

Board of Governors of the Federal Reserve System

International Finance Discussion Papers

Number 722

April 2002

FINANCIAL CENTERS AND THE GEOGRAPHY OF CAPITAL FLOWS

Francis E. Warnock and Chad Cleaver

NOTE: International Finance Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to International Finance Discussion Papers (other than an acknowledgment that the writer has had access to unpublished material) should be cleared with the author or authors. Recent IFDPs are available on the Web at www.federalreserve.gov/pubs/ifdp/.

FINANCIAL CENTERS AND THE GEOGRAPHY OF CAPITAL FLOWS

Francis E. Warnock and Chad Cleaver*

Abstract: We examine an assumption common in empirical work on bilateral portfolio capital flows that the countries the flows are attributed to are also the countries of the security's issuer, seller, or ultimate buyer. We do this by estimating U.S. investors' holdings of debt and equities in over 40 countries and, for the same countries, foreign investors' holdings of U.S. debt and equities. A comparison of our estimates with data from benchmark surveys provides insight into U.S. data on international debt and equity transactions. We find that, contrary to the common assumption, the data do not track the location of U.S. investment or the location of investors in U.S. assets very well. Because the U.S. portfolio flow data collection system was designed to measure cross-border transactions with foreign counterparties who are often intermediaries, the majority of the flows are attributed to financial centers. By aggregating our country-level estimates, we find that U.S. data accurately portray net inflows into U.S. equities and net outflows into foreign bonds. However, the data substantially overcount net inflows into U.S. bonds and may undercount net outflows into foreign equities. We conclude with a discussion of the implications of our findings for research on capital flows.

Keywords: portfolio flows, equity and bond flows, international investment position, net foreign assets
JEL Classification: G15, F32, C82

* The authors are, respectively, Economist and Research Assistant in the International Finance Division of the Board of Governors of the Federal Reserve System. The authors thank for helpful comments members of an interagency working group tasked with improving the quality of U.S. capital flows data, in particular Ralph Kozlow and John Rutter of the Bureau of Economic Analysis; Dwight Wolkow of the Treasury Department; Ken Lamar and Leon Taub of the Federal Reserve Bank of New York; William Grier, Gary Lee, and Charles Thomas of the Board of Governors; and Lois Stekler. All errors are our own. The views in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System, of any other person associated with the Federal Reserve System, or of the above-mentioned agencies. Corresponding author: frank.warnock@frb.gov

I. Introduction

When did Korean financial markets become integrated with global capital markets? Are capital flows to emerging markets susceptible to large reversals? What drives investors to purchase Chilean stocks? Are investors chasing past returns in international markets? Do information asymmetries put international investors at a disadvantage when buying German stocks? Are financial flows driven by the same factors that influence trade in goods? What explains the recent strength of the dollar? Each of these questions has been recently addressed using U.S. bilateral capital flows data.^{1,2} With more and more academic researchers and practitioners analyzing capital flows, there is a need to take a step back and determine whether the data are up to the task.

The focus of this paper is on the potential pitfalls of using U.S. data on cross-border purchases and sales of securities for analyzing the types of questions posed above. The large volume of trading in U.S. and foreign securities in financial centers such as London is the source of many of these pitfalls, distorting analysis of geography. The magnitude of these problems is illuminated by alternative data sources, particularly the periodic surveys of U.S. holdings of foreign long-term securities and foreign holdings of U.S. long-term securities. Moreover, these holdings surveys cast some doubt on the completeness of some components of the transactions data.

In accordance with balance of payments (BOP) accounting, the U.S. securities transactions data are collected on a transactor basis. That is, the data indicate (1) where U.S. residents are purchasing foreign securities, but not the residence of the issuer of the foreign security, and (2) the residence of the initial foreign purchaser of U.S. securities, but not the ultimate foreign holder. The common assumption in empirical work is that the transactor country is the same as the country in which the security's issuer, ultimate purchaser, or seller is resident. But there are many trades that violate this assumption by being conducted through intermediaries in third countries, such as the financial centers of the United Kingdom and the Caribbean. For example, if a German resident

¹ See Bekaert, Harvey, and Lumsdaine (forthcoming); Taylor and Sarno (1997); Chuhan, Claessens, and Mamingi (1998); Bohn and Tesar (1997); Brennan and Cao (1997); Portes and Rey (1999); and IMF (2001).

