Valuation Effects and External Adjustment: A Review

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Ever since David Hume introduced his price-specie flow mechanism in 1752, the question of external adjustment has been a classic issue for international macroeconomists. In 1968 Robert Mundell asked "To what extent should surplus countries expand; to what extent should deficit countries contract?" (Mundell, 1968). The debate in those days was about the relative merits of expenditure-switching and expenditure-reducing policies, analyzed within the useful template of the Mundell-Fleming model. Subsequent research introduced microfoundations, added an explicit dynamic dimension borrowed from optimal growth theory, and highlighted the role of expectations. Throughout this process, understanding the adjustment of a country's external balances remained a key issue. By the early 1980s a modern synthesis had emerged, in the form of the intertemporal approach to the current account. It characterized the dynamics of external debt as the result of forward-looking decisions by households and investment decisions by firms, set in market structures of varying degrees of complexity. As Obstfeld remarks:

> [This approach] provides a conceptual framework appropriate for thinking about the important and interrelated policy issues of external balance, external sustainability, and equilibrium real exchange rates… [and shifts] attention from automatic adjustment mechanisms and dynamic stability considerations to intertemporal budget constraints and transversality conditions for maximization (Obstfeld, 2001, p. 12).

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According to this intertemporal approach, a country's current account at time t, CA_t reflects expectations of changes in that country's future economic circumstances, as follows:

$$CA_t = -E_t\left[\sum_{s=t+1}^{\infty} R^{-(s-t)}\Delta NY_s\right], \tag{1}$$

where NY_t denotes net income (output minus investment and government expenditures), Δ is the difference operator ($\Delta NY_s = NY_s - NY_{s-1}$), R is the gross real return on a one-period risk-free international bond, and $E_t[.]$ is the expectation operator, conditional on information available at time t. According to equation (1), countries run current account deficits when future net income, NY_s, is expected to improve, and run current account surpluses when future net income is expected to deteriorate. The smoothing motive at the heart of the intertemporal approach is immediate: countries run surpluses to offset future unwelcome developments, and run deficits in anticipation of future improvements in their standard of living.

This class of models provides useful insights about short-run dynamic issues, for example, the response to transitory and permanent shocks. In most empirical studies, however, it falls short of explaining the dynamics of the current account.[1] Many empirical tests have been devised over the years. The most convincing ones—the present value tests—rely on a direct econometric verification of equation (1) using reduced-form vector autoregressions (VAR). The results often indicate that the implied current accounts—that is, the right-hand side of equation (1)—are too smooth compared to actual current accounts. In other words, the intertemporal approach accounts for only a small fraction of the movements in the current account.

Recent research argues that the focus on current accounts and fluctuations in future net income is misguided. Instead, one should focus on the determinants of a country's net foreign asset position. The two are identical in the standard intertemporal model, since, by definition, the change in the net foreign asset position equals the current account. In reality, however, the change in a country's net foreign asset position need not equal its current account. The reason is that the current account does not track unrealized capital gains arising from local-currency asset price and currency movements. To be more precise, define NA_{t+1} as a country's net foreign asset position at the

1. See Nason and Rogers (2006) for a recent assessment.

end of period t. The change in the net foreign asset position from one period to the next is given by the following accumulation equation:

$$NA_{t+1} = R_t NA_t + NX_t, \tag{2}$$

where NX_t represents the balance on goods, services, and net transfers, and R_t represents the gross portfolio return on the net foreign portfolio between the end of period $t-1$ and the end of period t.[2] Adding and subtracting the net investment income balance, NI_t, yields

$$\begin{aligned} NA_{t+1} - NA_t &= (R_t - 1)NA_t - NI_t + NX_t + NI_t \\ &= \left[(R_t - 1)NA_t - NI_t\right] + CA_t \\ &\equiv VA_t + CA_t \end{aligned} \tag{3}$$

where the second line uses the following definition of the current account: $CA_t = NX_t + NI_t$. The change in the net foreign position equals the current account, CA_t, plus a valuation adjustment, VA_t. This valuation adjustment (the term in brackets on the right-hand side of the second equation) equals the capital gain on the net foreign asset portfolio: the total net return minus income, dividends, and earnings distributed.[3] In many countries, this valuation component has greatly expanded in the last two decade, following the sharp surge in cross-border holdings of financial securities.

This paper reviews the evidence on the empirical relevance of this valuation component. Section 1 surveys the existing literature on patterns of cross-border asset holdings, in particular the pattern that emerges from the seminal empirical work of Philip Lane and Gian-Maria Milesi-Ferretti. It discusses the evolution over time and across countries of net and gross foreign asset positions since 1970 for industrial countries and emerging markets. It then assesses the evidence on the importance of valuation effects, relative to the

2. To be complete, the accumulation equation should also include the capital account, KA_t, and errors and omissions, EO_t. I abstract from these components in this discussion and bring them back in when necessary. Capital account transactions are typically small in many countries, especially industrialized countries. Errors and omissions are also excluded from the financial account in the U.S. Bureau of Economic Analysis estimates of the U.S. international investment position. Similarly, errors and omissions are reported separately in Lane and Milesi-Ferretti (2006).

3. Technically, the net investment income balance also includes reinvested direct investment earnings. See Gourinchas and Rey (2007a) for a discussion of how to treat this component.

current account, both for a large sample of countries and, more specifically, for Australia, Canada, the United Kingdom, and the United States, based on more detailed evidence from Gourinchas, Lopez, and Rey (2006).

Section 2 focuses on the United States, summarizing the empirical evidence on the role of valuation effects for the external adjustment presented in Gourinchas and Rey (2007b, 2007a). This section introduces the important conceptual distinction between expected and unexpected valuation effects. It argues that while valuation effects seem to be important, expected valuation effects may remain small for most countries other than the United States. Section 3 turns to a discussion of the theory, with a review of some of the recent international portfolio models that give rise to unexpected and expected valuation effects. I essentially classify the literature into two strands: the complete markets setup, in which valuation effects are mostly unexpected and valuation terms reflect mostly the transfer payments associated with perfect risk sharing; and portfolio balance models (and their modern incarnation), in which predictable valuation terms play an important role. The final section then concludes.

1. Patterns of Net Foreign Assets

None of the research presented in this paper would have been possible without the huge international effort in data collection of the last fifteen years. While data on balance of payments are generally available, for the reasons discussed above, they typically don't provide accurate estimates of a country's net foreign asset position. Starting in the 1980s, a number of national statistical agencies started to collect the information necessary to build estimates of net and gross external assets and liabilities at market value. For instance, the U.S. Bureau of Economic Analysis has provided annual data on the U.S. net international investment position at market value since 1991, with data going back to 1982 (see Landefeld and Lawson, 1991). Unfortunately, data for most countries remained fragmentary until quite recently.

The first important breakthrough came from the data collection efforts initiated by the International Monetary Fund (IMF). While the fourth edition of the IMF's *Balance of Payments Manual* (BPM4), published in 1977, introduced the concept of international investment position, it did not present a systematic framework for measuring its components. By contrast, the fifth edition of the manual (BPM5), published in 1993, provides a set of comprehensive guidelines. In subsequent years, the IMF started to report member countries' international investment positions (IIP). The initial coverage was limited (twenty-five countries in 1995), but it expanded rapidly through the Fund's outreach efforts. By 2002, the Fund collected partial or complete information on eighty countries, with annual data going back to 1980, at best.

The second breakthrough occurred with the work of Philip Lane at Dublin's Trinity College and Gian-Maria Milesi-Ferretti at the International Monetary Fund. Their database on the external wealth of nations, which was first published in 1991 (Lane and Milesi-Ferretti, 2001), provided scholars with a set of very useful annual estimates of net and gross international investment positions for a sample of sixty-seven industrial and developing countries. Their database covered the period 1970–98, thus adding at least ten years of data to the IMF's IIP database (and often much more than that, since many countries in the IMF database had only partial coverage). To construct net investment position at market value, Lane and Milesi-Ferretti devised ways to estimate the valuation component, VA_t, from balance-of-payments (flows) data, auxiliary data sources on world equity returns and exchange rates, and data on external debt from the World Bank, the OECD, and the BIS.[4] A major update to the data set, released in 2006 (Lane and Milesi-Ferretti, 2006), extends the sample to 140 countries with data through 2004.[5]

Next, I review the evidence on net and gross foreign asset positions that emerges from this data set. I then focus more specifically on the importance of valuation effects in a few industrial countries for which more detailed data are available.

1.1 Pattern of Net Foreign Assets from the External Wealth of Nations

What does the External Wealth of Nations data set reveal about international investment positions? The first well-known fact is

4. Given the lack of data, Lane and Milesi-Ferretti (2001) estimate foreign direct investment at book value, that is, correcting for currency fluctuations and assuming that the pattern of holdings of direct investment assets mimics the trade pattern.

