a flow) appears to be very significant, with a positive sign. However, the puzzling marginal effect of this flow component is around one-sixth the effect of the current account deficit.

2.2 Sudden Stops of Capital Inflows

The recent literature on external crises focuses not only on current account reversals as a measure of crisis, but also on sudden stops of capital inflows.[8] A sudden stop episode occurs when the flow of capital coming to a country is reduced significantly in a very short period of time.

Current account reversals and sudden stop episodes do not necessarily coincide. Although the two phenomena are strongly related, a country could certainly suffer a sharp reduction in capital inflows without experiencing a current account reversal. By definition, net capital inflows are equal to the sum of the current account deficit and the net change in international reserves. The latter component may absorb part of the effect of a reduction of capital inflows on the current account balance. In fact, empirical evidence confirms that sudden stops may imply a quite different timing for the onset of a crisis compared to current account reversals: in our data set, only 28 percent (31 percent) of current account reversals (sudden stops) coincide with sudden stops (current account reversals).

This section evaluates the effect of the stock of net foreign assets, and its composition, on the likelihood of sudden stops of capital inflows. As in the previous sections, we estimate a panel probit model using a broad multi-country data set and evaluate the effect of alternative partitions of country's net foreign asset position on the likelihood of a sudden stop. Following Edwards (2005b), we define a sudden stop as a reduction in net capital inflows of at least 5 percent of GDP in one year.

8. For more on sudden stops, see Calvo (1998) Calvo, Izquierdo, and Talvi (2003), Calvo, Izquierdo, and Mejía (2004), and Edwards (2005a).

The country in question must have received an inflow of capital larger to its region's third quartile during the two years prior to the sudden stop. Since current account reversals and sudden stops are closely related phenomena, our estimations consider the same explanatory variables used in previous section.

Table 2 reports the results. In line with the findings of Calvo, Izquierdo, and Mejía (2004), openness increases the probability of a sudden stop. Evidence confirms the importance of regional contagion: having a sudden stop in the country's region increases the probability of a sudden stop. This finding supports Calvo's (1999) view that liquidity shocks to investors stemming from adverse developments in one country may trigger the sale of assets from other countries in the investors' portfolio to restore liquidity.

With regard to foreign assets and liabilities, we find that a higher stock of net foreign assets reduces the likelihood of a sudden stop (column 1). Also, when we break down net foreign assets into one-year-lagged net foreign assets, lagged current account deficit, and valuation adjustment, we observe that net foreign assets is not significant while the current account deficit emerges as the main determinant of sudden stops (column 2). A higher current account deficit increases the likelihood of sudden stops. Also, its marginal effect on the probability of a crisis is the highest of all the explanatory variables.

Although the net foreign asset position is not significant when we include current account deficit, its composition seems to matter (columns 3 and 4). Both FDI assets and liabilities have an impact: countries that accumulate more direct investment abroad (FDI assets) are more prone to sudden stops; while countries that accumulate more foreign direct investment (FDI liabilities) face a smaller chance of crisis. Unexpectedly, a higher stock of international reserves is related to a higher probability of sudden stop. This last result may be due to endogeneity: countries that are more prone to crises are required to hoard larger stocks of international reserves. Finally, both valuation adjustments and cumulative valuation adjustments are statistically insignificant (column 5).

How different are these result from our findings for current account reversals? The current account deficit is the main determinant of both types of crisis. Not only is the marginal effect on the probability of a crisis the highest of the explanatory variables, but it is also very significant. Portfolio equity assets and liabilities are key for current account reversals, with higher marginal effects, while the stocks of FDI assets and portfolio equity assets seem more relevant for sudden stops. Finally, the valuation component of net foreign assets matters only for current account reversals.

2.3. Exchange Rate Market Pressure

Our third measure of external crisis is an indicator of exchange rate market pressure. We again consider a large sample of country experiences, as we empirically evaluate the role of foreign assets and liabilities in the likelihood of episodes of significant pressure on the exchange rate market. As in the previous section, we do not attempt to test specific theories on this matter, but rather examine the contribution of foreign assets and liabilities. The valuation effects that emerge from these holdings, usually denominated in different currencies, lead to large capital gains or losses. The basic question is whether foreign assets or liabilities (or both) are relevant in explaining a country's vulnerability to an exchange rate crash.

The exchange rate market pressure (ERMP) measure considered here is the standard index defined by Eichengreen and others (1995), which includes both large exchange rate depreciations and speculative attacks that are successfully warded off by the authorities. The latter include episodes characterized by large and sudden falls in international reserves (or increases in interest rates). Concretely, a speculative attack exists when the ERMP index is above a certain threshold. The index is a weighted average of changes in the real exchange rate (RER) and in international reserves (IRES) for country i in month t:

$$\mathrm{ERMP}_{i,t} = \omega_{\mathrm{RER}} \left(\frac{\mathrm{RER}_{i,t} - \mathrm{RER}_{i,t-1}}{\mathrm{RER}_{i,t-1}} \right) - \omega_{\mathrm{RES}} \left(\frac{\mathrm{IRES}_{i,t} - \mathrm{IRES}_{i,t-1}}{\mathrm{IRES}_{i,t-1}} \right).$$

The weights ω_{RER} and ω_{RES} are the relative precision of each variable, defined as the inverse of the variance for each variable for all countries and over the full sample period. We do not consider interest rates in constructing the index because of the lack of comparable data.

The rationale for using this measure to characterize a currency crisis is that it captures the options faced by a government. At a given moment, authorities may tolerate currency depreciation or avoid it through intervention (or by raising the interest rate). We consider that a currency crisis (CR) episode occurs when this index exceeds its mean by more than three standard deviations. The mean and the standard deviation are country specific:

$$CR_{i,t} = \begin{cases} 1 & \text{if } ERMP_{i,t} > \overline{ERMP_i} + 3SD\left(ERMP_i\right) \\ 0 & \text{otherwise} \end{cases}$$

We assume that there is a well-defined function that relates macroeconomic variables to the probability of a crisis in country i in period t. The estimation procedure closely follows previous contributions, including Eichengreen and others (1995), Milessi-Ferretti and Razin (1998), Bussiere and Fratzscher (2002), and García and Soto (2005). We estimate a probit model using maximum likelihood and considering several explanatory variables other than foreign assets and liabilities. All these variables are lagged one year, and their inclusion follows the large literature on currency crises. As before, we report marginal effects, that is, the effects of one-unit changes in regressors on the probability of a crash (expressed in percentage points), evaluated at the mean of the data. Although the estimates cannot be interpreted structurally, they allow us to characterize currency crises.

