International Portfolio Constraints and the USD
Defining the limits of U.S. international borrowing

Executive Summary
Despite the USD’s 2005 strength, underlying fundamental trends suggest an increasing risk of a sharp reversal of the USD’s fortunes. We present evidence that suggests that the USD’s multiyear downtrend is due to portfolio constraints on the growth of U.S. external borrowing. Our estimates suggest that U.S. international borrowing is already large relative to the pool of internationally mobile foreign savings. Under our forecasts for continued outperformance of the U.S. economy, U.S. demand for external financing continues to grow faster than foreign savings. Thus, non-U.S. residents must either continuously increase the U.S. share of their portfolios, exposing themselves to greater concentration risk, or the USD must depreciate to equate U.S. borrowing demand with foreign supply of funds. Yet, to attract a greater share of global savings, market expectations for U.S. assets must constantly rise; outperformance of U.S. returns alone, if expected, is not sufficient to prevent further USD depreciation. However, we also find little evidence to support the contention that balance of payments crises concerns are driving the USD, despite a clear rise in market focus on U.S. external balance data. The implications of this analysis are:

- A sustained, broad-based depreciation of the USD from current levels remains very likely.
- The USD’s first-half strength may reflect an overshoot due to a shift in the stock of global wealth towards U.S. assets, and raises the risk of a sharp depreciation as foreign exchange markets digest the one-time surge and U.S. capital inflows return to sustainable levels.
- The capacity for further USD rebounds may be constrained by earlier increases in the U.S. share of foreign portfolios and by the maturity of the U.S. economic cycle.
- While a USD decline may be rapid, a disorderly drop is unlikely as depreciation is itself diffuses some of the risk of further losses by (a) raising the expected returns on U.S. assets, (b) loosening the portfolio constraint on U.S. borrowing, and (c) improving U.S. net external liabilities.
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We present evidence that the USD’s multiyear downtrend is due to portfolio constraints on U.S. borrowing, as the growth of U.S. demand for external financing outpaces the growth of non-U.S. savings. Dollar depreciation is required to equate U.S. borrowing with external sources of funding. Bouts of USD strength, like that in the first half of 2005, reflect upgrades to markets’ expectations for outperformance of U.S. assets and an associated a reweighting of global portfolios in favor of U.S. assets. Yet, such portfolio shifts may cause overshooting that raises the risk of later USD retracement. Importantly, mere outperformance of U.S. assets is insufficient to fuel USD rebounds: the U.S. economy must continuously raise markets’ expectations for relative performance. But each incremental improvement in expectations raises the bar to further increases (and the risk that the next revision to expectations will be downward). Furthermore, the already large share of U.S. assets in international portfolios implies that each addition to the U.S. share requires an ever-greater jump in expectations for U.S. outperformance to offset the exponential increase in concentration risk.

Yet, read another way, our results should downplay concern over a disorderly adjustment of the USD. If portfolio constraints, rather than concern over balance of payments risks, are driving the USD’s decline, then USD depreciation itself is a sign that markets are self-regulating the risks of “over accumulation” of U.S. assets. While we find that market focus on U.S. external imbalances is growing, we also find little evidence to suggest that concern over balance of payments risks is behind the USD’s downtrend. Large U.S. current account deficits are unsustainable over a long horizon, but how long remains an open question. We do not see a significant probability of discrete changes in markets’ perceptions of the risks associated with U.S. assets that would drive a sudden cessation (or reversal) of U.S. capital inflows.

Section 1 of this report examines FX market focus on U.S. cyclical outperformance and the growth of U.S. external liabilities, and finds that, contrary to conventional wisdom, market interest in U.S. deficits has grown steadily, even during periods of USD strength. Section 2 considers the extent to which the increase in market attention to U.S. deficits is due to concern over a potential U.S. balance of payments crisis and finds little evidence to support this notion. Section 3 analyzes factors that may limit U.S. external borrowing, and Section 4 presents evidence that the USD’s multiyear depreciation trend may result from the United States abutting those boundaries.

1. Structural vs. Cyclical: Does the U.S. current account still matter?

The strength and durability of the USD’s first-half rebound – the largest and longest since the USD bear market began in 2002 – has raised questions about the relevance of large U.S. current account deficits in forecasting the USD’s course over any but the longest horizons. Some argue that U.S. external liabilities only affect the USD when U.S. assets underperform their peers, and that U.S. asset outperformance diminishes market focus on external deficits and drives the USD.
However, the USD’s relationship with relative yields and evidence from market reactions to U.S. data releases appear to contradict these notions. Rather, it appears that the U.S. external deficit is wielding increasing influence over the USD at even the shortest horizons.

Figure 1 tells a cautionary tale for those relying on U.S. economic outperformance and higher relative interest rates to fuel a stronger USD in the face of a widening current account deficit. Every significant USD rebound past four years has been associated with an upward revision to markets’ assessment of U.S. economic growth prospects and an associated jump in the U.S. yield advantage over other major economies. But, since its low in October 2002, the U.S. yield advantage has improved by 1.3%, while the USD has weakened 21% versus the corresponding currencies on a trade-weighted basis. Similarly, the 275-basis-point increase in U.S. policy rates in the past 15 months has, apparently, only stemmed more significant USD losses, as the USD is off 4% versus other major currencies since the start of the Federal Reserve’s tightening cycle. The most likely culprit behind these divergent medium-term trends is growth of the U.S. external borrowing.