5. The Mark II dataset differs from the original database along three main dimensions: errors and omissions are now reported separately; portfolio data uses data from the IMF's Coordinated Portfolio Investment Survey, when available; and direct investment is reported at market value when available.

the dramatic increase in financial integration since 1970. Figure 1 reports a commonly used measure of financial integration, the sum of gross assets and gross liabilities normalized by output, for a sample of industrial countries and a sample of emerging markets.[6] For the sample of industrial countries, the index of financial integration increased from 45 percent of output to 302 percent. For the emerging sample, the index increased from 15 percent to 120 percent. The log-scale of the graph reveals that the index of financial integration has increased at roughly the same pace for both industrial and emerging countries, about 6 percent per year. Figure 2 breaks down the series into gross assets and gross liabilities by group. The figure reveals a close match between gross assets and liabilities for industrial countries: each series grew at roughly 5.5 percent a year, from 20 percent of output in 1970 to 150 percent in 2004. Closer inspection uncovers a modest build-up in imbalances, with net foreign assets decreasing from 3.4 percent of output to –6.5 percent. By contrast, the sample of emerging countries displays a closing of imbalances. These countries are net borrowers throughout the period. However, the ratio of gross assets to output increases from 3.4 percent to 54 percent of output (a growth rate of 8 percent per year), while the ratio of gross liabilities increases from 12 percent to 66 percent (a growth rate of "only" 5 percent per year).[7] Thus, despite greater access to international financial markets, there is no evidence that emerging markets could increase their collective net borrowing. This closing of net imbalances for emerging countries is the focus of much recent literature.[8]

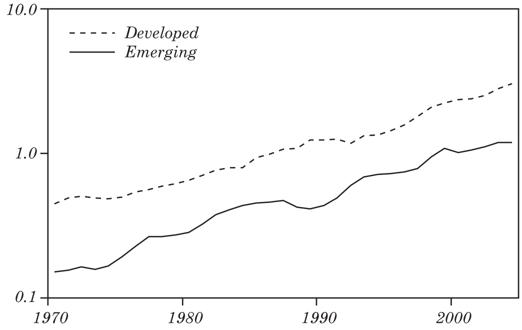
While financial integration seems to have proceeded at a fairly constant rate, individual country experiences have grown more disparate. Figure 3 reports the cross-country dispersion in gross positions, as measured by the standard deviation of our financial integration index. The industrial countries in the sample record a dramatic increase in this measure after 1995, from roughly 118 percent of output to 393 percent. This is driven in part by the spectacular explosion in cross-border asset holdings of countries like Ireland (1,880

6. See the appendix for a list of countries in each sample.

7. The fact that gross assets grew much faster than gross liabilities is consistent with an increase in net foreign liabilities (from 8 to 12 percent of output) for the emerging markets sample. The point is that net foreign liabilities increased much less than they would have if both gross assets and gross liabilities had been growing at the same rate.

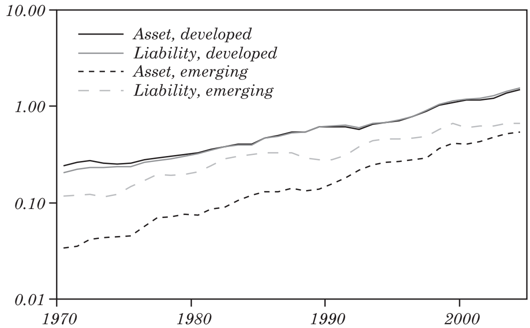
8. See Reinhart, Rogoff, and Savastano (2003), for a discussion of debt intolerance; see also Gourinchas and Jeanne (2007) for a discussion of the allocation puzzle.

Figure 1. International Financial Integration: (A + L) / Y (log scale)



Source: Author's calculations.

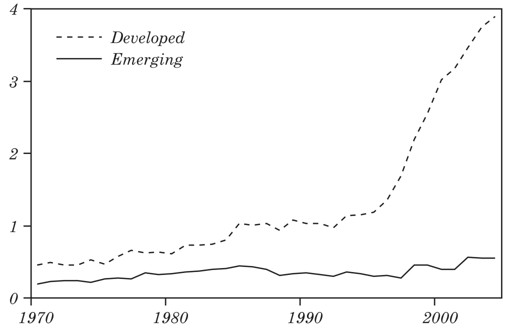
Figure 2. Gross Positions: A/Y, L/Y (log scale)



Source: Author's calculations.

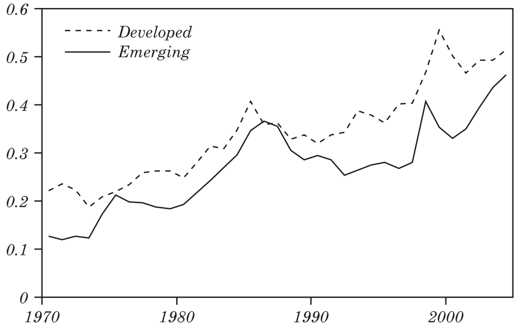
percent of GDP in 2004), Switzerland (1,010 percent), and Belgium (819 percent). By contrast, the pattern of cross-country dispersion for emerging countries remains quite stable, at around 40 percent. On the other hand, figure 4 reveals a growing pattern of cross-country net external imbalances for both emerging and industrial countries. The cross-country dispersion increased from 22 percent in 1970 to 51 percent in 2004 for industrial countries and from 12 percent to 46 percent for emerging economies.

Figure 3. Cross-Country Dispersion in Gross Positions: σ[(A + L) / Y]



Source: Author's calculations.

Figure 4. Cross-Country Dispersion in Net Positions: σ[(A − L) / Y]



Source: Author's calculations.

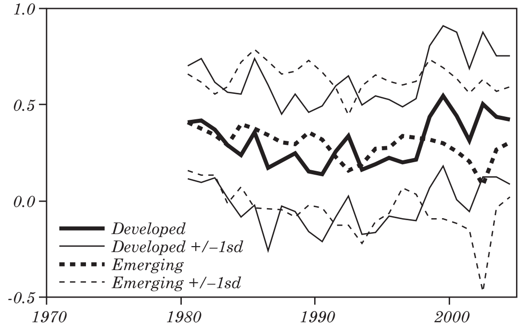
The next four figures characterize the change in the time-series process of gross assets and liabilities. I estimate the following process:

$$\ln a_{i,t+1} = \overline{\rho}_{i,t}^{a} \ln a_{i,t} + \overline{\delta}_{it}^{a} t + \varepsilon_{i,t+1}^{a} \quad (4)$$

$$\ln l_{i,t+1} = \overline{\rho}_{i,t}^{l} \ln l_{i,t} + \overline{\delta}_{it}^{l} t + \varepsilon_{i,t+1}^{l}$$

where $a_{i,t} = A_{i,t}/Y_{i,t}$ is the ratio of gross external assets to output and $l_{i,t} = L_{i,t}/Y_{i,t}$ is the corresponding ratio of gross external liabilities to output. This specification allows for a first-order autoregressive, or AR(1), component and also for a deterministic time trend that captures the gradual process of financial globalization. The AR coefficient, $\overline{\rho}_{i,t}$, and the trend coefficient, $\overline{\delta}_{i,t}$, are estimated by rolling regressions, with a ten-year window.[9] Figures 5 and 6 report the average serial correlation of gross asset and gross liabilities, while figures 7 and 8 report the average volatilities $\sigma_{\varepsilon,t}$. In figures 5 and 6 each data point represents the cross-country average of $\rho_{i,t}$ for a rolling regression over the previous ten years (so the value in 1980 represents the coefficient estimated over 1970–80). Figures 5 and 6 also report the two-standard-deviation bands around the point estimates. The serial correlation of gross positions does not seem to have changed significantly over that period: it remains close to 0.5 and takes similar values for gross assets and gross liabilities. By contrast, the time-series volatility of log gross asset and liability positions (expressed as a percent of output) has increased significantly throughout the period, from about 3 percent to 13 percent of output for industrial countries' gross assets and gross liabilities, from 3 percent to 6 percent for emerging countries' gross assets, and from 5 percent to 9 percent for emerging countries' gross liabilities. This means that over the last ten years, a one-standard-deviation innovation to gross assets or gross liabilities represents between 12 and 14 percent of output for industrial countries and between 6 and 9 percent of output for emerging countries!

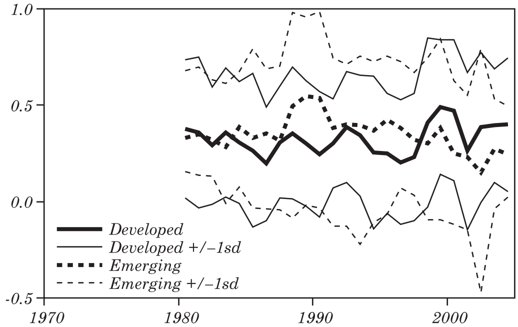
Figure 5. Serial Correlation of Gross Asset Positions[a]



Source: Author's calculations.
a. Ten-year rolling regressions; gross asset position measured as ln $a_{i,t}$.

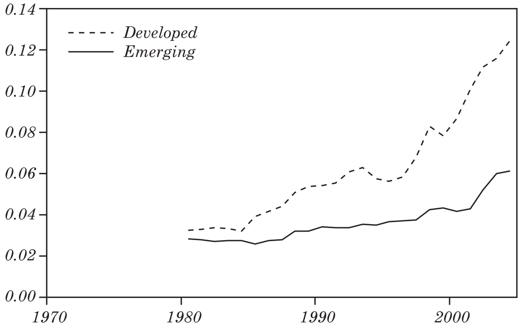
9. It is rather hazardous to estimate an AR process with only ten observations. This is meant only as an illustration of the change in the empirical process for gross assets and liabilities.

Figure 6. Serial Correlation of Gross Liability Positions[a]



Source: Author's calculations.
a. Ten-year rolling regressions; gross liability position measured as ln $l_{i,t}$.