Numerous theoretical models have been used to explain the causes and origins of currency crises.[9] First-generation models (Krugman, 1979; Blanco and Garber, 1986) emphasize the role of inconsistencies between fiscal, monetary, and exchange rate policies. Key variables that emerge from this approach are the exchange rate regime, domestic credit growth, the level of international reserves, and the fiscal balance. Second-generation models, such as Obstfeld (1996), consider that governments face tradeoffs (output-inflation), so their decisions are not state invariant. From the government's standpoint, it may be optimal to abandon a fixed exchange rate regime even if it might have been possible (at some cost) to maintain it. A key variable that emerges is the overvaluation of the real exchange rate. Ceteris paribus, the more overvalued the real exchange rate, the bigger the incentives for the government to abandon a fixed exchange rate regime and, therefore, the higher the probability of having a currency crisis in the coming months.

Third-generation models focus on moral hazard and imperfect information, highlighting the importance of banking problems and overborrowing as determinants of a currency crisis. Diaz-Alejandro (1985) and Velasco (1987) model banking problems as determinants of currency crises, whereby the central bank's financing of the rescue of the financial system could be inconsistent with a managed exchange rate regime. These models suggest that the growth in bank credit may play an important part in currency crises.

More recent models highlight the relevance of capital flows as a possible source of instability (Calvo, 1998; Calvo, Izquierdo, and Talvi, 2003). A sudden stop of capital inflows can generate a liquidity crisis and trigger a significant depreciation of the domestic currency. Variables such as foreign interest rates, the amount of external debt, and the composition of foreign assets and liabilities might have an important impact.

Our set of control variables is rather standard and follows previous empirical contributions on the determinants of speculative attacks and currency crises. We follow Frankel and Rose (1996) and Milesi-Ferretti and Razin (1998) in examining seven variables related to domestic macroeconomic

9. For a review of the economic literature on currency crises, see Eichengreen and others (1995), Flood and Marion (1998), and Kaminsky (2003).

conditions and currency crises: the growth rate of bank credit; the ratio of the fiscal balance to GDP; the current account deficit as a percentage of GDP; the real growth rate of GDP; the real growth rate of exports; the degree of overvaluation of the real exchange rate; and the stock of international reserves. We also include foreign variables such as the U.S. interest rate and the real GDP growth rate in member countries of the Organization for Economic Cooperation and Development (OECD); a dummy variable for a fixed exchange rate regime; and a measure of trade openness represented by the ratio of imports to GDP. Our measure of real exchange rate overvaluation is the deviation of the actual value of the real exchange rate from the trend component of a rolling Hodrick-Prescott (HP) filter.

The growth in bank credit is intended to capture the monetary policy stance and overborrowing. Crashes are more likely to occur in countries where the real exchange rate is appreciated relative to its historical average. We take a step forward on this variable and introduce the real exchange rate misalignment estimated from a rolling (real time) HP filter. As suggested by second-generation models, sluggish GDP growth may trigger difficulties in repaying the debt burden, and the government may be reluctant to implement stabilization programs if output is already slowing down (Bussiere and Fratzscher, 2002). Trade openness exposes the country to external shocks, but it may benefit the economy through gained opportunities to share risk with the rest of the world. Export growth can serve as a driving force for economic growth or as a proxy for misalignment. Finally, the U.S. interest rate is a measure of how "easy" foreign borrowing is. The literature includes other variables to explain currency crashes, but there is no clear consensus on their importance and significance. We therefore chose to avoid overparameterizing our benchmark model and took the most parsimonious specification, which we extend with stocks, cumulative flows, and valuation effects of foreign assets and liabilities, distinguishing between net and gross components.

After we remove insignificant variables, our basic model is reduced to five variables: the degree of overvaluation or misalignment of the real exchange rate; the growth rate of bank credit; the growth rate of real GDP; the growth rate of exports; and the U.S. interest rate. This model is extended with alternative disaggregations of the net foreign asset position.

Table 3 reports the results. Real exchange rate misalignment measured by the rolling HP filter of the effective real exchange rate has the expected sign, but it is not always statistically significant.[10] Bank credit is significant for all specifications, suggesting a significant role for financial variables in line with third-generation models of currency crises. While GDP growth is not significant, we report a negative and significant association between crashes and export growth. Finally, an increase in the U.S. interest rate increases the probability of a crisis.

The net foreign asset position (as a ratio to GDP) is negatively related to currency crises (column 1). The previous period's current account deficit—the main component of the change in net foreign assets —appears to have no link to a currency crisis (column 2). This contrasts sharply with the results on current account reversals. Milesi-Ferretti and Razin (1998) also report a statistically insignificant link between these variables when they include a large sample of middle- and low-income economies.

Disaggregating net foreign assets into total gross assets and gross liabilities (columns 3 and 4) shows that gross assets play a significant role. Within gross assets, debt is the only statistically significant component. Interestingly, if we split net foreign assets between cumulative current account and cumulative valuation adjustments (column 5), both turn out to significantly reduce the probability of a currency crash. The marginal contribution of cumulative valuation effects almost dobles the contribution of cumulative current account.

Table 4 presents a summary of the main results, distinguishing among the different components of the stock of net foreign assets and the types of external crises. Our results support the view that assets and liabilities are rather different external holdings. A larger stock of net foreign assets does

10. We also performed estimations including the cyclical component of the HP filter and using the whole sample. Although the coefficient turned out to be highly significant under this procedure, we prefer a real-time variable to avoid overfitting currency attacks. An ex post filter is equivalent to using information that will only be available in the future to determine whether domestic currency is presently undervalued. Although this improves the fit of the model, the main results are the same.

not necessarily make crises less likely: both the composition of the overall position of international investments and the amount of financial flows (namely, the current account deficit) are key determinants. Changes in the composition of gross assets towards more portfolio investment and less FDI assets make current account reversals and sudden stops less likely. The opposite happens with the composition of gross liabilities.

Also, the cumulative valuation adjustment component of net foreign assets reduces the probability of a crisis, while the cumulative financial flow (cumulative current account balance) is often irrelevant. In general, financial flows (that is, current account deficits) do not matter for currency crises and are very important for current account reversals and sudden stops.