Yet, even at a shorter horizon, it appears that the current account deficit can exert significant downward pressure on the USD. The shaded regions of Figure 1 highlight that some of the USD’s sharpest drops have come as yields spreads have moved in favor of the USD. While it is tempting to think that these episodes can be explained by waxing and waning concern among foreign exchange market participants over U.S. external liabilities, markets’ reactions to U.S. data appear to suggest otherwise.

Although markets clearly do display signs of faddishness, their attention to U.S. external imbalances seems to have grown steadily since late 2002. Figure 2 plots the coefficient from rolling regressions of the 20-minute change in EUR/USD around U.S. trade and non-farm payroll data releases on the surprise in each release, relative to consensus expectations. Market reactions to trade balance surprises – even at these very short, intraday horizons – have increased steadily in both magnitude and statistical significance since late 2002.

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A higher-than-expected trade balance – a smaller deficit – leads to a greater decline in EUR/USD now than it did during the sharp USD depreciation in late 2004. Over the same period, reactions to non-farm payroll surprises, a headline cyclical indicator, have also increased, but not as uniformly or by as much as reactions to trade data, and over the last year have even begun to diminish.

Even surges in the USD, such as in early 2004 or early 2005, were not particularly associated with an increase in market focus on cyclical factors, or a decrease in focus on trade deficits. Instead, market attention to U.S. external deficits grew steadily even during USD rallies. These results imply that the USD’s recent rebounds were not the result of a switch in market focus from cyclical to structural factors, but instead occurred despite rising attention to external imbalances in the United States. The next section explores the extent to which this increased focus can be explained by market concerns over a U.S. balance of payments crisis.

2. Are balance of payments concerns behind USD depreciation?

There are two main strains of thought on the importance of the U.S. external deficits for the USD. The most frequently encountered is as a balance of payments risk. Proponents of this view, expect the USD to fall as foreign residents shun, or even flee, USD assets out of concern over the ability of the United States to repay its external liabilities if they become too large. The other approach, which we favor, suggests that USD weakness results from U.S. demand for external borrowing running into portfolio-based limits on the supply of internationally mobile capital. There are important differences in the implications of these two models for the path of the USD.

The balance of payments risk view is driven by a country’s net foreign liabilities (NFL). As a country borrows internationally – i.e. runs a current account deficit – its NFL increase, raising the probability that it will encounter difficulty repaying its debt. At the end of 2004, the United States had NFL of about 22% of GDP. As shown in Figure 3, with no further USD depreciation, U.S. NFL likely explode, and net income on the U.S. foreign asset position likely will turn negative, adding to U.S. liabilities. According to the balance of payments risk view, the USD’s downtrend is due to an increasing risk premium on USD assets as fears of non-repayment mount. In its “scariest” form, well voiced by Nouriel Roubini and Brad Setser, the view suggests that eventually non-U.S. residents will begin to avoid, or even sell, U.S. assets, causing a balance of payments crisis and a disorderly plunge in the exchange value of the USD.

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1 I omit another oft-voiced view that external imbalances must reverse simply because they are aberrations from some imagined equilibrium. While it is probably true for most countries in the very long run, it is rather unhelpful as a forecasting model. Australia’s persistent current account deficits and Switzerland’s perennial surpluses clearly counter the notion that sustained imbalances need to correct (at least within a lifetime).

However, there is little evidence of such a USD risk premium.\(^4\) A balance of payments risk premium should show up not only in the USD, but also in U.S. bond yields, asset prices and currency options. During the periods shaded in Figure 1, U.S. bond spreads did widen as the USD fell, but U.S. equity prices rose, even relative to those in other major economies. Furthermore, long-term options prices have not shown signs of elevated market concern over the USD. The ratio of one-year option-implied volatility to trailing historical volatility is charted in Figure 4. A balance of payments risk premium should show up through a higher ratio: i.e. markets willing to pay more for option protection against USD depreciation (or equivalently, implying higher future volatility) than trailing volatility would indicate. Yet, as shown in Figure 4, the average ratio since the start of the USD’s downturn has been lower than its long-term average. Even during those periods in which U.S. yield spreads and the USD moved in opposite directions (the shaded regions in both Figures 1 and 4), the ratio was generally lower than the long-term average.

The balance of payments risk view has other problems explaining recent USD moves. If U.S. NFL of almost 22% of GDP are driving the 15% real trade-weighted slide in the USD since early 2002, how does one explain the 29% and 35% real trade-weighted increases in the AUD and NZD, respectively, over the same period? Australia and New Zealand each run current account deficits as a percent of income similar in magnitude to the United States and have NFL of 65% and 84% of GDP, respectively. One explanation is the difference in fiscal stance, with both Australia and New Zealand running fiscal surpluses and the United States running a large fiscal deficit. However, if that were the difference, presumably U.S. Treasury yields would exhibit greater evidence of a risk premium than their 4.3% level and normal (negative) spread relative to swap rates suggests.