Figure 7. Volatility of Gross Asset Positions[a]



Source: Author's calculations.
a. Ten-year rolling regressions; gross asset position measured in logs, and gross asset positions is expressed as

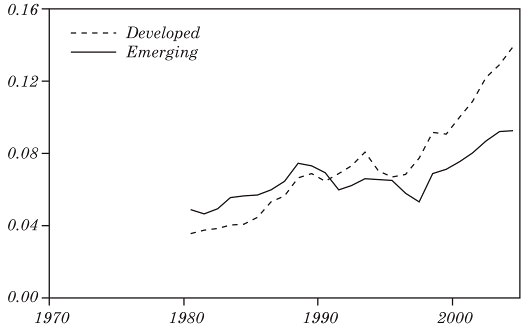
This increase in the time-series volatility of gross foreign assets reflects the growing importance of valuation effects. This can be illustrated most dramatically by looking at a slightly different process:

$$\Delta na_{i,t+1} = \bar{\rho}^{n}_{i,t}\Delta na_{i,t} + \varepsilon^{n}_{i,t+1} \quad (5)$$

$$ca_{i,t+1} = \bar{\rho}^{c}_{i,t}\, ca_{i,t} + \varepsilon^{c}_{i,t+1}$$

where $na_{i,t}$ denotes the ratio of net foreign assets to GDP, $ca_{i,t}$ the ratio of the current account to GDP, and Δ the difference operator. Figures 9 and 10 report the standard deviation of the innovations as

Figure 8. Volatility of Gross Liability Positions[a]
Percent of GDP



Source: Author's calculations.
a. Ten-year rolling regressions; gross liability position measured in logs, and gross liability positions is expressed as percent of GDP.

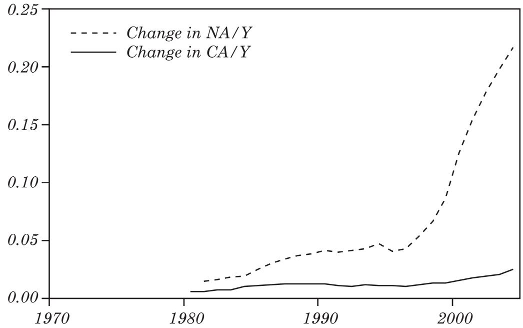
a fraction of GDP. Most of the increase in the time-series volatility of the change in net foreign assets can be attributed to the valuation component.[10] For industrial countries, innovations to the current account increased from 0.5 percent of output to 2.5 percent. Over the same period, innovations to the change in net foreign assets increased from 1.5 percent of output to 21.6 percent. Innovations to the change in net foreign asset positions were thus up to ten times larger than innovations to the current account between 1994 and 2004 (the last data point). For emerging countries, the volatility of innovations to the current account remained remarkably stable at around 2 percent, whereas innovations to the change in net foreign asset increased from 2 percent to about 6.4 percent.

1.2 Deconstructing the Valuation Component: Currency and Asset Price Movements

The net foreign asset portfolio is a leveraged portfolio: it is short in domestic assets (the gross liabilities) and long in foreign assets (the gross assets). For instance, the U.S. net foreign asset portfolio is short in, for example, U.S. equities, U.S. bonds, bank deposits held by

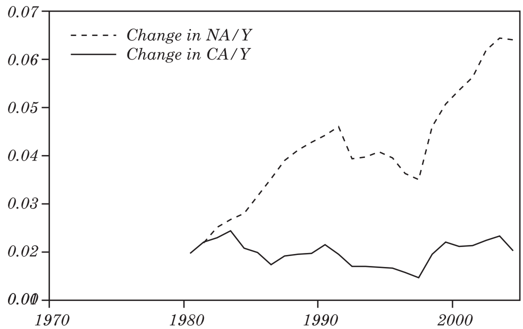
10. The decomposition is not exact since
$$na_{t+1} - na_t = ca_t + \left[va_t.Y_t / Y_{t+1} + (Y_t / Y_{t+1} - 1)(na_t + ca_t)\right],$$
so the difference between the two curves also reflects the second term inside the brackets. This term is often negligible, however, since annual growth rates remain quite small.

Figure 9. Volatility of the Innovations to the Change in Net Foreign Assets and the Current Account: Industrial Countries[a]
Percent of GDP



Source: Author's calculations.
a. Ten-year rolling regressions; net foreign assets and the current account are measured as percent of GDP.

Figure 10. Volatility of the Innovations to the Change In Net Foreign Assets and the Current Account: Emerging Markets[a]
Percent of GDP



Source: Author's calculations.
a. Ten-year rolling regressions; net foreign assets and current account are measured as percent of GDP.

foreigners, and direct investment in the United States. It is long in, for example, Japanese equity, direct investment in Ireland and China, bank deposits in Switzerland, German government bonds, and U.K. guilds. The real total gross return on that portfolio, R_{t+1}, is defined as a weighted average of the return on gross assets and gross liabilities:

$$R_{t+1} = \mu_t^a R_{t+1}^a - \mu_t^l R_{t+1}^l, \tag{6}$$

where R^a_{t+1} and R^l_{t+1} denote the total real return on gross assets and gross liabilities, respectively, μ^a_t and μ^l_t the portfolio weights A_t/NA_t and L_t/NA_t, respectively, and $\mu^a_t - \mu^l_t = 1$.[11] As with any leveraged portfolio, the weights μ^a and μ^l can be significantly larger then one, so even relatively small changes in asset prices can have a disproportionate effect on the overall net foreign asset position. To fix ideas, consider the case of the Chile. According to the Lane and Milesi-Ferretti data set, as of 2004, gross assets represented 81 percent of GDP, while gross liabilities represented 118 percent of GDP. The weights μ^a and μ^l thus equal –2.19 and –3.19 percent.[12] Hence, a ten-percent excess return on gross foreign assets translates into a 22 percent improvement in the net position, or about 8 percent of GDP![13]

Beyond the impact of asset movements, Tille (2003) and Gourinchas and Rey (2007b) emphasize the role of currency movements. To illustrate how this might matter, I approximate the compounded return on the net foreign portfolio as follows:

$$\begin{aligned} r_{t+1} \equiv \ln R_{t+1} \quad &\approx \quad \mu^a_t r^a_{t+1} - \mu^l_t r^l_{t+1} \\ &= \mu^a_t\,(\omega^{ah}_t r^{ah}_{t+1} + \omega^{af}_t r^{af}_{t+1}) - \mu^l_t\,(\omega^{lh}_t r^{lh}_{t+1} + \omega^{lf}_t r^{lf}_{t+1}) \\ &= (\mu^a_t \omega^{ah}_t r^{ah}_{t+1} - \mu^l_t \omega^{lh}_t r^{lh}_{t+1}) + (\mu^a_t \omega^{af}_t r^{af}_{t+1} - \mu^l_t \omega^{lf}_t r^{lf}_{t+1}) \end{aligned} \tag{7}$$

where ω^{ih} and ω^{if} represent the share of asset i denominated in home and foreign currency, respectively, and $r^i_{t+1} = \ln R^i_{t+1}$. The last line rearranges the portfolio terms according to the currency of denomination of the various returns. The first term in brackets on the right-hand side represents the contribution of domestic-currency-denominated assets, while the second term in brackets represents the contribution of foreign-currency-denominated assets.

To make further progress, the real return on foreign-currency-denominated asset can be written as $r^{if}_{t+1} = \tilde{r}^{if}_{t+1} + \Delta\lambda_{t+1}$, where $\tilde{r}^{if}_{t+1}$ is a real return expressed in terms of the relevant foreign basket of goods, and $\Delta\lambda_{t+1}$ is the rate of depreciation of the real exchange rate between t and $t+1$, equal to $\Delta e_{t+1} + \pi^f_{t+1} - \pi^h_{t+1}$, where π^i_{t+1}

11. These weights are well defined as long as the net foreign position is different from zero. Even in that case, the total real return, $R_{t+1}NA_t$, is well defined.

12. To see this, note that $\mu^a = 81/(81 - 118) \approx -2.19$.

13. The appendix reports the values of A/Y, L/Y and μ^a in 2004 for each country in the sample.

represents the inflation rate in country i. Substituting into the above expression yields:

$$r_{t+1} = (\mu_t^a \omega_t^{ah} r_{t+1}^{ah} - \mu_t^l \omega_t^{lh} r_{t+1}^{lh}) + (\mu_t^a \omega_t^{af} \tilde{r}_{t+1}^{af} - \mu_t^l \omega_t^{lf} \tilde{r}_{t+1}^{lf}) \\ + (\mu_t^a \omega_t^{af} - \mu_t^l \omega_t^{lf})(\Delta e_{t+1} + \pi_{t+1}^f - \pi_{t+1}^h). \quad (8)$$

The first two terms in brackets on the right-hand side represent the contribution of local real asset returns. The last term in brackets provides a measure of currency exposure of the net foreign asset position: holding everything else constant, the coefficient $\left[\mu_t^a \omega_t^{af} - \mu_t^l \omega_t^{lf}\right]$ measures the impact of a depreciation of the real exchange rate on the net foreign asset position of a country. It highlights that a measure of currency exposure must include the currency weights in addition to the portfolio weights. Unfortunately, this information is currently available only for a small number of countries. The next frontier in terms of data collection will be to compile information on the geographic and currency composition of gross external asset holdings, along the lines of the IMF's Coordinated Portfolio Survey.