3. Foreign Assets and Liabilities and Sovereign Credit Ratings

In this section, we identify whether the size and composition of foreign assets and liabilities help explain the sovereign risk ratings awarded by the rating agencies to developing economies. Our approach consists of modeling sovereign ratings within a maximum-likelihood, ordered probit framework. The credit standing of an obligor, at the end of the period, is assumed to be governed by a latent variable consisting of a random error plus an index of macroeconomic variables.[11]

Indices such as the EMBI, assembled on the basis of price movements in emerging-economy secondary bond markets, are related to the borrowing costs of sovereign or private bond issuers. The correlation and possible causality between qualitative ratings of sovereign risk, on the one hand, and indices of the premiums charged in the secondary sovereign bond markets, on the other, are important factors that have a bearing on the interest rates in emerging economies. This is a direct channel of influence exercised by risk ratings on the macroeconomic management of emerging economies.

The principal international official and private credit risk rating agencies (namely, Moody's and Standard and Poor's) regularly carry out sovereign risk rating exercises. The rating agencies dealing with sovereign risk seek to assess the capacity and willingness of a sovereign government to service its debt within the maturity dates and in accordance with the conditions agreed upon with the creditors at the time the loans were contracted. The outcome of this assessment is synthesized in ratings, which essentially are estimates of the probability that a given government will default—meaning not only the suspension of interest payments or nonpayment of the principal at maturity date, but also its swap or "involuntary" restructuring.

Risk ratings are straightforward indicators available in the public domain, and their fairly widespread use to manage risk exposure is a sign that investors consider them to be appropriate indicators of the probability of default. Ratings are indicators of relative risk across countries. A given country with an Aa rating will not necessarily remain creditworthy, but that tends to be the case more frequently over time than for economies with lower risk ratings. Default rates are sensitive to economic factors at the time they are calculated, and they vary considerably in line with world and local economic cycles. Our exercise tries to disentangle the role of asset and liability holdings, controlling for variables usually reported as explanatory of credit ratings.[12]

Variables commonly used in past studies of credit ratings may be classified as liquidity variables, solvency variables, macroeconomic fundamentals, and external variables. Liquidity variables include the debt-service-to-exports ratio, the interest-to-service ratio, and the liquidity-gap ratio, which all capture short-run financing problems. Most empirical results point to the debt-service-to-exports indicator as the most significant (Hu, Kiesel, and Perraudin, 2002). Solvency variables measure a country's medium- to long-term ability to service its debt; they include the reserves-to-imports and debt-to-GDP ratios. The key macroeconomic fundamentals are the inflation rate, investment/GDP, and GDP growth; and external variables include the U.S. Treasury interest rates and commodity prices.

11. In this section, we follow Godoy (2006) in defining the benchmark dependent variables and in the sample of economies, which are listed in the appendix.

12. See, for example, Cantor and Parker (1996) for cross-section estimation and Hu, Kiesel, and Perraudin (2002) for panel estimation.

We estimate an ordered probit model for the period 1990–2004 using a sample of fifty-two developing economies. Block and Vaaler (2004) and Hu, Kiesel, and Perraudin (2002) use the same estimation procedure, based on its better forecasting ability relative to linear procedures. We consider sovereign credit ratings of Moody's and Standard and Poor's separately.

The assumption of ordered probit estimation, which is relatively standard for credit ratings, is that for $j + 1$ rating categories and the initial rating of a particular obligor, i, the terminal rating at the end of one period, j, is determined by the realization of a latent variable, R:

$$\begin{cases} j = 0 & \text{if} \quad R \le 0 \\ j = 0 & \text{if} \quad 0 < R \le Z_2 \\ \ldots & \\ j = J + 1 & \text{if} \quad Zj \le R \end{cases}$$

Zs are scalar cut-off points. It is assumed that $R = \beta\mathbf{X} + \xi$, where $\mathbf{X}$ is a vector of predetermined variables and ξ is assumed to have a standard normal distribution. The probabilities of being in each category are thus as follows: Prob($j = 0$) = $\Phi(-\beta\mathbf{X})$, Prob($j = 1$) = $\Phi(Z_1 - \beta\mathbf{X})$,…, Prob($j = J + 1$) = $1 - \Phi(Z_j - \beta\mathbf{X})$.

Our dataset of credit ratings is collected directly from Bloomberg and is ordered such that AAA (Aaa) corresponds to 20 and D corresponds to 0 under Standard and Poor's (Moody's) classification. Table 5 presents the results of the baseline estimation. The benchmark variables in the baseline model are the ones we might expect to influence credit ratings standing, and they are also included in past empirical studies as determinants of sovereign ratings. Overall, there is a robust selection of liquidity, solvency, and macroeconomic variables, abstracting from external variables which are partially captured in the domestic macroeconomic variables.[13]

As expected and widely reported in previous contributions, we observe a significant role for GDP growth in Standard and Poor's ratings. Remarkably, per capita income, the inflation rate, and the fiscal deficit are significant for most specifications. The debt-service-to-exports ratio is not significant in Moody's ratings, and it has the wrong sign in Standard and Poor's. A larger current account deficit is associated with a better rating. This last result may be explained by the endogeneity of the series, but it may also reflect the fact that developing countries experienced a strong process of financial integration in the 1990s—mainly through larger indebtedness with the rest of the world. This timeline does not bring enough cross-section variability as an explanatory variable, however. Block and Vaaler (2004) report a similar result for a sample of seventeen emerging market economies.

Including different measures of stocks of foreign assets and liabilities yields several interesting results. Our estimates suggest that net foreign assets have a significant effect on one of the rating agencies only (Standard and Poor's; see column 7). Furthermore, the split between gross assets and gross liabilities shows that while Moody's ratings appear not to depend on any of them, Standard and Poor's reacts to both with effects that are broadly similar (columns 4 and 9).

With regard to net and gross components of net foreign assets (columns 3, 5, 8, and 10), the results show that their effect in the aggregate for Standard and Poor's is explained not only by the role of debt, but also by a significant role of FDI liabilities and equity liabilities. Allowing nonresidents to hold large shares of domestic stocks and firms seems to be positively associated with credit ratings. Debt assets, which are associated with lending to the rest of world, are positively associated with Moody's ratings. Similarly, equity assets, which are related to the acquisitions of stocks in external financial markets, seem to be quite significant for Standard and Poor's ratings.

13. We also performed estimations including the real oil price, and results were unaltered. The model is estimated including country and time dummies.

Finally, we evaluate the role of changes in gross assets and liabilities, distinguishing aggregate components (table 6). We do not include the current account, to avoid colinearity with the other explanatory variables. As expected, increases in debt liabilities are negatively associated with credit ratings. Again, we observe a significant effect for FDI liabilities in improving credit ratings.