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Furthermore, there are other channels of NFL adjustment beyond the current account. As noted recently by several researchers, the growing size of gross foreign asset and liability positions has increased the importance of financial adjustment of net foreign asset/liability positions. For instance, since 2002, the U.S. NFL has actually improved, despite persistent current account deficits of around 5% of GDP. Because U.S. liabilities are largely denominated in USD, while U.S. foreign assets are mostly in other currencies, the USD's depreciation since 2002 has increased the value of U.S. international assets relative to U.S. international liabilities, shrinking the U.S. NFL. Conversely, the NFL of both the euro area and Canada have worsened sharply in the last few years as the currencies of both economies appreciated, devaluing their foreign assets relative to liabilities. Accordingly, USD depreciation acts as a “safety valve,” reducing balance of payments risks as they begin to bite.

Over a longer horizon, we tend to agree that sustained U.S. current account deficits of recent (or larger) size relative to national income increase the probability of some form of balance of payments crisis. However, over our five-year forecast horizon, we do not see a significant chance of a discrete change in market perceptions of the riskiness of U.S. assets that creates a sudden halt to U.S. capital inflows. If the events of 2002 (recession, deflation fears, war, corporate scandals, exploding budget and current account deficits) were not enough to induce such a discrete change, it is hard to imagine what will. We concur with Federal Reserve Chairman Alan Greenspan that markets are likely to adjust the U.S. current account well before risks build to balance of payments crisis levels. In our view, concern over repayment risk is not the constraint on U.S. external borrowing. Instead, the concentration of U.S. assets in foreign portfolios and the (slower) growth of non-U.S. savings appear to be the limiting factors on the (faster) growth of U.S. borrowing at current USD exchange rates.

The remainder of this article presents a paradigm that we believe explains the role of U.S. external liabilities in driving the exchange value of the USD and reconciles the seesaw decline of the USD in recent years with the steady increases in both the U.S. external deficit and in market attention to it. The paradigm is the basis for our medium-term forecasts and, at a shorter horizon, suggests that the length and strength of the most recent USD rebound is less a sign of the downtrend’s end, than a sign of increasing risk of reversal.

3. Supply versus demand: Defining the U.S. “budget constraint”

As a net debtor, the United States must “borrow” from abroad to finance its net purchases of foreign goods and services, as well as its own investment in foreign economies: i.e. the current account deficit and net U.S. capital outflows. To meet

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2 However, both Lane & Milesi-Ferretti and Gourinchas & Rey (see preceding footnotes) point out that the United States cannot continuously rely on such financial adjustment without eventually inducing expectations for lower U.S. asset returns, and reducing capital inflows of the United States.


4 I use the terms borrowing and lending loosely to refer to any exchange of claims between U.S. residents and non-U.S. residents. It need not refer loans or debt securities issuance. The sale of U.S. equities, land or other
its borrowing needs, the United States must attract foreign capital through bank loans, foreign direct investment, or the sale of debt and equity securities, land, and other U.S. assets. Thus, the willingness and ability of the rest of the world to increase claims on U.S. assets represents a constraint on U.S. external borrowing. The key to understanding the role of U.S. external borrowing in determining the USD’s course is to understand that the multilateral exchange value of the USD is the price that clears the market for U.S. borrowing from abroad and foreign lending to the United States.

Figure 5 illustrates in simplified terms the constraints on U.S. borrowing. An increase in U.S. demand for international borrowing, the shift in the demand curve from D to D’ (A), pushes the market-clearing equilibrium up the supply curve from point (1) to point (2). The value of the USD falls (the price of foreign currencies rises, (B)), and the capital inflow into the United States increases (C). If, simultaneously, foreign demand for U.S. assets increases, for instance if the expected return on U.S. assets rises, the shift in the supply curve (E) from S to S’ pushes the equilibrium along the new demand curve, D’, from point (2) to point (3). The exchange value of the USD rebounds (F), and foreign capital inflows/U.S. borrowing increases even further (G). By understanding the factors driving U.S. demand for external borrowing and those driving the supply of foreign funds, one can better forecast where the USD is going.

U.S. demand for external funding is determined by net U.S. demand for foreign goods and total demand for foreign assets. Both increase with U.S. income as higher incomes allow U.S. residents to consume more imported goods and to invest more savings in foreign assets. Somewhat mysteriously, U.S. demand for imports tends to grow almost twice as fast as U.S. income, meaning that a small increase in U.S. income can (and does) have a large impact on U.S. demand for external funding.9

Figure 5. Equating US Demand for Funding with Foreign Supply

Figure 6. US Capital Inflows Relative to Non-US Savings

assets to a non-U.S. resident qualifies as U.S. borrowing from abroad. Similarly, I consider bank loans to U.S. residents and purchases of U.S. debt securities by non-U.S. residents as external demand for U.S. assets.