In the meantime, detailed data are available for a few countries, like the United States, thanks to the work of Tille (2003, 2005) and Gourinchas and Rey (2007a). Table 1 reports Tille's (2005) currency decomposition for the United States in 2004. At the end of 2004, the overall net foreign position represented –21.7 percent of GDP (85

Table 1. Currency Composition of U.S. External Positions, 2004
Billions of U.S. dollars

Currency	*Assets*	*Liabilities*	*Net (A–L)*	*Percent GDP*
Total	9,973	12,515	–2,542	–21.7
U.S. dollar	3,476	11,869	–8,393	–71.5
Foreign currencies	6,497	646	5,851	49.9
Euro	1,784	296	1,488	12.7
U.K. pound	1,039	71	968	8.3
Canadian dollar	557	1	556	4.7
Japanese yen	506	61	445	3.8
Swiss franc	304	18	286	2.4
Other	2,307	199	2,108	18

Source: Tille (2005).

percent in gross assets and 107 percent in gross liabilities), with dollar weights of 35 percent on gross assets (ω^{ah} = 3.48/9.97) and 95 percent on gross liabilities (ω^{lh} = 11.869/12.515). This asymmetry implies that the United States holds a short position in U.S. dollars (to the tune of 71.5 percent of GDP) and a long position in foreign currency (roughly 50 percent of GDP). In terms of net foreign asset returns, the United States has a foreign currency exposure of –2.37 (obtained as [0.85*0.65–1.07*0.05]/0.21).

It is instructive to inspect equation (8) for different configurations of the currency denomination of assets and liabilities. If all assets are denominated in foreign currency while all liabilities are local, the exposure coefficient is maximized and equal to μ_t^a. The above calculations indicate that even for a country like the United States this is a substantial overestimate of the true currency exposure ($\mu^a = -3.92$). A fortiori, consider the situation of an emerging country with foreign-currency-denominated assets and, more importantly, foreign-currency-denominated liabilities (or dollarized liabilities), that is, a country with $\omega_t^{af} = \omega_t^{al} = 1$. In that case, $\mu_t^a \omega_t^{af} - \mu_t^l \omega_t^{lf} = \mu_t^a - \mu_t^l = 1$, so the currency exposure is limited to the size of the net foreign asset position. Since net foreign asset positions are typically much smaller than gross positions, valuation terms must remain comparatively smaller for emerging countries. On the other hand, valuation effects are also likely to be more destabilizing for borrowing emerging countries ($\mu^a < 0$), because a depreciation of the domestic currency increases the local currency burden of a given net liability.

One incorrect interpretation of these exposure numbers nevertheless captures an important element of the discussion. Specifically, with an exposure of –2.37, a 10 percent depreciation of the dollar would—holding everything else constant—create a positive wealth transfer for the United States of about 5 percent of GDP (–2.37*–0.217*0.1). Given a GDP of about 11.73 trillion U.S. dollars in 2004, this represents the nonnegligible sum of $585 billion! Such a wealth transfer would be of the same order of magnitude as the trade deficit for that year (5.2 percent of GDP, according to the U.S. Bureau of Economic Analysis).

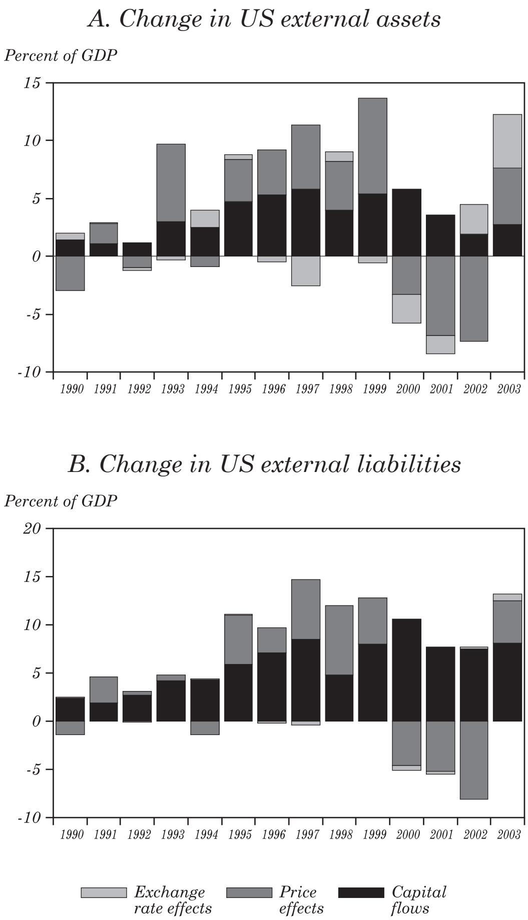
This interpretation is incorrect precisely because everything else is not constant. If a currency depreciation is expected to deliver substantial wealth transfers to the United States, then foreigners will require some compensation in the form of higher expected local returns on dollar-denominated assets or lower expected local returns on foreign-currency-denominated assets. In fact, ex ante local real returns should be expected to move in such a way as to neutralize the expected rate of depreciation. This arbitrage logic is precisely what stands behind the usual interest rate parity condition. Important valuation effects may still arise because the exchange rate differs from its expectation: with substantial leverage, expectation errors will translate into significant valuation effects, but these will not lead to predictable fluctuations in net foreign asset positions and thus cannot contribute to the external adjustment process. Predictable valuation effects that contribute systematically to the adjustment process require significant violations from the usual parity conditions. The evidence discussed so far does not attempt to distinguish between predictable and unpredictable valuation effects, yet the above discussion indicates that this is an essential element of the analysis. I return to this question in more details in section 2, where I survey results for the United States.

1.3 Naive Net Foreign Assets versus Valuation Term

Tille (2003) for the United States and Lane and Milesi-Ferretti (2004) for Australia propose a decomposition of the change in net foreign assets into what they call a flows component (the opposite of the financial account) and price and exchange rate components that sum to the valuation term since 1990.[14] I reproduce their findings in figure 11 for the United States and figure 12 for Australia. As expected, the U.S. exchange rate component is much larger for gross assets than for gross liabilities, reflecting the asymmetry in currency composition discussed above. What is striking is the importance of the capital gains on portfolio and direct investment positions (the price effect). For the United States, the price effect easily dwarfs the exchange rate effect in most years, while for Australia, the two components are similar in size. The price effects on gross assets and gross liabilities are of similar and offsetting size in the United States, whereas the exchange rate effects are of similar and offsetting size in Australia. These two figures clearly illustrate that a full account of the external adjustment process must involve a discussion of the joint determination of trade flows, asset returns, portfolios, and currency values.

14. The U.S. Bureau of Economic Analysis has published that information for the United States since 2005. It is available at www.bea.gov/international/xls/intinv05_t3.xls.

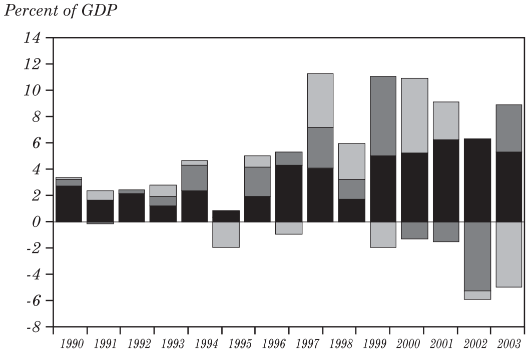
Figure 11. Change in NA: United States



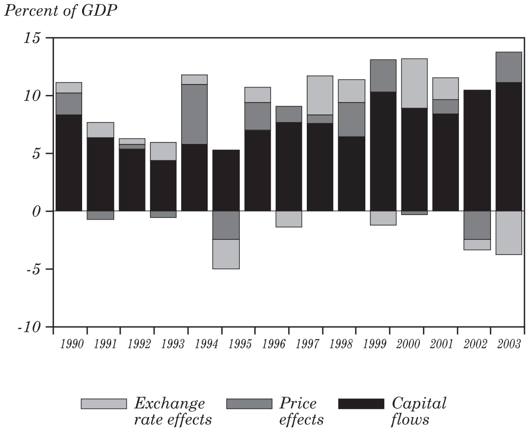
Source: Tille (2003) and Lane and Milesi-Ferreti (2004).

Figure 12. Change in NA: Australia

A. Change in external assets



B. Change in external liabilities



Source: Lane and Milesi-Ferreti (2004).

Using equation (3), one can write the change in net foreign assets relative to GDP between year 0 and year t as follows:

$$\begin{aligned} na_t - na_0 &= \sum_{s=0}^{t-1}(ca_s - g_{s+1}na_{s+1}) + \sum_{s=0}^{t-1}\left[(R_s - 1)na_s - ni_s\right] \\ &\equiv \sum cay_t + vay_t \end{aligned} \qquad (9)$$

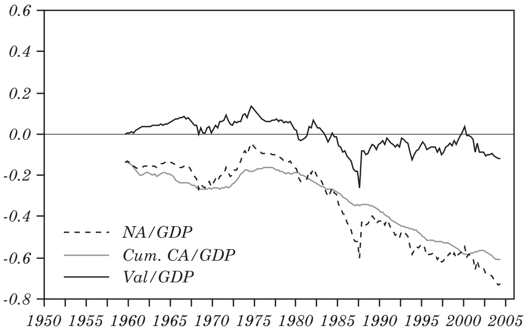
where g_t denotes the growth rate of output between periods $t-1$ and t and, as before, lower case variables represent ratios to GDP. The first sum on the right-hand side corresponds to a naive estimate of the net foreign asset position, one that omits the cumulative valuation effects captured by the second summation term. Gourinchas, Lopez, and Rey (2006) construct detailed estimates of the net foreign asset position for the United States and the United Kingdom. Figure 13 reports their estimate of *na* as well as its decomposition between current account and valuation components for both countries, together with more preliminary data for Canada and Australia. The figure highlights that there is a variety of patterns for the valuation adjustment. In the case of the United States, valuation effects have been positive and relative moderate since the early 1980s, with a sharp acceleration in recent years. As of 2004, they account for 20 percent of GDP. A similar pattern is evident in Canada, which displays increasingly large valuation effects that also reach 20 percent of GDP and that reflect the importance of direct investment assets. The valuation component in both countries is never large enough to offset the naive estimate, except in Canada since 2000.