The above exercises confirm that assets and liabilities have an important effect on the credit ratings of emerging market economies. They also highlight the importance of distinguishing among the different components of countries' international investment position. We find support for the view that FDI liabilities play a part in sovereign ratings, in a context in which FDI has usually been associated with a large potential for generating employment, raising productivity, transferring skills and technology, enhancing exports, and contributing to the long-term economic development of the recipient country.

4. FOREIGN ASSETS AND LIABILITIES AND THE REAL EXCHANGE RATE

An increasingly dominant view is that over the business cycle, the real exchange rate tends to move toward an underlying equilibrium value determined by real factors, usually defined by some version of purchasing power parity. Examining the path of the equilibrium exchange rate over time can be extremely helpful in allowing economists to determine the degree to which movements in actual exchange rates have deviated from fundamentals and to offer some idea as to the likely rate of return to the underlying equilibrium. This has immense practical value, as such medium-term trends in exchange rates are an essential tool in assessing current and future macroeconomic conditions in industrial and developing countries.

This section extends previous contributions that assess the role of foreign assets in the long-run dynamics of the real exchange rate. In particular, we evaluate whether the alternative components of external assets affect the real exchange rate in the same way, based on a large panel of countries. An empirical assessment is important for policy analysis since it will allow us to judge whether the process of international financial integration may affect the level and dynamics of an economy's currency.

As our starting point, we consider the same basic specification that has been used elsewhere to evaluate the effect of fundamentals on the real exchange rate. In particular, we use the specification and country sample outlined in Aguirre and Calderón (2005). They construct a series of equilibrium real exchange rate measures for a large group of countries to obtain misalignment estimates; they then use standard empirical growth equations to evaluate how misalignment estimates affect growth.

The specification follows the so-called single-equation approach, which relates the real exchange rate to a particular set of fundamentals in a reduced form and has a long tradition in empirical international finance. Edwards (1989), Obstfeld and Rogoff (1995), and Faruqee (1994) provide theoretical underpinnings that motivate the type of fundamentals to be considered. Almost all of the fundamentals have an effect on the real exchange rate from a flow perspective. Higher productivity will appreciate the domestic currency in real terms (appreciate the real exchange rate herein) through the well known Balassa-Samuelson effect. More favorable terms of trade allow the country to spend more, thereby pressuring nontradable goods prices and appreciating the real exchange rate. A larger participation of government spending will appreciate the real exchange rate through a composition effect (which is usually assumed to be relatively nontradables intensive) or just as an aggregate demand effect if there is not perfect capital mobility.

More importantly for the purpose of this paper, the stock of net foreign assets (as a ratio to GDP) should influence the real exchange rate because owning more assets has a counterpart in larger revenues earned (a surplus in factor payments), which in turn can finance a larger sustainable commercial deficit in steady state. This larger commercial deficit is coherent only with a more appreciated real exchange rate. Of all the fundamentals considered, net foreign assets is the only one that is a stock. Its impact, however, stems from its flow effect on the current account.

In principle, if all components of net foreign assets have the same rate of return, they should have the same effect on the equilibrium real exchange rate, for they would produce the same income

flow. Nevertheless, expected returns may differ across particular assets and liabilities. More importantly, the different components of net foreign assets can have very different valuation effects, which in turn may depend on the exchange rate. The dynamics of the real exchange rate could also be influenced by the flows associated with the changing stocks. In this case, an increase in a particular asset could end up depreciating the exchange rate, at least temporarily.

Several studies use a specification similar to the one we use here to study the effects of different fundamentals on the real exchange rate. Goldfajn and Valdés (1999) use a very similar approach to calculate misalignments and study the way they are resolved. Valdés and Délano (1999) use the same type of model to explore the quantitative relevance of the Balassa-Samuelson effect. Razin and Collins (1997) consider panel fundamental real exchange rate equations to study the effects of misalignments on growth. Edwards and Savastano (2000) survey other papers that make use of this approach.

The basic specification we consider includes a real exchange rate constructed from the domestic consumer price index (CPI) and the wholesale price index (WPI) of trading partners, while productivity is measured as the relative tradables-to-nontradables labor productivity. Net foreign assets corresponds to the series constructed by Lane and Milessi-Ferreti (2001), updated with capital account information.

The results of the basic specification (column 1 in table 7) are the same as in Aguirre and Calderón (2005). The four fundamentals have the expected sign and are highly significant: higher productivity, improved terms of trade, a larger share of government consumption in GDP, and higher net foreign assets (as a percentage of GDP) are all correlated with a more appreciated domestic currency in real terms. Furthermore, the tests on the stationarity of residuals show that the variables cointegrate (table 8).[14]

When we split the whole sample into industrial and developing countries, the results of the former continue to meet expectations.[15] In the developing countries' subsample, however, productivity is no longer statistically significant, whereas terms-of-trade shocks appear to depreciate the real exchange rate. Cointegration continues to hold.

When we consider alternative decompositions of net foreign assets, the results show that gross assets and gross liabilities have quite similar effects on the real exchange rate in all three cases (with the opposite sign) (column 2). More external assets or less gross liabilities equivalent to one percentage point of GDP appreciate the real exchange rate by approximately 0.1 percent if one considers the full sample and the subsample industrial countries. For developing countries, assets appear to appreciate the real exchange rate by almost 0.15 percent, while liabilities depreciate it by 0.1 percent.

Although gross assets and liabilities appear roughly equally important in determining the real exchange rate, different components of net foreign assets have quite different effects (column 3). Considering all countries together, we find that while the cumulative current account has a positive effect on the real exchange rate (as expected in theory), the valuation effect has a negative one, albeit smaller in magnitude. Within the subsamples, the current account result still holds (with a larger effect in developing countries), but the valuation effect has a positive impact in industrial countries and a rather large negative effect in developing countries. Part of this could be the result of a reverse causality problem: in developing countries, real exchange rate depreciation may have a larger adverse consequence for valuation effects (that is, a larger share of their liabilities is denominated in foreign currency).

As for different components by type of flows (column 4), FDI does not have any significant impact on the real exchange rate for the full sample, whereas net portfolio and net debt assets have a strong positive effect. International reserve assets appear to depreciate the real exchange rate. Some of these results do not hold for both subsamples simultaneously. In fact, both net debt and reserve accumulation appear to be quite relevant for developing countries' real exchange rate, which is not

14. Rank cointegration test is available on request.
15. The list of countries included in each group is in the appendix.

the case in industrial economies.[16] Net portfolio significantly appreciates the real exchange rate only in the subsample of industrial countries.