9The perplexingly high U.S. income elasticity of imports – for each percentage point growth in U.S. income, imports grow by about 1.8% – exacerbates the effect on the current account deficit of relatively more rapid income growth in the United States than in its trading partners, since for other countries the ratio of income to import growth is closer to one. See “Analyzing U.S. Current Account Dynamics,” CitFX Economics, 5 August 2003 for further details.
Depreciation of the USD tends to dampen U.S. demand for foreign goods by making them more expensive and simultaneously to raise non-U.S. demand for U.S. goods by making them less expensive. However, there is some evidence that suggests that USD depreciation raises U.S. residents’ demand for foreign assets. Bottom line: faster U.S. income growth increases U.S. demand for foreign funding, while USD depreciation helps to moderate the growth of that demand.

The foreign supply of funds to the United States – or equivalently, foreign demand for U.S. assets – is determined by foreign income growth and the share of foreign savings invested in the United States. Thus, our expectation for U.S. income to grow faster than most of its trading partners, ironically, plays a large role in our forecast for sustained, broad-based USD depreciation. Because U.S. income is expected to grow faster than non-U.S. income, U.S. borrowing demand grows faster than non-U.S. sources of funding. That necessitates a decline in the value of the USD unless an ever-increasing share of the world’s savings is devoted to U.S. assets.

The share of non-U.S. savings that is invested in U.S. assets is a function of the portfolio preferences of non-U.S. residents. Over a longer horizon those portfolio preferences are importantly influenced by “home bias”; while over a shorter horizon they are largely a function of expected risk-adjusted rates of return on U.S. assets relative to other economies’ assets. The former has probably been the most important factor behind the expansion of the U.S. current account deficit beyond previous norms, and the latter likely has played a more important role in the periodic USD rebounds of recent years.

“Home bias” refers to a phenomenon first identified by Martin Feldstein and Charles Horioka, that contrary to economic theory, countries tend to invest most of their savings at home, rather than in a diversified international portfolio. The Federal Reserve estimates that since 1992, the correlation between domestic investment and domestic savings across countries has fallen from 0.96 to 0.8, implying a roughly five-fold pickup in the proportion of savings crossing international borders. Our own estimates, using a model that incorporates long-run savings/investment relationships and weights countries by their global savings share, suggests that, across countries, the fraction of each additional dollar of savings that is invested domestically has fallen from about 0.74 in the 1980s to about 0.53 after the Asian crisis in 1997-98, and been roughly stable since.

The supply of foreign funding is dependent on foreign income growth and portfolio preferences...

...which are subject to “home bias” in the longer run...

“Home bias”, or a preference for local assets, appears to have declined in recent decades, leading to greater international capital flows that have helped ease the growth of the U.S. deficit.
However, the erosion of home bias may be slowing and further declines will not necessarily support an expansion of the U.S. external deficit without a downward adjustment of the USD. By our estimates, home bias fell significantly from the late 1980s to the late 1990s, as financial system reform opened capital accounts across the globe. But, it appears to have changed little since 1998. Academic research suggests that much of the residual home bias is due to “soft barriers” to foreign investment such as differences in reporting standards. In particular, when non-U.S. firms meet U.S. disclosure practices, U.S. home bias largely disappears. Accordingly, as International Accounting Standards and other U.S.-style disclosure practices for securities spread, U.S. residents may see their home bias fall by more than non-U.S. residents, since foreign investment in the United States already benefits from the highest standards for disclosure. That would tend to expand U.S. residents’ demand for external borrowing without a corresponding increase in the supply foreign funds. (The next section presents some evidence that an asymmetry does exist between U.S. residents’ willingness to invest in foreign assets and foreign willingness to invest in U.S. assets.)

At shorter intervals, an increase in the U.S. asset share of international portfolios increases the supply of funds available to meet U.S. borrowing needs, even if the international mobility of global savings does not increase. The proportion of U.S. assets in international portfolios should increase with their expected risk-adjusted return relative to assets in other economies.

Importantly, mere sustained (and thus, expected) outperformance of U.S. assets is not sufficient to increase the U.S. share of global portfolios (and prevent USD depreciation). Rising expectations for U.S. return outperformance are required to attract increased capital inflows. However, each incremental increase in expectations for U.S. asset returns raises the bar to further improvement. Thus, outperformance of U.S. assets is not only an impediment to further USD gains, but may actually imply future USD losses if U.S. borrowing demand grows faster than foreign savings.

**Stocks versus flows: Portfolio adjustments**

If portfolio shares are stable, (i.e. expected asset returns across countries do not change), then the proportion of internationally mobile savings flows into U.S. assets should mirror the share of U.S. assets in the stock of wealth invested in the international portfolio. In such an equilibrium, for the USD to remain stable, U.S. borrowing can not grow faster than non-U.S. savings. If U.S. borrowing grows more rapidly, then the USD needs to depreciate to equate supply and demand. If U.S. borrowing grows more slowly, then the USD would appreciate to match non-U.S. demand for U.S. assets with U.S. demand for external borrowing.