² The term capital flows comes from the capital account, which has recently been renamed the financial account. Whereas financial flows would thus be a more descriptive term, we continue to use the traditional term. In addition, in this paper we do not discuss two other components of capital flows, direct investment and banking flows.

purchases a U.S. bond through a broker in London, U.S. capital flows data will show an inflow from the United Kingdom. In practice, this means that in U.S. data a disproportionate amount of purchases and sales of securities are attributed to residents of financial centers. The purpose of this paper is to quantify this mismatch between the foreign country of the ultimate buyer (in the case of foreign purchases of U.S. securities) or issuer (in the case of U.S. purchases of foreign securities) and the intermediary that determines the country attribution for BOP purposes. We refer to this as a geographical mismatch in the capital flows data, a mismatch caused by a difference in the design of the capital flows data collection system and the way many researchers use the data.

Our main point is that even if the data accurately portray bilateral BOP flows, for many areas of economic research it is undesirable to attribute transactions to the country of the intermediary. Classifying these transactions according to the country of original issuer (or according to the location of the ultimate foreign buyer or seller) may be preferred. In this paper we do not discuss the usefulness of BOP accounting conventions, the main impetus behind the design of the U.S. data collection system. We assume that the conventions are indeed useful; at the very least they help to maintain the consistency of the BOP accounts, both within countries and internationally. The design of the system does, however, have important implications for research and analysis that use the bilateral capital flows data.

While we will never know with certainty the extent of the geographical mismatch in the data, we can use the U.S. capital flows data to estimate cross-border *holdings* of securities and then compare the estimates with the high-quality but infrequent data from comprehensive benchmark surveys.³ To be sure, there are other unknown elements to these estimates—the major one being valuation adjustments—so that inaccurate estimates do not necessarily imply a geographical mismatch in the flows data. However, in our view, even allowing for these unknown elements, our analysis provides a useful picture of the geographic mismatch.⁴

³ The benchmark survey data are not perfect, but they are collected at the individual security level, allowing for detailed analysis and editing of reported data. See Grier, Lee, and Warnock (2001) for a comprehensive primer on the U.S. data on cross-border securities holdings and transactions.

⁴ Part of this exercise—the estimation of U.S. holdings of foreign equities—was undertaken in Warnock and Mason (2001). In that paper, which is superseded by this one, a programming error resulted in a misestimation of U.S. holdings of Hong Kong equities.

Our findings can be broken into two main categories. While our main conclusions concern bilateral flows, we begin by discussing our aggregate estimates, formed by summing the bilateral estimates. We compare the aggregate estimates with amounts from benchmark surveys to get an indication of the accuracy of U.S. data on total cross-border financial flows.⁵ The main findings from our estimates of aggregate cross-border holdings, shown in Figure 1, are as follows:

- Our aggregate estimates of foreign holdings of U.S. equities and of U.S. holdings of foreign bonds are quite close to amounts from benchmark surveys, suggesting that for these two subcomponents, the U.S. data on capital flows are accurate.
- We substantially underestimate aggregate U.S. holdings of foreign equities, suggesting that U.S. net purchases of foreign equities may be substantially undercounted in the capital flows data.⁶ Our country-level estimates show that the bulk of this underestimation is in equity flows to industrial countries (excluding the United Kingdom, where there is a slight overestimation).
- Our overestimation of foreign holdings of U.S. bonds is very large (23 percent), suggesting that there are significant problems with the data on foreign purchases and sales of U.S. bonds.

The apparent overestimation of bond inflows and underestimation of equity outflows imply that the U.S. net debt position is not likely as large as official estimates indicate. If, for example, end-2000 U.S. holdings of foreign securities were underestimated by 10 percent and foreign holdings of U.S. securities were overestimated by 10 percent—not inconceivable amounts given our analysis—the U.S. position as a net debtor was overstated by about \$600 billion, or over 30 percent.