5. CONCLUSIONS

Despite several external crises, financial integration has intensified in recent decades in industrial and developing countries. This has been accompanied by significant changes in the composition of countries' international investment position. Large holdings of foreign assets and liabilities, along with increasing relevance of the valuation effects, have characterized the international financial integration of economies.

In this paper, we have empirically assessed the implications of stocks, flows, and valuation adjustments in current account reversals, sudden stops, speculative attacks, and sovereign ratings, as well as in the long-run dynamics of real exchange rates in industrial and developing economies. The paper has tackled a number of policy-oriented questions. First, it assessed whether the size of net foreign assets (a stock beyond current flows) is an important determinant of crises and creditworthiness. Second, it evaluated whether gross external assets and liabilities have differentiated roles in determining the likelihood of crises, the real exchange rate, and creditworthiness. Third, it estimated the effects of different components of net external assets on different outcomes. Finally, it explored the differences and similarities between valuation effects and the impact of accumulated flows in different dimensions.

We found support for the view that assets and liabilities are rather distinctive external holdings with different implications for the occurrence of an external crisis. In general, flows do not influence the likelihood of currency attacks and are quite relevant for current account reversals and sudden stops. A higher stock of net foreign assets reduces the likelihood of currency crises, while its composition is what matters for reversals and sudden stops: more portfolio equity assets and FDI liabilities reduce the likelihood of these crises. Furthermore, cumulative valuation adjustments seem to have a statistically significant impact on current account reversals and currency crises.

In the long-run dynamics of the real exchange rate, gross assets and liabilities appeared to be equally important, but components of external holdings have considerably different effects. While the cumulative current account is associated with real depreciation of the currency in the long run, a valuation effect is strongly linked with real currency appreciations in developing economies.

From an economic policy perspective, our work sheds light on the importance of how economies integrates with the rest of world. The amount of assets and liabilities the economy accumulates is not innocuous. Some assets and liabilities, and the flows associated with them, may trigger important valuation effects that, along with the external holdings, certainly are significant in the mechanism for adjusting to external shocks and in the constraints the economy faces in the international financial markets. Further research on this issue is unquestionably a must for academia and policymakers.

APPENDIX

Data sources and Sample Definition

The data for the estimations on current account reversals correspond to Edwards (2005b). The data set for the estimations on exchange rate market pressure corresponds to García and Soto (2005). These data sets were enlarged with the foreign assets and liabilities of the main components of the international investment position prepared by Lane and Milesi-Ferretti (2006).[17] Valuation adjustments were constructed subtracting from the net foreign asset position (assets and liabilities)

16. The results should be compared with some care, considering that the actual samples change depending on data availability.

17. Available at www.imf.org/external/pubs/ft/wp/2006/data/wp0669.zip.

the cumulative current account taken from the IMF's *International Financial Statistics*. All stock and flow series are over current GDP in dollars.

For the credit ratings estimations, we take the year-end sovereign ratings released by Standard and Poor's and Moody's for the period 1990–2005. Ratings were converted into a numeric scale as indicated in table A1.

Table A1. Numeric Conversion of Standard and Poor's and Moody's Ratings

Standard & Poor's	*Moody's*	*Numeric Scale*
AAA	Aaa	20
AA+	Aa1	19
AA	Aa2	18
AA-	Aa3	17
A+	A1	16
A	A2	15
A-	A3	14
BBB+	Baa1	13
BBB	Baa2	12
BBB-	Baa3	11
BB+	Ba1	10
BB	Ba2	9
BB-	Ba3	8
B+	B1	7
B	B2	6
B-	B3	5
CCC+	Caa1	4
CCC	Caa2	3
CCC-	Caa3	2
CC	Ca	1
D	D	0

For the panel real exchange rate, we take the real exchange rate, productivity, government consumption, and terms of trade from Aguirre and Calderón (2005). Foreign assets and liabilities are again taken from Lane and Milesi-Ferretti (2006). Country and fixed effects were removed from the series on foreign assets and liabilities before performing the long-run estimations.

We used a sample of 136 countries for our analysis of current account reversals, currency crises, and sudden stops. The full sample encompasses 33 industrial and 103 developing countries. See table A2 for the complete list.

Table A2. List of Countries Used for the Current Account Reversals, Currency Crises, and Sudden Stops

Industrial	*Developing*		
Australia	Albania	Ghana	Oman
Austria	Algeria	Guatemala	Pakistan
Bahrain	Angola	Guinea	Panama
Belgium	Argentina	Haiti	Papua New Guinea
Canada	Armenia	Honduras	Paraguay
Cyprus	Azerbaijan	Hungary	Peru
Denmark	Bangladesh	India	Philippines
Finland	Belarus	Indonesia	Poland
France	Benin	Iran, Islamic Rep.	Romania

Germany	Bolivia	Jamaica	Russian Federation
Greece	Bosnia and Herzegovina	Jordan	Rwanda
Hong Kong, China	Brazil	Kazakhstan	Saudi Arabia
Iceland	Bulgaria	Kenya	Senegal
Ireland	Burkina Faso	Kyrgyz Republic	Slovak Republic
Israel	Cambodia	Laos PDR	South Africa
Italy	Cameroon	Latvia	Sri Lanka
Japan	Chad	Lebanon	Sudan
Kuwait	Chile	Libya	Swaziland
Luxembourg	China	Lithuania	Tajikistan
Malta	Colombia	Macedonia, FYR	Tanzania
Netherlands	Congo, Dem. Rep.	Madagascar	Thailand
New Zealand	Congo, Rep.	Malawi	Togo
Norway	Costa Rica	Malaysia	Trinidad and Tobago
Portugal	Croatia	Mali	Tunisia
Qatar	Czech Republic	Mauritius	Turkey
Singapore	Dominican Republic	Mexico	Uganda
Slovenia	Ecuador	Moldova	Ukraine
Spain	Egypt, Arab Rep.	Morocco	Uruguay
Sweden	El Salvador	Mozambique	Venezuela, RB
Switzerland	Equatorial Guinea	Myanmar	Vietnam
United Arab Emirates	Estonia	Namibia	Yemen, Rep.
United Kingdom	Ethiopia	Nepal	Zambia
United States	Fiji	Nicaragua	Zimbabwe
	Gabon	Niger	
	Georgia	Nigeria	

The real exchange rate panel regressions include 49 countries. The 20 industrial countries in the sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, New Zealand, Portugal, Spain, Sweden, the United Kingdom, and the United States. The 29 developing countries in the sample are Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Costa Rica, Dominican Republic, Ecuador, Egypt, Indonesia, India, Jamaica, Jordan, Korea, Mexico, Morocco, Norway, Pakistan, Panama, Peru, Philippines, Syrian Arab Republic, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay, and Venezuela.