The United Kingdom exhibits a very significant and growing positive valuation component, in the context of very large gross positions (in excess of 300 percent of GDP), reaching 50 percent of GDP in 2000. This valuation component is so large that it overturns the naive estimates since 1980. Between 1980 and 2000, the cumulated current account deficits fall from 0 to –20 percent of GDP, while the correct net foreign asset position rises from 0 to 20 percent of GDP. Since that time, the valuation component has been reduced by half, pushing the net foreign position into debt in 2002 for the first time since 1977.

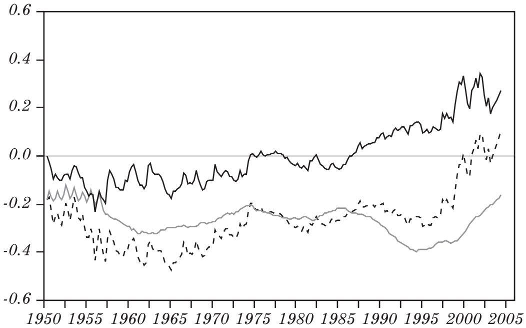
The case of Australia is also interesting. Here, valuation effects have been mostly small relative to cumulated current account deficits, but also negative, contributing to a worsening of the country's already substantial net foreign liability.

Figure 13. Valuation Component for Australia, Canada, the United Kingdom, and the United States

A. Australia



B. Canada



C. United Kingdom

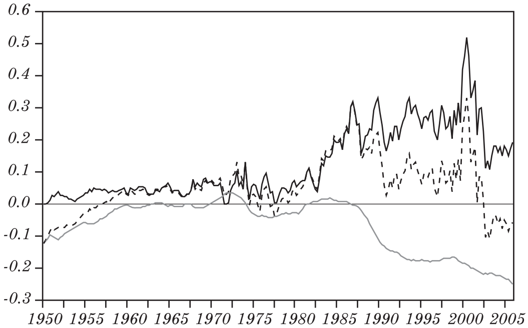
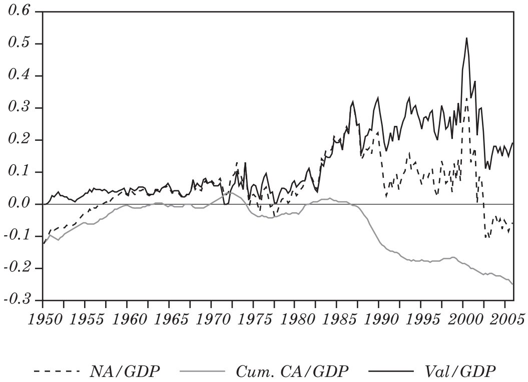


Figure 13. (continued)

D. United States



Source: Gourinchas, Lopez, and Rey (2006).

Emerging economies also exhibit a variety of patterns. Lane and Milesi-Ferretti (2004) provide a decomposition according to equation (9) for a number of emerging countries, between 1992 and 2001. Table 2 reproduces their findings. The importance of these valuation effects is difficult to miss. Consider the case of Indonesia or Thailand. While the naive accumulation of current accounts would point toward a significant improvement in the net foreign asset position (32.9 percent and 11.9 percent of GDP, respectively), the valuation effect more than offset this (–39.0 and –21.9 percent of GDP, respectively). This reflects the impact of these countries' devaluation on their dollarized liabilities. Nevertheless, not all emerging markets experienced negative valuation terms over the period (see the Czech Republic and Mexico).

Table 2. Cumulated Current Account and Valuation Terms
Percent of GDP

Country	Δnay_t	Σcay_t	vay_t
Brazil	–30.6	–17.5	–13.1
Czech Republic	–29.4	–40.0	10.5
Indonesia	–6.1	32.9	–39.0
Mexico	–8.8	–27.7	19.0
Thailand	–10.0	11.9	–21.9
Turkey	–21.3	2.6	–23.9

Source: Lane and Milesi-Ferretti (2004).

In sum, the valuation component of the international investment position is large, sometimes sufficiently so to overturn the naive estimate constructed from cumulated current accounts. This component is also volatile.

2. Predictable Valuation Effects: The Case of the United States

Gourinchas and Rey (2007a) construct detailed estimates of the United States' gross foreign assets and liabilities, disaggregated into four asset classes: direct investment, equities, debt, and other, where the latter category contains mostly official reserves, bank loans, and trade credit. The estimates are compiled from data from the U.S. Bureau of Economic Analysis on the U.S. international investment position, the Federal Reserve's flow-of-funds data, and various surveys on the geographic and currency composition of portfolio and direct investment assets and liabilities.[15] The data are also supplemented with data on equity returns, bond yields, and exchange rates, obtained from the IMF's *International Financial Statistics* and the Global Financial Database. The resulting data allow me to address two important and related questions regarding, first, the composition of gross assets and liabilities and, second, the rates of returns on gross assets, r^a, and gross liabilities, r^l.

Table 3 reports estimates of the share of gross assets and gross liabilities in the different asset classes, relative to GDP, for every decade between 1952 and 2004. Two evolutions are striking. First, the U.S. gross asset position has shifted increasingly toward high-yield risky assets, while its gross liabilities remain dominated by safer lower-yield assets. While equity and direct investment assets represented only 8.75 percent of gross assets in the 1950s [(1.06+0.66)/19.6], the share reached 59.40 percent in 2000 [(26.56+16.04)/71.72]. By contrast, the share of liquid liabilities in total gross liabilities declined from 76.265 [(4.59+0.71)/6.95] to 54.5 percent [(25.07+26.47)/94.6], but it was always in excess of 50 percent. Second, in the 1950s, the U.S. net creditor position was concentrated in other assets (12.61 percent of GDP), while net positions in equities, direct investment,

15. See Gourinchas and Rey (2007a) for a detailed discussion of the data construction. See Hooker and Wilson (1989) for a reconciliation of the flow-of-funds accounts and the international transactions accounts from the U.S. Bureau of Economic Analysis.

and debt assets were mostly balanced (columns 9–12).[16] By 2000, the composition of the net asset position shifted significantly: the U.S. net debtor position is now concentrated in debt instruments (–21.57 percent of GDP). Interestingly, the net position in equity and direct investment remains almost exactly balanced, in part as a result of the decline in equity prices after 2001. Following Despres, Kindleberger, and Salant (1966), Gourinchas and Rey (2007a) argue that the United States is essentially a provider of global liquidity, issuing liquid liabilities and investing in high-yield, high-return assets.[17]

Turning to the second question, Gourinchas and Rey (2007a) decompose the overall excess return on gross assets relative to gross liabilities as follows:

$$\begin{aligned} E(r^a - r^l) &= E\left[\bar{\mu}^o(r^{ao} - r^{lo})\right] + E\left[\bar{\mu}^d(r^{ad} - r^{ld})\right] \\ &\quad + E\left[\bar{\mu}^e(r^{ae} - r^{le})\right] + E\left[\bar{\mu}^f(r^{af} - r^{lf})\right] \\ &\quad + E\left[(\mu^{ad} - \mu^{ld})(\bar{r}^d - \bar{r}^o)\right] + E\left[(\mu^{ae} - \mu^{le})(\bar{r}^e - \bar{r}^o)\right] \\ &\quad + E\left[(\mu^{af} - \mu^{lf})(\bar{r}^f - \bar{r}^o)\right] \end{aligned} \tag{10}$$

where $E[.]$ denotes the expectation operator, μ^{ji} is the share of asset class i ($i \in \{o, d, e, f\}$) in gross assets (j = a) or gross liabilities (j = l), r^{ji} is the corresponding asset return, $\bar{\mu}^i = (\mu^{ai} + \mu^{li})/2$ is the average portfolio share for asset class i, and $\bar{r}^i = (r^{ai} + r^{li})/2$ is the average return on asset class i. The terms on the first line represent the return effect. They denote the average excess return on external assets relative to liabilities within each class of assets. This return effect is zero if the return is the same within each asset class ($r^{ai} = r^{li}$). The terms on the second line represent the composition effect. They quantify the difference in weights between assets and liabilities for equity, foreign direct investment (FDI), and debt. This composition effect is zero if U.S. external assets have the same composition as U.S. external liabilities ($\mu^{ai} = \mu^{li}$). Table 4 shows that the total real return on U.S. assets vastly exceeds the return on its liabilities (by 2.11 percent). Moreover, this excess return mainly reflects a return

16. Gold reserves represented a significant fraction of other gross asset holdings, at 5.24 percent of GDP in the 1950s.

17. See Caballero, Farhi, and Gourinchas (2007) for an analysis of global imbalances that emphasizes this role for the United States.