⁵ A similar comparison is made by the Bureau of Economic Analysis (BEA) when they use recent benchmarks to update estimates of the international investment position. See, for example, Bach (1997).

⁶ Doubling our valuation adjustments would bring the estimates in line with the benchmark survey data, but it is not likely that our adjustments are off by a factor of two.

In Section VII, we discuss this implication in greater detail; we also discuss why it is not likely to persist in the future.

Our main findings involve estimates of bilateral holdings, such as German holdings of U.S. bonds or U.S. holdings of Argentinian equities. Our bilateral estimates provide the following conclusions:

- One financial center—the United Kingdom—is particularly problematic (Figure 2). Our exceptionally large overestimations of U.K. holdings of U.S. securities suggest that a substantial portion of reported U.K. transactions in U.S. securities are made by residents of other countries using U.K. intermediaries. This severely limits the usefulness of the bilateral capital flows data between the United States and the United Kingdom for purposes such as the analysis of the determinants of capital flows.
- While we substantially underestimate U.S. holdings of euro-area equities, our other estimates for the euro-area are quite accurate (Figure 3).

Our finding that the geography of capital flows is heavily influenced by financial centers, especially the United Kingdom, has important implications for recent research on capital flows, on which we will elaborate in Section VII.⁷ Briefly, our results have implications for regressions of the euro-U.S. dollar exchange rate on net equity flows from the euro area to the United States; because U.S. outflows into euro-area equities are undercounted, net equity flows from the euro-area to the United States are overcounted, suggesting a measurement error in such regressions. In addition, empirical work on the determinants of bilateral capital flows that includes financial centers should be viewed cautiously.

The paper proceeds as follows. In the next two sections we provide a short discussion of the data on cross-border holdings and capital flows and present the history of cross-border holdings estimates. Section IV presents our methodology. Aggregate and country-level estimates are

⁷ We do not address in this paper the reasons financial centers exist; see, for example, Walter (1998), Gehrig (1998), and Tschoegl (2000).

discussed in greater detail in Sections V and VI. Implications of discrepancies between our estimates and survey amounts are discussed in Section VII. Section VIII concludes.

II. The Nature of the Data on Cross-Border Holdings and Capital Flows

In the United States, there are two elements of the system for collecting data on cross-border transactions in, and holdings of, long-term securities. *Transactions* involving U.S. residents and foreigners are reported monthly, mainly by brokers and dealers. These monthly reports contain information on gross purchases and gross sales (market value) of long-term securities; the country of the foreign counterparty to the transaction (which may differ from the country of the original issuer or ultimate purchaser); in the case of foreign securities, whether the security was an equity or a bond; and, in the case of a U.S. security, whether it was an equity, a Treasury bond, a corporate bond, or an agency bond. Data on cross-border *positions* in long-term securities—U.S. holdings of foreign securities and foreign holdings of U.S. securities—are collected in infrequent but detailed benchmark surveys.

There are strengths and weaknesses of each component of system that any user of the data must recognize. For balance of payments purposes, the monthly transactions data, while providing a relatively frequent picture of capital flows, are designed to provide information on the country in which the foreign intermediary resides. In terms of analysis of bilateral portfolio flows, this design feature is not entirely desirable. As we will show, far too many flows are attributed to financial centers, such as the United Kingdom and the Caribbean. Even if the monthly reports accurately measure aggregate long-term security flows into and out of the United States, the country attribution of those flows is heavily influenced by financial centers.⁸

The benchmark surveys are less frequent, but they are more comprehensive than the monthly transactions data. Reporting to the surveys is mandatory, with penalties for noncompliance, and the data received are subjected to extensive analysis and editing before being accepted as accurate. The main sources of the benchmark survey data are large custodians, who provide security-level holdings data.

⁸ Note, too, that any subsequent trading of U.S. securities between foreigners (that is, foreign-to-foreign trading) is not captured by U.S. capital flows data.