The credit rating regressions are based on the following 52 countries: Argentina, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Fiji Islands, Guatemala, Honduras, Hungary, India, Indonesia, Israel, Jordan, Kazakhstan, Korea, Latvia, Lebanon, Lithuania, Malaysia, Mauritius, Mexico, Moldova, Morocco, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Romania, Russian Federation, Slovak Republic, South Africa, Thailand, Trinidad and Tobago, Turkey, Ukraine, Uruguay, Venezuela, and Vietnam.

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Table 1. Current Account Reversal: Panel Probit, All Countries[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Openness: imports to GDP (1st lag)	0.106	0.026	0.011	0.013	0.022
	(0.000)***	(0.049)**	(0.430)	(0.342)	(0.081)*
Sudden stops in region (1st lag)	0.190	0.070	0.041	0.043	0.066
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Terms of trade, % change (not lagged)	0.001	0.001	0.000	0.000	0.000
	(0.001)***	(0.011)**	(0.021)**	(0.020)**	(0.033)**
NFA to GDP (first lag)	–0.043				
	(0.000)***				
NFA to GDP		0.003			
		(0.699)			
Total assets to GDP				–0.007	
				(0.626)	
Total liabilities to GDP				–0.003	
				(0.651)	
Portfolio debt assets to GDP			–0.012		
			(0.430)		
FDI assets to GDP			0.048	0.053	
			(0.270)	(0.224)	
Portfolio equity assets to GDP			–0.173	–0.197	
			(0.071)*	(0.079)*	
Debt liabilities to GDP			–0.002		
			(0.744)		
FDI liabilities to GDP			–0.031	–0.028	
			(0.055)*	(0.096)*	
Portfolio equity liabilities to GDP			0.106	0.121	
			(0.004)***	(0.001)***	
International reserves to GDP			0.006		
			(0.827)		
Cumulative current account to GDP					0.011
					(0.132)
Cumulative valuation adjust. to GDP					–0.023
					(0.037)**
Current account deficit to GDP (1st lag)		0.453	0.323	0.337	0.449
		(0.000)***	(0.000)***	(0.000)***	(0.000)***
Valuation adjust. to GDP (1st lag)		0.054	0.046	0.048	0.069
		(0.073)*	(0.054)*	(0.051)*	(0.025)**
No. observations	1342	1254	1199	1199	1254
Pseudo R^2	0.15	0.35	0.38	0.38	0.39
No. crisis	65	60	53	53	60

Source: Authors' calculations.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is the current account reversal indicator. Coefficients are marginal effects at the mean. Explanatory variables are two–year lags, unless otherwise mentioned. Robust *p* values are in parentheses.

Table 2. Sudden Stops: Panel Probit, All Countries[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Openness: imports to GDP (1st lag)	0.117	0.078	0.028	0.056	0.079
	(0.000)***	(0.000)***	(0.266)	(0.013)**	(0.000)***
Sudden stops in region (1st lag)	0.249	0.178	0.139	0.150	0.177
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Terms of trade, % change (not lagged)	0.000	0.000	0.000	0.000	0.000
	(0.526)	(0.449)	(0.438)	(0.330)	(0.450)
NFA to GDP (1st lag)	–0.018				
	(0.026)**				
NFA to GDP		0.007			
		(0.479)			
Total assets to GDP				0.002	
				(0.873)	
Total liabilities to GDP				0.008	
				(0.468)	
Portfolio debt assets to GDP			–0.018		
			(0.249)		
FDI assets to GDP			0.227	0.205	
			(0.000)***	(0.001)***	
Portfolio equity assets to GDP			–0.225	–0.350	
			(0.161)	(0.043)**	
Debt liabilities to GDP			0.012		
			(0.219)		
FDI liabilities to GDP			–0.090	–0.093	
			(0.010)***	(0.028)**	
Portfolio equity liabilities to GDP			0.066	0.114	
			(0.366)	(0.121)	
International reserves to GDP			0.114		
			(0.044)**		
Cumulative current account to GDP					0.006
					(0.561)
Cumulative valuation adjust. to GDP					0.010
					(0.500)
Current account deficit to GDP (1st lag)		0.448	0.425	0.452	0.445
		(0.000)***	(0.000)***	(0.000)***	(0.000)***
Valuation adjust. to GDP (1st lag)		–0.047	–0.042	–0.041	–0.048
		(0.385)	(0.317)	(0.375)	(0.381)
No. observations	1261	1219	1164	1164	1219
Pseudo R^2	0.15	0.22	0.26	0.25	0.22
No. crisis	54	53	49	49	53

Source: Authors' calculations.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is the sudden stop indicator. Coefficients are marginal effects at the mean. Explanatory variables are two–year lags, unless otherwise mentioned. Robust *p* values are in parentheses.

Table 3. Exchange Rate Market Pressure: Panel Probit, All Countries[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
RER deviation from HP rolling trend (1st lag)	–0.022	–0.023	–0.021	–0.021	–0.021
	(0.085)*	(0.106)	(0.075)*	(0.088)*	(0.139)
Real bank credit growth (1st lag)	0.029	0.03	0.032	0.033	0.031
	(0.001)***	(0.001)***	(0.000)***	(0.000)***	(0.001)***
Real GDP growth (1st lag)	–0.071	–0.077	–0.094	–0.089	–0.074
	(0.252)	(0.230)	(0.115)	(0.142)	(0.249)
Real export growth (1st lag)	–0.079	–0.078	–0.083	–0.084	–0.075
	(0.060)*	(0.068)*	(0.042)**	(0.044)**	(0.079)*
U.S. interest rate (1st lag)	0.004	0.005	0.005	0.005	0.005
	(0.017)**	(0.006)***	(0.003)***	(0.003)***	(0.006)***
NFA to GDP (1st lag)	–0.022				
	(0.060)*				
NFA to GDP		–0.03			
		(0.005)***			
Total assets to GDP				–0.065	
				(0.014)**	
Total liabilities to GDP				0.017	
				(0.334)	
Portfolio debt assets to GDP			–0.082		
			(0.037)**		
FDI assets to GDP			–0.08	–0.033	
			(0.357)	(0.705)	
Portfolio equity assets to GDP			0.021	0.091	
			(0.838)	(0.477)	
Debt liabilities to GDP			0.021		
			(0.232)		
FDI liabilities to GDP			0.03	0.038	
			(0.398)	(0.394)	
Portfolio equity liabilities to GDP			0.159	0.128	
			(0.168)	(0.292)	
International reserves to GDP			0.002		
			(0.972)		
Cumulative current account to GDP					–0.026
					(0.017)**
Cumulative valuation adjust. to GDP					–0.046
					(0.013)**
Current account deficit to GDP (1st lag)		–0.056	–0.134	–0.127	–0.041
		(0.649)	(0.339)	(0.362)	(0.752)
Valuation adjust. to GDP (1st lag)		–0.009	0.007	0.01	–0.001
		(0.904)	(0.921)	(0.895)	(0.984)
No. observations	1304	1257	1206	1206	1257
Pseudo R^2	0.06	0.06	0.09	0.08	0.06
No. crisis	55	54	53	53	54