Table 3. The Composition of Gross Assets and Gross Liabilities
Percent of GDP

	Gross assets				*Gross liabilities*				*Net*			
	Other	*Debt*	*Equity*	*FDI*	*Other*	*Debt*	*Equity*	*FDI*	*Other*	*Debt*	*Equity*	*FDI*
Period	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
1950	17.20	0.69	0.66	1.06	4.59	0.71	1.36	0.29	12.61	–0.02	–0.70	0.77
1960	11.96	1.20	0.75	4.49	4.17	1.57	1.86	0.91	7.78	–0.36	–1.11	3.58
1970	9.54	1.49	0.61	7.72	4.94	4.74	2.02	1.81	4.60	–3.25	–1.41	5.91
1980	18.87	1.69	1.22	10.84	11.62	7.36	3.23	5.88	7.25	–5.67	–2.01	4.96
1990	19.21	4.53	9.58	20.17	18.21	16.31	7.78	17.10	1.00	–11.78	1.80	3.06
2000	24.21	4.91	16.04	26.56	25.07	26.47	14.47	28.59	–0.86	–21.57	1.57	–2.03

Source: Gourinchas and Rey (2007a).

effect, especially on debt and other assets (1.97 percent over the entire sample, and as high as 4.28 percent in the 1970s).

Table 4 illustrates an important finding: returns measured in common units are not equated. In other words, the arbitrage argument that I evoked above as putting some limits on the role of valuation effects does not appear to be strongly operating. Clearly, U.S. gross assets and gross liabilities are not close substitutes: even within classes, asset returns can be vastly different. Several factors could account for such large average excess returns. First, the asset classes considered are quite broad, so the return effect may, in fact, capture an equity-like premium. For instance, according to the United States was borrowing short and lending long in the Bretton Wood era (Despres, Kindleberger, and Salant, 1966), so the difference in maturities within the debt and loans category could account for the difference in returns. Another hypothesis emphasizes the role of the U.S. dollar as a reserve currency, or the greater liquidity and security of the U.S. financial markets. This would imply that foreigners are willing to hold underperforming dollar-denominated or dollar-area-based assets as long as these assets provide these liquidity services. The excess return obtained by the United States can then be interpreted as an intermediation rent that relaxes the external constraint of the United States. Various names have appeared in the literature for these intermediation rents: exorbitant privilege for some, dark matter for others.[18]

3. Valuation Effects: Some Elements of Theory

As I discussed earlier, valuation effects come in two flavors: unpredictable and predictable. The first variety does not create any particular difficulty for standard models of international finance: while analysts may argue over which model best characterizes international portfolio holdings, most models incorporate something similar to a parity condition in one form or another. Conceptually, perhaps the simplest way to understand unpredictable valuation terms is by reference to a complete market model. In such a setup, one could interpret valuation effects as the record-keeping of future payments on the contingent claims held by domestic and foreign investors, payments that implement full risk sharing. Interpreted in this light, the volatility generated by valuation adjustments could be interpreted

18. See Caballero, Farhi, and Gourinchas (2007); Gourinchas and Rey (2007a); and Hausmann and Sturzenegger (2006).

Table 4. Decomposition of U.S. Total Real Returns into Return and Composition Effects

	Return effect					*Composition effect*				*Total*
	Other	*Debt*	*Equity*	*FDI*	*Total*	*Debt*	*Equity*	*FDI*	*Total*	*ra – rl*
Period	*(1)*	*(2)*	*(3)*	*(4)*	*(1–4)*	*(5)*	*(6)*	*(7)*	*(5–7)*	*(1–7)*
1950	0.37	0.34	0.52	–0.07	1.16	–0.05	–2.14	0.13	–2.06	–0.90
1960	1.00	0.53	–0.04	0.24	1.73	–0.06	–0.64	0.62	–0.07	1.66
1970	2.36	0.16	0.47	1.29	4.28	0.71	–0.42	0.48	0.77	5.05
1980	0.49	0.55	0.79	–0.12	1.71	–0.11	–1.13	1.32	0.08	1.79
1990	0.70	1.24	0.06	–1.36	0.63	–0.16	0.83	1.04	1.71	2.33
2000	0.81	0.42	0.37	0.70	2.30	–0.46	–0.19	0.13	–0.53	1.77
Total	1.00	0.56	0.35	0.06	1.97	0.03	–0.59	0.70	0.14	2.11

Source: Gourinchas and Rey (2007a).

as good volatility insofar as it reduces the volatility of marginal utility of consumption and improves welfare.

By contrast, the predictable valuation effects that are relevant for the United States require large deviations from standard arbitrage conditions. Some limited progress has been made toward modeling predictable valuation effects with a revival of the portfolio balance literature associated with the work of Dale Henderson, Pentti Kouri, or the late Bill Branson.

3.1 Unpredictable Valuation Effect as Efficient Risk Sharing

One puzzling observation is that the increase in valuation effects documented in section 1 is not associated with an increased volatility in consumption. Surely, if wealth becomes more volatile because of valuation effects, then consumption should also become more volatile. There is little direct empirical evidence on this question, yet it seems fairly clear that consumption volatility has not changed much even though valuation effects have become increasingly prevalent.

One possible interpretation is that wealth is not becoming more volatile. This would be the case if, for instance, valuation effects reflect the flow payments associated with greater risk sharing. This hypothesis can be formally investigated with a simple complete market model. In such a model, the current account remains equal to zero after the initial period. Yet net foreign assets can change over time, purely from valuation effects. To see how this is possible, consider the symmetric pooling equilibrium of the Lucas (1982) model. A positive domestic endowment shock generates a dividend payment to foreigners (who are holding claims to half of the domestic tree). This income flow, duly recorded in the net investment income balance, exactly offsets the trade surplus of the home country (which consumes half of the world endowment), leaving the current account equal to zero.

The endowment shock may significantly change the value of the domestic tree relative to the foreign tree. Whether the value of the domestic tree goes up or down depends on the elasticity of intertemporal substitution and the elasticity of substitution between domestic and foreign goods. Under the reasonable assumption that the value of the domestic tree increases following a positive endowment shock, this generates a valuation loss for the domestic economy. This valuation loss exactly offsets the present value of future expected trade surpluses of the home country, evaluated at the equilibrium stochastic discount factor. Since the current account is equal to zero, trade deficits equal net investment income, and the net foreign asset portfolio also records the present value of future net income payments. Net foreign asset positions will thus change over time, but purely as a result of valuation adjustments. The extent of the predictability of asset returns depends on the time-varying risk premium that arises from undiversifiable aggregate risk. This class of models, however, does not typically generate economically significant fluctuations in the risk premium for realistic values of the coefficient of relative risk aversion.

Gourinchas and Rey (2006) explore these insights formally in an endowment model similar to Kollman (2005). The model is simple: it is a complete markets model with two countries and two goods, à la Lucas (1982), where agents have mirror-symmetric preferences for their home good. This consumption home bias implies deviations from purchasing power parity and equilibrium movements in the real exchange rate. In the model, the net foreign asset position represents the value of a tail asset that prices sequences of future trade surpluses using the equilibrium unique stochastic discount factor. It is also possible to characterize gross assets from the portfolio holdings of the Lucas trees that implement the complete market allocation. Gourinchas and Rey (2006) find that there are very small—and economically negligible—predictable valuation effects, no predictability of returns or exchange rates, and very significant unpredictable valuation terms, with net foreign asset positions that can represent many multiples of output.

Such models are not able to match the facts about the United States, but they may still provide an important benchmark for valuation terms and consumption volatility. Models based on improved risk sharing should all predict that the volatility of the relative marginal utility of consumption should decrease over time, as financial globalization and risk sharing increase. Whether this is the case remains an open empirical question.

3.2 Predictable Valuation Effects and Portfolio Balance Models

I now present a stylized and simplified portfolio balance model in which predictable valuation effects can arise in equilibrium. The model is a two-country version of Kouri (1982).[19] Time is continuous.

19. Blanchard, Giavazzi, and Sa (2005) analyze a similar model.

There are two symmetric countries. Each country can invest either in domestic outside assets (D) or in foreign assets (D^*). B represents the net foreign liabilities of the home country measured in domestic currency, $W = D - B$ domestic wealth, and $W^* = D^* + B/e$ foreign wealth. The nominal exchange rate, e, is defined as the domestic price of the foreign currency, while r and r^* denote the instantaneous net returns on domestic and foreign outside assets (each measured in local currency). Assume further that the domestic (respectively, foreign) country wants to invest a fraction α (respectively, α^*) of its wealth in its own asset. α and α^* are a function of the expected excess return on the domestic asset versus the foreign asset: $E(r^* + \dot{e}/e - r)$ with $\alpha'(.) < 0$ and $\alpha^{*\prime}(.) > 0$.

I consider two possible scenarios. In the first scenario, countries borrow in their own currency and acquire external assets in the foreign currency. This situation is a good characterization for the United States. The second scenario considers a country that can only borrow in the foreign currency. This situation is closer to the experience of many developing and emerging countries who face the problem of original sin.

3.2.1 A stylized model of the U.S. external position: stabilizing and predictable valuation effects

Consider first the case in which the home country is a net debtor ($B > 0$) and gross liabilities (assets) are denominated in domestic (foreign) currency. Formally, B is defined as

$$B = \left(1 - \alpha^*\right)eW^* - \left(1 - \alpha\right)W > 0, \tag{11}$$

with $0 \leq \alpha, \alpha^* \leq 1$. I simplify the analysis further by assuming that domestic nominal interest rates, r and r^*, are constant and equal.