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16 Portfolio rebalancing due to differences in realized returns may cause deviations from such an equilibrium, but notice that if U.S. assets outperform other economies’ assets without increasing expectations for future asset performance, rebalancing would lower capital flows into the United States.
However, adjustment of portfolio shares in the global stock of wealth can have large, one-off effects on asset flows, complicating analysis. For instance, we estimate that if non-U.S. residents shifted an additional 1-percentage point of their financial asset portfolio into U.S. assets, it would create a one-time U.S. capital inflow of roughly $570 billion, or nearly three quarters of our estimate for the likely 2005 U.S. current account deficit. Accordingly, changes in market expectations for relative rates of return across economies can induce large swings in exchange rates as currency markets digest lumpy one-off flows. The growth of currency overlay programs further exacerbates exchange rate swings by magnifying or even divorcing foreign exchange positions from underlying asset flows, at least temporarily.

Shifting portfolio shares in the stock of global assets may cause exchange rates to overshoot, temporarily, their equilibrium market clearing levels, helping to explain some of the USD’s sharp swings along its recent downtrend. As non-U.S. residents raise their U.S. portfolio shares in response to an increase in their expectations for U.S. asset returns, the surge in U.S. capital inflows may push the exchange value of the USD beyond that which would be supported by subsequent equilibrium flows. Once the surge subsided, the USD would then have to depreciate to match U.S. borrowing with the equilibrium flow of foreign savings devoted to U.S. assets. Hence, while adjustments to portfolio stocks can contribute to swings in the USD, eventually it is the share of internationally mobile savings that the United States attracts that will determine the trend of the USD.

4. Is the United States borrowing “too much”?

By almost any measure the U.S. current account deficit is large, but our analysis suggests that U.S. external borrowing may be straining the portfolio limits of external creditors at current exchange rates. Rather than measure the current account relative to national income, which reflects balance of payments concerns, we focus on the share of non-U.S. savings that is required to fund it. The difference in denominator reflects our view that the U.S. current account is not yet constrained by the ability of the United States to service its debts, but rather by the ability of the rest of the world to finance U.S. borrowing while maintaining a diversified international portfolio and persistent home bias.

Figure 6 charts the history of the U.S. current account as a percentage of the rest of the world’s total savings. Since 1997, it has been on an explosive path, and in 2000 it breached the mid-1980s peak of 6.2% that precipitated a 30% real, trade-weighted drop in the USD. We estimate that this year the U.S. current account will eclipse 10% of non-U.S. savings and expand from there, even with our expectations for broad based depreciation of the USD. Yet, total U.S. borrowing – the current account deficit (net borrowing) plus U.S. residents’ international investment (capital outflows) – swallows an even greater share of non-U.S. savings. Gross U.S. borrowing, also shown in Figure 6, recently pushed past 20% of non-U.S. savings.

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17 We estimate that non-U.S. residents have a total financial portfolio of roughly $57 trillion. However, a portion of those assets is subject to home bias, and thus, may not be internationally mobile.
Is 20% of non-U.S. savings too much? I.e., can the U.S. asset share of internationally mobile capital increase further without USD depreciation? There are not sufficient data to answer that question definitively. However, available economic and financial market data suggest to us that 20% may indeed be too large.

Estimating global portfolio shares is difficult, and estimating the internationally mobile share of global portfolios is even more trying. Our estimate of the current global portfolio of financial assets is charted in Figure 7. Given that U.S. assets make up 41% of global financial markets, U.S. gross borrowing of 20% of foreign savings may appear manageable.

Yet, one must also take account of remaining home bias. Estimating the proportion of global savings and assets that are internationally mobile is challenging, and accordingly all estimates must be taken with a healthy degree of skepticism. Our approach has been to look at a variety of measures, all of which appear to be signaling the same thing: U.S. borrowing is pushing the limits of foreign residents’ willingness to lend. Figure 8 charts the growth of U.S. international borrowing as a percent of foreign savings and possible measures of portfolio constraints on that share.18

The simplest measure of constraint is the share of U.S. assets in foreign residents’ financial asset portfolios (stock rather than flow). In the early 1990s, a smaller share of foreign savings was flowing into the United States than the fraction of U.S. assets in non-U.S. residents’ financial portfolios. However, as the U.S. current account deficit expanded, U.S. external borrowing relative to foreign savings caught up with and then surpassed the U.S. asset share of foreign financial portfolios, despite an increase in the latter over the course of the 1990s. U.S. assets as a share of non-U.S. residents’ financial portfolios peaked in 2001 and have since declined. But the share of non-U.S. savings devoted to U.S. external borrowing has continued to rise. We estimate that the proportion of non-U.S. savings required to fund U.S. international borrowing now exceeds the share of U.S. assets in non-U.S. financial portfolios by about 5 percentage points.

However, the U.S. asset share of foreign residents’ financial asset portfolio is an imperfect measure of the limits of U.S. international borrowing. If home bias is diminishing, the share of U.S. assets in the existing stock of foreign portfolios may underestimate desired holdings of U.S. assets, and thus the expected proportion of global capital flows that should be directed to U.S. assets. Conversely, to the extent that preferences for non-financial assets (land, private equity, etc.) are even more skewed towards domestic assets than preferences for financial assets, then the share of U.S. assets in foreign financial portfolios may overstate non-U.S. residents’ preferences for claims on the United States.