For asset surveys (U.S. holdings of foreign securities), the reporters consist mainly of all large custodians and large institutional investors; smaller custodians and institutional investors were sampled, but 99 percent of the data was from the major reporters. Holdings of U.S. private investors are included to the extent they were through U.S. mutual funds or entrusted to U.S.-resident custodians for safekeeping. Further details of the 1997 asset survey, including findings and methodology, are discussed in Treasury Department and Federal Reserve Board (2000).⁹ The security-level data and associated identifiers (such as an ISIN or SEDOL number) provide information on the issuer's country of residence and, hence, ensure that the country attribution of the data is accurate.

For liability surveys (foreign holdings of U.S. securities), the reporters consist of issuers of securities and—because issuers' ownership records usually list the names of U.S. custodians that are holding securities on behalf of beneficial owners or other intermediaries—U.S. custodians. Security-level information is provided in the liability surveys, but the identifier on a U.S. security does not provide information on the country of the *holder*. If the foreign holder entrusts her U.S. securities to a custodian in her country or to a U.S. custodian that can accurately identify her country of residence, then the country attribution of the liabilities survey should be accurate. However, the geography will be confounded when the foreign holder entrusts the safekeeping of the security to an institution that is neither in the United States nor in her country of residence. For example, a resident of Germany may buy a U.S. security and place this security in the custody of a Swiss bank. The Swiss bank will then normally employ a U.S.-resident custodian bank to act as its foreign subcustodian for this security to facilitate settlement and custody operations. When portfolio surveys are conducted, information is collected only from U.S.-resident entities. Thus, the U.S.-resident bank, acting as the subcustodian of the Swiss bank, will report this security on the survey. Since this U.S. bank will typically only know that it is holding this security on behalf of a Swiss bank, it will report this security as Swiss held.

⁹ The more recent survey was part of the 1997 Coordinated Portfolio Investment Survey (IMF, 2000) in which 29 countries participated. The United States is among the few countries that use the security-by-security approach to data collection, recognized by the IMF as providing more accurate results.

III. History of Cross-Border Holdings Estimates

In this section we discuss past estimates of aggregate cross-border holdings. It should be stressed, however, that the goal of this paper is not to estimate holdings, but to use holdings estimates to learn more about securities transactions data. Along that line of thinking, when discussing the accuracy of past estimates, we pay particular attention to the implications for the capital flows data.

In the United States, as in most countries, timely *and* accurate estimates of cross-border portfolio holdings do not exist.¹⁰ Annual estimates are provided by BEA using previous benchmark surveys of holdings, purchases and sales data since the last holdings survey, and estimates of changes in value. These estimates are usually quite accurate for foreign holdings of U.S. securities, for which the geography of the capital flows data cannot affect valuation adjustments—whether the transaction originated in Germany or Thailand, the same returns index would be used to revalue past holdings. But for U.S. holdings of foreign securities, valuation adjustments depend crucially on the country of the issuer of the security, and holdings estimates have been wildly off the mark.¹¹ We discuss the history of these estimates in this section.

*Foreign Holdings of U.S. Securities*¹²

Estimates of foreign holdings of U.S. securities have been quite accurate, at least until very recently. The first two benchmark surveys of foreign holdings of U.S. securities took place in 1869 and 1941. In the 33-year interval between the 1941 survey and the next one, conducted in 1974, the BEA's cumulative underestimation of foreign holdings of U.S. securities was only 18 percent, or \$10 billion. In addition to the long period of time between benchmark surveys, inaccuracies in the

¹⁰ For estimates of international investment positions (IIP) across a wide range of countries, see Lane and Miles-Ferretti (2001).

¹¹ As the presentation in this paper should convey, we think inaccuracies in holdings estimates are due to the design of the capital flows data collection system, not to problems with BEA's (or anybody else's) estimation techniques.

¹² The discussion in this section borrows from *Report on Foreign Portfolio Investment in the United States* (Treasury Department, various years) and Griever, Lee, and Warnock (2001).

estimate may have resulted from erroneous 1941 survey data. Benchmark surveys in 1941 were subject to more error than more recent surveys; moreover, the business community was not as aware of the importance of the surveys at that time. And, as always, inaccurate valuation adjustments could also have added to the inaccuracies in the estimates.