Equilibrium on the market for the domestic asset requires

$$D = \alpha\left[E\left(\frac{\dot{e}}{e}\right)\right]W + \left\{1 - \alpha^*\left[E\left(\frac{\dot{e}}{e}\right)\right]\right\}eW^*. \tag{12}$$

The first term on the right-hand side reflects the domestic demand for the domestic asset; the second term reflects foreign demand for the domestic asset. The second equilibrium condition is the balance-of-payments condition:

$$\dot{B} = r\left\{1-\alpha^*\left[E\left(\frac{\dot{e}}{e}\right)\right]\right\}eW^* - \left(r^* + \frac{\dot{e}}{e}\right)\left\{1-\alpha\left[E\left(\frac{\dot{e}}{e}\right)\right]\right\}W \\ -NX\left(e,W,W^*\right). \tag{13}$$

The first term on the right-hand side represents interest payments to foreigners; the second term represents interest payments received from foreigners; The third term is the trade balance, expressed as a function of the nominal exchange rate and domestic and foreign wealth., I assume that changes in wealth directly affect the trade balance. Specifically, I assume that a depreciation of the nominal exchange rate or an increase in foreign wealth improve the trade balance (NX_e, $NX_{w*} \geq 0$), while an improvement in domestic wealth worsens the trade balance ($NX_w \leq 0$). Substituting the definition of net external debt isolates the role of valuation effects in equation (13), as follows:

$$\dot{B} = rB - NX(e,W,W^*) - \frac{\dot{e}}{e}\left\{1-\alpha\left[E\left(\frac{\dot{e}}{e}\right)\right]\right\}W.$$

The first two terms on the right-hand side sum to (the opposite of) the current account. The last term represents the valuation term. Since $r = r^*$, this valuation term arises purely from fluctuations in the value of the currency. When gross liabilities are denominated in domestic currency and gross assets are denominated in foreign currency, a depreciation of the exchange rate reduces the country's external debt proportionately to its gross foreign asset holdings,[20]

$$\left\{1-\alpha\left[E\left(\frac{\dot{e}}{e}\right)\right]\right\}W.$$

Taking D, D^*, r, and r^* as given, equations (12) and (13) form a dynamic system in B and e. Setting $\dot{e} = 0$ in equation (12) yields the first steady-state relationship, which I label the portfolio balance relation (following Blanchard, Giavazzi, and Sa, 2005):

20. The valuation term depends on the realized depreciation of the currency.

$$D\left(1-\alpha_0\right)=\left(1-\alpha_0-\alpha_0^*\right)\bar{B}+\left(1-\alpha_0^*\right)\bar{e}D^*, \tag{14}$$

where $\bar{e}$ and $\bar{B}$ denote the long-run equilibrium values of the currency and external debt, respectively, while $\alpha_0 = \alpha(0)$ and $\alpha^*_0 = \alpha^*(0)$ represent the steady-state portfolio shares. The slope of the relation between the exchange rate and external debt is

$$\frac{d\bar{e}}{d\bar{B}}=\frac{\alpha_0+\alpha_0^*-1}{\left(1-\alpha_0^*\right)D^*}. \tag{15}$$

This slope is positive when $\alpha_0 + \alpha^*_0 > 1$, that is, when there is portfolio home bias. When this condition is satisfied, the domestic demand for the domestic asset (α_0) exceeds the foreign demand for the domestic asset ($1 - \alpha^*_0$). This guarantees that an increase in external debt is associated with a depreciation of the nominal exchange rate. The increase in external debt makes the home country poorer and the foreign country richer. Under equity home bias, the decline in the domestic demand for the home asset exceeds the increase in the foreign demand for the home asset. Hence, there is excess supply of the domestic asset at the initial exchange rate. To restore equilibrium on the asset market, the exchange rate needs to depreciate, making foreigners richer (in domestic currency) and increasing their demand for the domestic asset.

Setting $\dot{B} = 0$ and $\dot{e} = 0$ in equation (13), I obtain the second steady-state condition, which I label the current account balance relation:

$$\begin{aligned} 0 &= r\bar{B}-NX\left(\bar{e},D-\bar{B},D^*+\bar{B}/\bar{e}\right) \\ &= \psi\left(\bar{e},\bar{B}\right) \end{aligned}$$

The model predicts that eventually, trade surpluses must be sufficient to cover interest payments on net foreign debt. The valuation term disappears in the steady state. Thus, while valuation effects influence adjustment dynamics, they do not replace the need for an ultimate adjustment in net exports via expenditure switching or reducing mechanisms. This point is developed in detail in Obstfeld and Rogoff (2004), and is consistent with the results of Gourinchas and Rey (2007b). The slope of the current account balance relation depends on the values of ψ_e and ψ_B. I assume that $\psi_e < 0$ and $\psi_B > 0$.

$\psi_e < 0$ when the expenditure switching effect ($NX_e > 0$) is stronger than the wealth effect ($NX_{w^*}B/e^2 > 0$). Moreover, $\psi_B > 0$ when the impact of the increase in debt on interest payments (r) exceeds the wealth effect on the trade balance ($NX_w - NX_{w^*}/e < 0$).[21]

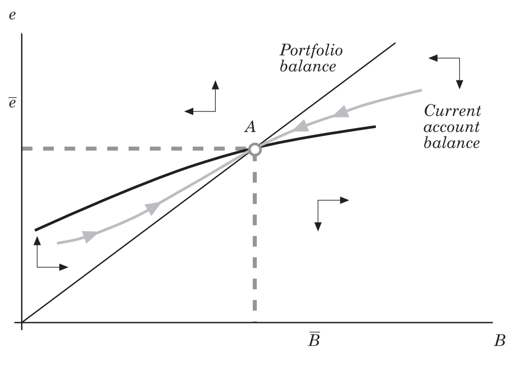
Under these assumptions, the current account balance relation is upward sloping. An increase in external debt increases interest payments and requires a depreciation of the currency that stimulates the trade balance.

To illustrate the model dynamics, figure 14 plots the two relations for the case in which the current account relation is flatter than the portfolio balance relation:

$$\frac{\alpha_0 + \alpha_0^* - 1}{\left(1 - \alpha_0^*\right) D^*} > -\frac{\psi_B}{\psi_e}. \tag{16}$$

In that case, it is easy to check that the dynamic system associated with equations (12) and (13) is saddle-point stable. The intersection of the two curves defines the long-run value of the currency and external debt, while the saddle path is also upward sloping.

Figure 14. Phase Diagram: Assets in Foreign Currency, Liabilities in Domestic Currency



Source: Author's construction.

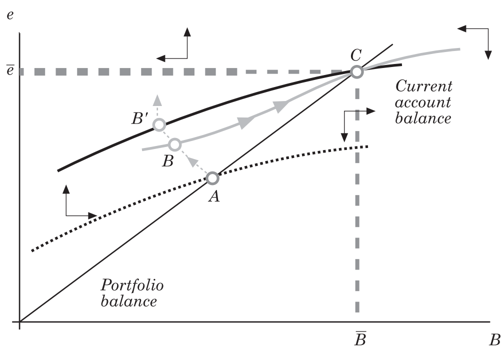
Blanchard, Giavazzi, and Sa (2005) provide an interpretation of condition (16). Consider a movement along the $\dot{e} = 0$ schedule stemming

21. It is easy to analyze the other cases where the wealth effects on debt are powerful enough to change the sign of ψ_e or ψ_B.

from an increase in $\bar{B}$. The currency must depreciate to keep the asset market in equilibrium. The increase in $\bar{B}$ has two effects on the balance of payments. First, it increases interest payments, thereby increasing external debt. Second, the depreciation of the currency improves the trade balance, which reduces external debt. The second effect needs to be stronger for saddle-path stability. This is condition (16).

To explore the response to a decline in the demand for domestic goods, consider now how the economy adjusts to an external shock, such as a permanent decline in the demand for domestic goods (that is, a negative shock to *NX*). The full dynamic adjustment is represented on figure 15. While the portfolio balance relation remains unchanged, the current account balance relation schedule shifts up: lower exports require a depreciation of the exchange rate if external debt is to remain unchanged.

Figure 15. Response to a Negative Demand Shock



Source: Author's construction.

How does the economy adjust to this shock? On impact, the economy jumps from point A to point B, on the new saddle path. Because external assets are denominated in foreign currency, the sudden depreciation of the currency generates a valuation gain that reduces *B*. This valuation gain is proportional to the depreciation, equal to

$$dB = -\left(1 - \alpha_0\right) W \frac{de}{e}.$$

The size of the valuation gain (the horizontal component of the segment [AB]) depends on the gross asset position. A larger gross asset position, $(1 - \alpha_0)W$, implies a larger valuation gain.[22] From point B, the exchange rate depreciates further, to point C, while external debt increases. In the long run, both $\bar{B}$ and $\bar{e}$ increase. Along that path, the exchange rate is expected to depreciate ($\dot{e} > 0$), and the current account, while improving, remains in deficit, that is, foreigners are lending ($\dot{B} > 0$). To understand what is going on, consider what would happen if the currency depreciated sufficiently to maintain the current account balance (point B′). In that case, the depreciation of the currency would stimulate the foreign demand for domestic assets, as foreigners become richer in domestic currency.[23] Equilibrium on the asset market requires that the currency be expected to depreciate further to discourage the demand for domestic assets. This expected depreciation would further stimulate exports and reduce net foreign debt, however, pushing the economy away from the conjectured equilibrium.

What happens instead is that the currency depreciates on impact, but less than needed to stabilize the current account. This depreciation stimulates the demand for domestic assets. What counters this effect is the expectation that the currency will depreciate further in the future. Since the exchange rate does not depreciate all the way to the current account balance relation, the trade balance worsens and the country borrows more.