Another approach to determine the limit of foreign appetites for U.S. assets is to look at the distribution of international savings at the margin rather than on average (as in the average proportion in existing portfolios). The original Feldstein-Horioka analysis relates marginal changes in savings with marginal changes in domestic investment; e.g. the proportion of each additional dollar of savings that goes to domestic investment. The remaining share is then the

18 Please see Appendix for details on the construction of each measure of constraint and measures of global savings flows.
marginal proportion of savings going to foreign investment. If savings invested internationally are allocated in proportion to shares in the global financial asset portfolio, then the marginal share of non-U.S. savings going to U.S. assets should equal marginal international investment rate times the share of U.S. assets in the global portfolio.

For instance, we estimate that in recent years the Feldstein-Horioka coefficient was 0.53, i.e. on the margin, 53 cents out of each dollar is invested domestically. Thus, 47% of savings, at the margin, is invested abroad. Given the 41% share of U.S. assets in global financial markets in 2005, the predicted marginal share of non-U.S. savings devoted to U.S. assets would be 47% x 41% = 19%. As shown in Figure 9, the predicted marginal proportion of foreign savings invested in U.S. assets remained healthily above the actual share of foreign savings invested in U.S. assets through 2003. Since then, however, it has fallen below the proportion of non-U.S. savings flows invested in U.S. assets.

This measure of predicted marginal investment in U.S. assets also has shortcomings. Again, the U.S. share of financial asset markets may be a poor representative of non-U.S. residents’ broader preferences for U.S. assets. Yet, it is likely that home bias is greater for non-financial assets than for financial assets, which would suggest that this marginal measure might overstate interest in U.S. assets. Also, marginal, average and desired investment shares may differ due to risk aversion. If risk tolerance increases with wealth and foreign assets are considered more risky than domestic assets, then each additional dollar of wealth will be increasingly allocated to foreign assets relative to domestic assets. Thus, marginal propensity to invest internationally will overstate the average desired proportion.

However, both average and marginal measures that we consider suggest that the United States indeed may be absorbing “too much” of the rest of the world’s savings. Furthermore, the shortcomings of our marginal measure of constraint, if anything, make it a conservative measure of the limits of U.S. borrowing.19

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19 Note also that our estimates of marginal home bias are much lower than those from other studies. As noted previously, the U.S. Federal Reserve finds that closer to 80% of savings is invested domestically, a figure consistent with other estimates from the academic literature. Thus, our marginal measure may understate true home bias, or equivalently, overstate internationally mobile savings.
A recent study from the International Monetary Fund, however, finds mixed evidence of a constraint on foreign appetite for U.S. assets. They find that “internationalization” of combined U.S. assets and liabilities is roughly on par with the size of U.S. financial markets, but that net foreign liabilities of the United States are more than a standard deviation greater than would be predicted by market size.

The mix of their results appears to be driven by the asymmetry between U.S. residents’ home bias and foreign residents’ preferences for U.S. assets. For instance, using the IMF’s definition of home bias, U.S. residents invest about 24% as much of their savings in foreign assets as would be predicted by U.S. market size; while the Fund’s definition of “Foreign Investor’s Bias” towards U.S. assets suggests that foreign residents invest in the United States more than 38% of the amount expected based on the size of the U.S. market. The IMF internationalization measure is the average of these two concepts (31%).

Given the asymmetry between assets and liabilities, however, internationalization is probably not the appropriate concept to address whether foreign investors’ appetite for U.S. assets is sated by their current rate of acquisition. That is a question about U.S. liabilities only. Furthermore, to the extent that the asymmetry between U.S. and foreign bias closes, as suggested earlier, it is likely to worsen any constraint on U.S. borrowing since it implies either greater U.S. demand for foreign assets or less foreign demand for U.S. assets (or both).

Interestingly, the IMF study does suggest why Australia and New Zealand are better able to attract capital relative to their global portfolio share. The IMF study finds a decreasing relationship between market size and internationalization; i.e. the smaller the market, the greater the share of foreign participation. As smaller economies/markets, Australia or New Zealand can more easily assume a larger position in international portfolios without raising concentration risk as much as a similar shift in the already large U.S. share. Figure 9 plots the IMF’s measure of foreign bias towards both Australian and U.S. financial assets.

Although it has fallen in recent years, foreign residents have invested a bit more than 79% as much of their financial asset portfolios in Australian assets as they would in the absence of home bias. That figure is just over double the corresponding figure for the United States. As a result, Australian international borrowing relative to non-Australian savings remains well below the average share of Australian assets in foreign portfolios (see Figure 10).

The last point is an important one for the United States due to the huge size of its financial markets. While there is a definitive upper bound to U.S. borrowing from other countries –100% of non-U.S. savings – the United States is likely to face a constraint at a much smaller share. Because U.S. assets already occupy the largest share in the international portfolio, the concentration risk associated with increasing that share is greater than for any other country. Consequently, each incremental rise in the U.S. share of international portfolios requires an even more dazzling increase in expected returns on U.S. assets than the previous addition.

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Ibid. We use the IMF’s definitions for average home bias and for average foreign bias towards U.S. assets, but our underlying data are a different. The IMF includes in their measures bank loans, which we do not.