Source: Authors' calculations.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is the exchange rate market pressure indicator. Coefficients are marginal effects at the mean. Explanatory variables are two–year lags, unless otherwise mentioned. Robust p values are in parentheses.

Table 4. Foreign Assets and Liabilities and External Crises: Main Results

	Effect on crisis probability[a]		
Explanatory variable	*Current account reversals*	*Sudden stops*	*Exchange rate market pressure*
Net foreign assets (NFA)	n.s.	n.s.	(–)
Gross assets			
FDI assets	n.s.	(+)	n.s.
Portfolio equity assets	(–)	(–)	n.s.
Portfolio debt assets	n.s.	n.s.	(–)
International reserves	n.s.	(+)	n.s.
Gross Liabilities			
FDI liabilities	(–)	(–)	n.s.
Portfolio equity liabilities	(+)	n.s.	n.s.
Portfolio debt liabilities	n.s.	n.s.	n.s.
Cumumulative current account	n.s.	n.s.	(–)
Cumulative valuation adjustments	(–)	n.s.	(–)
Δ NFA			
Current account deficit	(+)	(+)	n.s.
Valuation adjustment	(+)	n.s.	n.s.
No. crises	53	49	53

Source: Authors' calculations.
a. Only the sign of statistically significant coefficients are reported (n.s.: not significant).

Table 5. Credit Ratings, Stocks: Ordered Probit Estimation, 1990–2004[a]

	Moody's ratings[b]					*Standard & Poor's ratings[b]*				
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Real GDP growth	0.016	0.016	0.018	0.016	0.018	0.039	0.036	0.041	0.036	0.045
	(0.279)	(0.286)	(0.249)	(0.277)	(0.243)	(0.015)**	(0.019)**	(0.017)**	(0.022)**	(0.015)**
Per capita real GDP (PPP)	0.96	0.936	0.703	0.918	0.691	7.407	7.588	7.362	7.575	8.299
	(0.007)***	(0.007)***	(0.026)**	(0.008)***	(0.035)**	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Inflation rate	–0.294	–0.309	–0.219	–0.311	–0.226	–0.227	–0.195	–0.07	–0.195	–0.069
	(0.000)***	(0.000)***	(0.022)**	(0.000)***	(0.020)**	(0.039)**	(0.068)*	(0.561)	(0.070)*	(0.574)
Fiscal deficit / GDP	–6.831	–6.696	–6.234	–6.768	–5.869	–12.922	–12.638	–13.23	–12.525	–8.356
	(0.007)***	(0.008)***	(0.021)**	(0.008)***	(0.030)**	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.018)**
Debt – services / Exports	1.352	0.789	1.499	0.805	1.593	2.188	2.491	3.608	2.419	4.092
	(0.169)	(0.442)	(0.129)	(0.433)	(0.109)	(0.061)*	(0.045)**	(0.002)***	(0.055)*	(0.001)***
Current account deficit / GDP	13.318	13.866	11.373	13.829	11.092	16.819	16.087	14.236	16.209	11.141
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
NFA / GDP		–0.191					1.936			
		(0.770)					(0.008)***			
Net FDI /GDP			–5.127					–5.204		
			(0.002)***					(0.001)***		
Net portfolio equity / GDP			–2.178					1.556		
			(0.342)					(0.544)		
Net debt /GDP			2.462					4.391		
			(0.001)***					(0.000)***		
Assets / GDP				–0.43					2.347	
				(0.673)					(0.022)**	
Liabilities / GDP				0.205					–1.944	
				(0.752)					(0.009)***	
Reserves / GDP			1.398		1.566			1.457		2.02
			(0.601)		(0.557)			(0.599)		(0.467)
FDI assets / GDP					–3.175					–2.885
					(0.479)					(0.445)
FDI liabilities / GDP					4.981					4.512
					(0.003)***					(0.004)***
Debt assets / GDP					1.623					1.641
					(0.199)					(0.313)
Debt liabilities / GDP					–2.42					–4.683
					(0.001)***					(0.000)***
Equity assets / GDP					–0.898					10.62

					(0.719)					(0.000)***
Equity liabilities / GDP					3.234					9.734
					(0.239)					(0.007)***
No. observations	336	328	317	328	317	323	318	313	318	313
Pseudo R^2	0.42	0.42	0.43	0.42	0.43	0.49	0.49	0.51	0.49	0.53

Source: Authors´ calculations.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The regressions were estimated with time and country dummies (not presented). All stocks are in first lags. Robust *p* values are in parentheses.
b. A rating of AAA for Moody's (Aaa for Standard & Poor's) corresponds to 20; a rating of D corresponds to 0.