Foreigners are willing to lend despite the expected currency depreciation for two reasons. First, as net foreign debt increases, the rate of depreciation, $\dot{e}$, decreases and foreign assets become progressively less attractive. Second, as e increases, the share $B/e/W^*$ decreases given B, so foreigners want to rebalance their portfolio by increasing their holdings of domestic assets.

3.2.2 A stylized model of an emerging country's external position: destabilizing and predictable valuation effects

In the previous scenario, valuation effects are stabilizing. Consider now the case of a country forced to borrow in the foreign currency.

22. Since $\bar{B}$ and $\bar{e}$ are determined from the steady-state conditions, one might be tempted to conclude that valuation gains have no impact on the long-run required depreciation or the change in external debt (the move from point A to point C). This would be incorrect since an increase in the cross-border positions coming from either a lower home equity bias (lower α_0 and α^*_0) or greater wealth (a larger D and D^*) would change the steady-state schedules, as well. A decrease in α_0—while still satisfying condition (16)—would reduce $\bar{B}$ and $\bar{e}$.

23. When $0 < \alpha_0$ and $\alpha^*_0 < 1$, $eD^* + B$ increases even though B decreases,

In terms of the model, this is equivalent to assuming that $\alpha^* = 1$ and $\alpha > 1$. The net foreign debt, B, is equal to $(1-\alpha)W > 0$.

Equilibrium on the domestic asset market takes the following form,

$$D = \alpha\left[E\left(\frac{\dot{e}}{e}\right)\right](D - B), \tag{17}$$

since only domestic agents acquire the domestic asset. The balance-of-payments condition becomes

$$\dot{B} = rB - NX(e, W, W^*) + \frac{\dot{e}}{e}B. \tag{18}$$

The last term represents the valuation term, as before. Two points are worth noting. First, the depreciation of the exchange rate applies to the net position, not the gross. This is simply because net and gross positions coincide in this case. Second, a depreciation of the currency worsens the external positions, because debt is denominated in foreign currency.

For the steady state, the portfolio balance relation takes a simple form here:

$$\bar{B} = \frac{1-\alpha_0}{\alpha_0}D.$$

The external debt in local currency is a constant fraction of initial assets, regardless of the value of the exchange rate. This implies that the foreign currency debt, $B^* = B/e$, and the exchange rate, e, move precisely in inverse proportions.

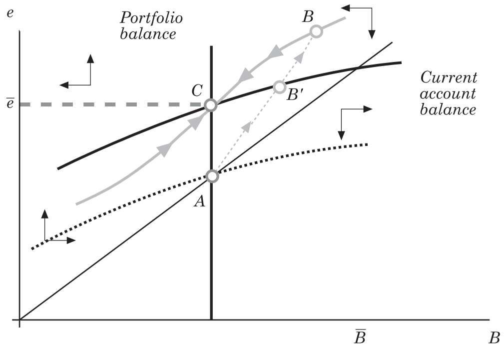
I obtain the current account balance relation by setting $\dot{B} = 0$ and $\dot{e} = 0$ in the balance-of-payments relation (18):

$$\begin{aligned} 0 &= r\bar{B} - NX(\bar{e}, W, W^*) \\ &= \psi(\bar{B}, \bar{e}) \end{aligned}$$

This is the same schedule as before, and I maintain the assumptions that $\psi_B > 0$ and $\psi_e < 0$: an increase in external debt requires a depreciation of the domestic currency.

Figure 16 presents the dynamic analysis. The local dynamics are always saddle-point stable, and the saddle path is upward sloping, as before. Hence, the model with foreign currency debt also features predictable currency and excess returns.

Figure 16. Response to a Negative Demand Shock: Case of Original Sin



Source: Author's construction.

The adjustment to an external shock is profoundly different from the previous case, however. Consider, as before, the case of a permanent decline in the demand for domestic goods. The portfolio balance relation remains vertical and unchanged, since the long-run local currency value of the external debt is unchanged. The current account balance relation schedule shifts up: lower exports require a depreciation of the exchange rate if external debt is to remain unchanged.

How does the economy adjust to this shock? Starting from the initial equilibrium at point A, the exchange rate suddenly depreciates to point B. This depreciation creates valuation losses ($\dot{e}/e\ \bar{B} > 0$) that increase the country's net debt. This necessitates a larger initial depreciation than that required by the current account balance relation. To see why, consider what would happen if the currency depreciated up to point B′, where current account balance is restored. At that point, the increase in external debt reduces domestic demand for the domestic asset. Equilibrium on the asset market thus requires that the domestic currency be expected to appreciate, but this expected appreciation would further increase external debt, requiring still further expected appreciation and pushing the economy away from the conjectured equilibrium.

Instead, the exchange rate needs to overshoot its long-run equilibrium value and then appreciate back. The overshooting of the exchange rate has to be sufficient to trigger an improvement in the trade balance, despite the initial negative shock. In turn, this improvement in the trade balance is what is necessary to reduce the external debt back to $\bar{B}$. As the economy moves from point B to point C, the exchange rate appreciates at a declining rate, while the external position improves. The exchange rate eventually depreciates, while the debt in foreign currency decreases ($B^* = \bar{B}/e$).

For emerging countries with foreign-currency-denominated liabilities, both the exchange rate and the trade balance become more volatile. This is due to the fact that the initial depreciation makes the country poorer, not richer. Following a sudden stop episode, the response of the trade balance and the exchange rate will need to be larger in countries with liabilities denominated in foreign currency and smaller in countries with liabilities denominated in domestic currency. This also implies that the trade balance and valuation component should be negatively correlated, a fact that seems to be borne out by the data presented in table 2.[24]

In contrast to the relatively innocuous valuation effects of the perfect-risk-sharing model, or the stabilizing effects that seem to be at work in the United States, valuation effects can be significantly destabilizing for many emerging countries, given the currency composition of their external balance sheet. It remains to be seen whether and how the increased importance of the valuation terms affects consumption and welfare.

4. Conclusion

This paper has provided a quick panorama of the empirical and theoretical research on the role of valuation effects for the external adjustment. On the empirical side, valuation effects are here to stay. The phenomenal increase in cross-border asset holdings opens the door to massive wealth transfers from relatively small price and currency movements. Short-term movements in a country's external asset position increasingly appear to be driven by the valuation component. The paper also expounded the distinction between predictable and unpredictable valuation effects. The former arise naturally and do not pose any particular theoretical or empirical challenge. For instance,

24. Brazil is the exception.

in a world with perfect risk sharing, valuation effects simply reflect the record keeping of future payments on the contingent claims held by domestic and foreign investors, payments that implement full risk sharing. Interpreted in this light, the volatility generated by valuation adjustments could be interpreted as good volatility, insofar as it reduces the volatility of marginal utility of consumption and improves welfare. However, the empirical evidence on the United States indicates that predictable valuation effects are important, at least in that particular case. The last section of this paper showed how such effects arise in a simple portfolio balance model. The model suggests that valuation effects are perverse for emerging countries with dollarized liabilities and stabilizing for countries like the United States, whose external debt is denominated in dollars. The model also suggests that the valuation terms and the trade balance should be negatively correlated for emerging economies, while their trade balance and exchange rate should be much more volatile than their developed counterpart. On the empirical front, testing these empirical implications should be the obvious first step. On the theoretical front, future research should extend the simple model presented here to a full-fledged international, intertemporal dynamic portfolio model.

Appendix

Sample Countries

Table A1. Industrial Countries, 2004

Country	*A/Y*	*L/Y*	μ^a
Australia	0.82	1.46	-1.28
Austria	1.88	2.05	-10.82
Belgium	4.25	3.94	13.75
Canada	0.99	1.12	-7.93
Denmark	1.95	2.08	-15.70
Finland	1.95	2.08	-16.14
France	2.12	2.06	39.80
Germany	1.67	1.59	20.76
Greece	0.67	1.40	-0.91
Iceland	1.49	2.42	-1.60
Ireland	9.30	9.50	-47.16
Italy	1.05	1.24	-5.82
Japan	0.89	0.51	2.34
Netherlands	4.03	4.08	-69.12
New Zealand	0.67	1.59	-0.73
Norway	2.06	1.41	3.18
Portugal	1.76	2.46	-2.53
Spain	1.25	1.75	-2.56
Sweden	2.13	2.23	-22.41
Switzerland	5.71	4.40	4.36
United Kingdom	3.57	3.71	-27.08
United States	0.84	1.07	-3.71

Source: Lane and Milesi-Ferretti (2006) and author's calculations.

Table A2. Emerging Countries, 2004

Country	A/Y	L/Y	μ^a
Argentina	0.88	1.36	–1.85
Brazil	0.28	0.78	–0.57
Chile	0.81	1.18	–2.19
Colombia	0.36	0.71	–1.03
Mexico	0.20	0.63	–0.46
Venezuela	0.89	0.73	5.33
China	0.55	0.47	6.94
India	0.23	0.34	–2.15
Indonesia	0.24	0.76	–0.46
Korea	0.53	0.57	–13.05
Malaysia	1.11	1.13	–54.37
Philippines	0.39	0.98	–0.67
Taiwan	2.07	0.65	1.46
Thailand	0.45	0.74	–1.54
Czech Republic	0.64	0.99	–1.85
Hungary	0.42	1.39	–0.43
Poland	0.32	0.85	–0.59
Russia	0.67	0.66	140.65
Israel	0.94	1.16	–4.29
South Africa	0.65	0.70	–12.77
Turkey	0.28	0.76	–0.60

Source: Lane and Milesi-Ferretti (2006) and author’s calculations.

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