For instance, in the Capital Asset Pricing Model (CAPM), the risk associated with a particular portfolio holding increases exponentially with its weight in the portfolio, while the expected return enters linearly. Thus, if Australian and U.S. assets have similar volatility (ignoring correlation effects), a 1-percentage point addition to the U.S. portfolio weight (from 41% to 42%) results in a much larger increase in portfolio risk than a 1-percentage point increase in Australia’s portfolio weight (from 1.6% to 2.6%).
This implies that the greater the share of global savings absorbed by U.S. borrowing, the more difficult it becomes for the United States to increase that share. Hence, if U.S. borrowing continues to grow faster than non-U.S. savings, as it does in our economic forecasts, the more likely it is that USD depreciation will be required to match demand with supply.

Another indication that U.S. borrowing is straining the ability of non-U.S. residents to lend without sacrificing portfolio diversification comes from financial markets. In our view, it is not coincidental that the USD began to plateau and then depreciate at roughly the same time (2000-02) that the above analysis – as imprecise as it may be – suggests that the United States began to borrow more from the rest of the world than its current market share would warrant after controlling for home bias.

As noted earlier, the USD’s depreciation since mid 2003 has taken place against a backdrop of increasing cyclical outperformance of the U.S. economy, a widening U.S. yield advantage, and rising U.S. equity prices. As shown in Figure 1, although periodic USD rebounds have occurred as U.S. relative performance surged, some of the USD’s sharpest declines have coincided with similar conditions.

Increased expectations for U.S. asset returns were sufficient to raise U.S. asset prices and bond yields, but apparently insufficient to increase foreign capital inflows to meet expanding U.S. borrowing demand without USD depreciation. This suggests a simple (albeit somewhat lagging) financial market indicator that U.S. borrowing is running into portfolio constraints: a divergence between U.S. asset prices and the USD. However, with U.S. borrowing already flirting with such a constraint, any disappointment in U.S. performance is likely to be greeted by USD depreciation.

**Asian adjustment: Shifting the USD’s budget constraint inwards**

To the extent the U.S. borrowing needs are already brushing against an external budget constraint, expected changes in Asian currency policy are likely to tighten the constraint, forcing even greater USD depreciation. Asian reserve accumulation and preference for U.S. securities may have lowered measured home bias in those countries relative to the portfolio preferences of local residents. Accordingly, any decline in official intervention may raise the region’s home bias, shrinking the pool of internationally mobile capital. Similarly, a reallocation of existing reserves...
away from their extreme preference for U.S. assets – two-thirds of global reserves are in USD – would lower the existing portfolio share of U.S. assets in the global portfolio. Either event would worsen the external borrowing constraint for the United States. Figure 8 also charts the share of U.S. assets in foreign financial portfolios when official holdings of Treasuries are excluded.\textsuperscript{23} The difference is greater than 2 percentage points. The before-mentioned IMF study also finds evidence that the buildup of USD official reserves is distorting measured global preferences for U.S. assets.

We expect Chinese currency authorities to allow the CNY to appreciate gradually versus the USD and become progressively less USD linked. Other Asian currency authorities are expected to follow China’s lead to some extent. As emerging Asia’s currencies appreciate from undervalued levels, official intervention by these countries likely will decline. Furthermore, as those currencies become less USD linked, governments in the region will face declining incentives to keep their reserves primarily in USD. This process probably will take years to unfold, but in our view, it is likely to increase downward pressure on the USD versus all currencies, not just Asian currencies, as it reduces the share of internationally mobile savings going to U.S. assets.\textsuperscript{24} Because private market participants are likely to account for these developments in forming expectations for relative USD performance, the share of U.S. assets in private portfolios is likely to fall even earlier, advancing the USD’s probable slide.

Conclusions

Understanding why U.S. external liabilities are affecting the USD is just as important as understanding that they do if we are to properly assess the manner of and risks associated with USD depreciation. The above evidence points to portfolio constraints on the growth of U.S. liabilities as the source of USD depreciation. As such, persistent but expected outperformance of U.S. assets is unlikely to be sufficient to deter USD weakness. Instead, if our forecasts for more rapid growth of U.S. external liabilities than foreign savings holds, the U.S. will have to continuously raise market expectations for relative U.S. asset performance to limit USD depreciation. This, however, appears increasingly unlikely as the U.S. economic cycle matures. Thus, it is the persistent outperformance of the U.S. economy relative to other economies that, ironically, drives the trend of USD depreciation.

On the other hand, our results suggest that a disorderly plunge in the USD is unlikely. First, there appears to be little evidence to support the idea that U.S. balance of payments concerns have been responsible for the trend of USD weakness in recent years, and we do not see a significant chance of a discrete change in market perceptions of the riskiness of U.S. assets over our forecast horizon. Second, if portfolio constraints are responsible for USD depreciation, then at some point the depreciation itself diffuses the risks of further losses by (a) raising the expected future return on U.S. assets, (b) loosening the portfolio constraint on U.S. international borrowing by making U.S. assets cheaper in foreign terms, and (c) lowering U.S. net foreign liabilities.

\textsuperscript{23} This measure understates the share of foreign holdings of U.S. assets that are official reserves since it represents only official holdings of U.S. Treasuries (not government agency or other U.S. securities).