Table 6. Credit Ratings, Change in Stocks: Ordered Probit Estimation, 1990–2004[a]

	Moody´s Ratings[b]						*Standard & Poors´ Ratings[b]*					
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
Real GDP growth	0.026	0.021	0.028	0.031	0.029	0.025	0.048	0.045	0.051	0.045	0.048	0.044
	(0.076)*	(0.141)	(0.065)*	(0.041)**	(0.058)*	(0.091)*	(0.001)***	(0.003)***	(0.001)***	(0.004)***	(0.001)***	(0.006)***
Per capita real GDP (PPP)	0.955	0.951	0.935	0.765	0.928	0.721	7.506	7.822	7.763	8.409	8.05	8.47
	(0.009)***	(0.006)***	(0.011)**	(0.048)**	(0.011)**	(0.045)**	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Inflation rate	–0.403	–0.435	–0.437	–0.388	–0.441	–0.374	–0.353	–0.337	–0.355	–0.196	–0.343	–0.2
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.002)***	(0.003)***	(0.002)***	(0.087)*	(0.002)***	(0.101)
Fiscal deficit / GDP	–7.886	–7.428	–7.932	–8.496	–6.842	–7.696	–13.517	–12.984	–13.837	–12.502	–16.137	–15.125
	(0.002)***	(0.003)***	(0.002)***	(0.001)***	(0.018)**	(0.007)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Debt – services / Exports	1.888	0.998	1.466	2.271	1.618	2.035	2.42	2.017	2.057	4.359	2.249	3.856
	(0.055)*	(0.310)	(0.144)	(0.024)**	(0.100)*	(0.036)**	(0.039)**	(0.100)	(0.096)*	(0.000)***	(0.061)*	(0.003)***
(ΔFDI assets) / GDP		–3.597				–3.77		3.263				–3.71
		(0.490)				(0.510)		(0.663)				(0.610)
(ΔFDI liabilities) / GDP		3.472				3.634		1.767				4.037
		(0.033)**				(0.078)*		(0.256)				(0.099)*
(ΔEquity assets) / GDP				0.361		1.683				2.747		2.684
				(0.800)		(0.200)				(0.093)*		(0.101)
(ΔEquity liabilities) / GDP				–1.69		–3.284				–5.16		–5.214
				(0.057)*		(0.000)***				(0.000)***		(0.000)***
(ΔDebt assets) / GDP			4.655			2.788			12.848			9.201
			(0.344)			(0.619)			(0.028)**			(0.154)
(ΔDebt liabilities) / GDP			1.923			0.22			–1.606			0.353
			(0.376)			(0.929)			(0.619)			(0.915)
(ΔReserves) / GDP					2.51	2.053					–6.613	–7.616
					(0.273)	(0.447)					(0.001)***	(0.005)***
No. observations	336	321	324	328	329	317	323	318	313	318	319	313
Pseudo R^2	0.39	0.39	0.39	0.40	0.39	0.41	0.45	0.45	0.45	0.48	0.46	0.49

Source: Authors´ calculations.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The regressions were estimated with time and country dummies (not presented). All stocks are in first lags. Robust *p* values are in parentheses.
b. A rating of AAA for Moody's (Aaa for Standard & Poor's) corresponds to 20; a rating of D corresponds to 0.

Table 7. Long–Run Real Exchange Rate Equations: Panel Cointegration[a]

	All Countries				*Industrial Countries*				*Developing Countries*			
Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(1)*	*(2)*	*(3)*	*(4)*	*(1)*	*(2)*	*(3)*	*(4)*
Productivity	0.160**	0.148**	0.095*	0.0861	0.409***	0.431***	0.393***	0.572***	–0.157	–0.168*	–0.284**	–0.492
	(0.03)	(0.02)	(0.10)	(0.18)	(0.00)	(0.00)	(0.00)	(0.00)	(0.11)	(0.08)	(0.02)	(0.31)
Terms of trade	0.244***	0.244***	0.227***	0.380***	0.428***	0.432***	0.426***	0.431***	–0.109*	–0.111*	–0.139**	–0.089
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.07)	(0.06)	(0.03)	(0.24)
Government consumption / GDP	0.267***	0.267***	0.263***	0.334***	0.442***	0.435***	0.437***	0.260***	0.114***	0.109**	0.141***	0.243***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)	(0.00)
NFA / GDP	0.093**				0.088**				0.010*			
	(0.02)				(0.02)				(0.07)			
Assets / GDP		0.103**				0.093**				0.148**		
		(0.02)				(0.02)				(0.02)		
Liabilities / GDP		–0.086***				–0.089**				–0.103*		
		(0.01)				(0.02)				(0.06)		
Net FDI / GDP				–0.067				–0.163**				–0.212
				(0.26)				(0.02)				(0.24)
Net portfolio / GDP				0.237***				0.194***				–0.439
				(0.00)				(0.00)				(0.14)
Net debt / GDP				0.147***				0.006				0.325***
				(0.00)				(0.44)				(0.00)
Reserves / GDP				–0.752***				–0.743				–1.573***
				(0.00)				(0.22)				(0.00)
Cum. current account / GDP			0.177***				0.119**				0.333**	
			(0.00)				(0.03)				(0.02)	
Net valuation (A – L) / GDP			–0.069*				0.065*				–0.220**	
			(0.07)				(0.09)				(0.01)	
No. observations	1815	1815	1815	888	660	660	660	480	924	924	924	312
R^2	0.14	0.15	0.18	0.28	0.37	0.38	0.38	0.40	0.04	0.04	0.13	0.25

Source: Authors' calculations.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. Panel DOLS estimates for each group of countries, accounting for country and time effects. p values are in parentheses.

Table 8. Long–Run Real Exchange Rate Equations: Residual–Based Cointegration Tests[a]

	All countries				*Industrial countries*				*Developing countries*			
	NFA / GDP	*CCA / GDP*	*Assets / GDP*	*NFDI / GDP*	*NFA / GDP*	*CCA / GDP*	*Assets / GDP*	*NFDI / GDP*	*NFA / GDP*	*CCA / GDP*	*Assets / GDP*	*NFDI / GDP*
		Net val. / GDP	*Liab. / GDP*	*NPort / GDP*		*Net val. / GDP*	*Liab. / GDP*	*NPort / GDP*		*Net val. / GDP*	*Liab. / GDP*	*NPort / GDP*
				NDebt / GDP				*NDebt / GDP*				*NDebt / GDP*
Cointegration test				*IR / GDP*				*IR / GDP*				*IR / GDP*
Homogeneous residual–based cointegration tests (p values) [b]												
DF(rho)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
DF(t_rho)	(0.001)	(0.000)	(0.000)	(0.002)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ADF	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
McCoskey and Kao (1998)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
Panel LM	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pedroni (1995)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
TN1(rho)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TN2(rho)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Heterogeneous residual–based cointegration tests (p–values) [c]												
Panel–v	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel–rho	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel–t (nonparametric)	(0.002)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel–t (parametric)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
Group rho	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Group–t (nonparametric)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Group–t (parametric)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Source: Authors' calculations.
a. Test includes Productivity, Terms of Trade and Government Consumption.
b. Kao (1999).
c. Pedroni (1999).

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