\textsuperscript{24} See “Ripples of China Across Major Currency Markets,” Marvin Barth, Citigroup, 21 April 2005.
While we view a disorderly adjustment of the USD as unlikely, that does not preclude a rapid and substantial depreciation of the USD. In fact, far from reassuring us that relative U.S. economic performance can propel the USD higher (or forestall further losses), the first-half rally in the USD has, in our view, raised the risk of a more significant and more rapid drop in the USD in coming months. The USD’s first-half surge appears to have been driven by a shift in favor of U.S. assets in the stock of foreign portfolios. However, the associated rise in U.S. asset prices and in the USD may reflect an overshoot that is unsustainable under equilibrium savings flows. Accordingly, the USD is likely to retrace one markets fully absorb the adjustment to portfolio stocks. With U.S. liabilities still growing more rapidly than foreign savings, the USD’s adjustment to sustainable savings flows may be still greater. A gradual shift in Asian currency policy will only exacerbate the USD’s decline.
Appendix

Construction of world savings estimates: Annual nominal USD savings for each country are calculated as the product of the savings rate and nominal USD gross domestic product. Nominal USD GDP estimates come from the International Monetary Fund (IMF) World Economic Outlook. Savings rates for the G-7 countries come from the World Economic Outlook, for all other countries they come from the World Bank. “Rest of the World” savings are the simple sum of individual country savings except the United States. Note, unlike IMF and World Bank estimates for global savings, these are not corrupted by purchasing power parity (PPP) conversions. PPP is a useful concept for welfare analysis, but wholly inappropriate for calculating global savings flows.

Construction of global and country financial asset portfolios: Each country’s financial assets are approximated by the sum of bond and equity market capitalizations (derivatives and loans are ignored due to data constraints). Bond market data come from the Bank for International Settlements’ Statistics on International Securities (local issues, Table 16, international issues, Table 11). Data on equity market capitalizations come from the World Federation of Exchanges (http://www.fibv.com). Both sources are assumed to miss a consistent share of each country’s bond and equity markets, and the miss these data sources have for the United States according to the U.S. Federal Reserve Flow of Funds (Table L.4) is used to scale up all countries’ markets.

Construction of foreign holdings of Australian, U.S. and “Rest of the World” residents: For the United States and the Rest of the World, data come from the Flow of Funds (Table L.107). For Australia, data come from the Australian Bureau of Statistics (Table H04). These figures are used for the numerator of the average annual portfolio share in, respectively, Australian and U.S. financial assets, graphed in Figure 8. The denominator is constructed using U.S. household wealth (from the Flow of Funds, Table B.100) and the global financial asset portfolios constructed above to infer global, non-Australian and non-U.S. wealth held in financial assets.

Estimation of marginal home bias and marginal foreign investment rates: Savings and investment are assumed to have a long-run relationship, but allowed to deviate from each other over short horizons, as follows:

\[ \Delta I_{i,t} = \alpha_i + \beta \Delta S_{i,t} + \gamma (I_{i,t} - \rho S_{i,t}) + \varepsilon_{i,t} \]

where \( I_{i,t} \) is the rate of investment in country \( i \) at time \( t \), \( S_{i,t} \) is the savings rate in country \( i \) at time \( t \), \( \Delta X \) represents the one-period change in variable \( X \), and \( \varepsilon \) is a random error. \( \beta \) is then the marginal change in domestic investment associated with a change in savings, while \( \rho \) is the long-run, “cointegrating” relationship between savings and investment (usually assumed to be 1, since in the long run savings should equal investment), and \( \gamma \) is the rate at which deviations from the long-run savings-investment relationship affect current investment.\(^{25}\) Equation (1) was estimated in a reduced form on a balanced panel of annual data from 87 countries with fixed effects \( \alpha_i \) over four samples: 1981-89, 1990-96, 1997-00, 2001-05.

and 2001-2004. Observations were weighted by the value of each country’s savings to give greater weight to those countries with a greater impact on world savings. Weighting by savings also gives more sensible estimates (for instance, \( \rho \) is statistically indistinguishable from 1 in the savings-weighted regression, but varies significantly in an unweighted regression). Marginal home bias, or the marginal share of each additional unit of domestic savings that is invested at home, is \( \beta \), and the marginal propensity to invest abroad is \( 1 - \beta \). In Figure 8, the predicted marginal share of foreign savings going to U.S. assets is calculated as \((1 - \beta)^* \) (the U.S. share of the global financial asset portfolio).

Estimates of foreign bias against Australian and U.S. assets: Following the IMF, the measure reflects the share of foreign participation in Australian and U.S. financial markets, relative to the size of their respective markets:

\[
(2) \quad \left( \frac{L}{D} \right) \left[ \frac{(W - D)}{W} \right]
\]

where \( L \) equals foreign ownership of U.S. (Australian) assets, \( D \) is the size of U.S. (Australian) financial markets, and \( W \) is the size of world financial markets.
Disclosure Appendix

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I, Marvin Barth, hereby certify that all of the views expressed in this research report accurately reflect my personal views about any and all of the subject issuer(s) or securities. I also certify that no part of my compensation was, is, or will be directly or indirectly related to the specific recommendation(s) or views in this report.

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