With the 1974 survey, the United States committed to conducting quinquennial surveys. Thus, holdings estimates at the time of the next survey, conducted in 1978, were much more accurate than in 1974. In 1978, the BEA overestimated foreign holdings of U.S. securities by \$966 million, or a mere 0.6 percent. The largest estimation error was in U.S. Treasury bonds, which were overestimated by \$1 billion, or 3 percent.

The 1984 survey included an assessment of the performance of the TIC transactions reporting system, which found that some respondents were unable to distinguish between issues of parent entities located in the United States and offshore affiliates of U.S. corporations. Furthermore, foreign equities traded in the United States were often classified as U.S. issues by respondents. Finally, some respondents incorrectly applied the definition of “long-term”. Each of these problems can lead to undetectable errors in the transactions data. Nonetheless, the BEA’s 1984 estimates of foreign holdings of U.S. securities were very accurate. Overall, foreign holdings were overestimated by \$7 billion, or roughly 3 percent. The largest errors involved overestimations of corporate and agency bonds of 14 and 10 percent, respectively.

The 1989 survey found that many respondents classified Canadian securities as U.S. securities in the benchmark survey. The respondents also had difficulty determining the value of reported holdings of U.S. securities that had never been publicly traded. But, overall, foreign holdings of U.S. securities were overestimated by 0.2%, as a 5% overestimate of equities and a 4% underestimate of debt offset each other.

The BEA’s 1994 estimates of foreign holdings of U.S. securities were \$54 billion, or 4 percent, greater than the survey results. While holdings of U.S. equities were underestimated, debt holdings were overestimated in every category. The BEA attributed the overestimation of agency debt to a large number of asset-backed securities. Asset-backed securities repay principal and interest every month, so the value of will be greater when they were purchased and recorded by the TIC system than when they were reported by the survey.

The BEA's estimates are available only for year end, so we cannot compare them with amounts from the March 2000 survey.¹³ Our own aggregate estimates as of March 2000, the subject of Section V, indicate that discrepancies are much larger than in the past.

In summary, over the years, discrepancies between estimated foreign holdings of U.S. securities and holdings data provided by the benchmark liabilities surveys were minor, much smaller than with the 2000 survey. Even with the small overall errors, past discrepancies have helped identify potential problems with the capital flows data.

U.S. Holdings of Foreign Securities

Whereas estimates of foreign holdings of U.S. securities have been quite accurate, the same cannot be said for estimates of U.S. holdings of foreign securities. This is to be expected. Estimates of holdings of foreign securities rely heavily on the geography of capital flows to form valuation adjustments, whereas estimates of foreign holdings of U.S. securities use U.S. bond and equity indexes regardless of the country of the purchaser.

The first benchmark survey of U.S. holdings of foreign securities was conducted in 1943. Between that survey and the second one, conducted as of March 1994, no accurate estimate of U.S. holdings of foreign securities existed. To form an estimate of current holdings, economists had to guess an initial level of holdings at some point in the past—or start with levels from the 1943 survey—and then sum subsequent transactions data and make valuation adjustments. No one knew how accurate the holdings estimates were, nor could they determine the accuracy of either the transactions data or the valuation adjustments.

That changed in 1996. The inadequacy of holdings estimates became clear with the release of results from the Treasury Department's first post-war benchmark survey of U.S. holdings of foreign securities. Official U.S. estimates, prepared using capital flows data, badly underestimated holdings; the benchmark survey prompted the BEA to increase its estimate of end-1994 holdings by some \$263 billion, or over 80 percent. Private estimates were no better; for example, Bohn and Tesar (1997) were off by more than \$300 billion. Without having a true initial value of holdings to start from, there was no way of discerning whether the underestimations were due to poor estimates

¹³ Data from the March 2000 survey are preliminary, as presented in Grier et al. (2001).

of initial holdings, omissions or inaccuracies in the transactions data, or inappropriate valuation adjustments.

With the release of another benchmark survey, conducted as of December 1997, it became apparent that the transactions data and/or the valuation adjustments were flawed. Even starting with actual March 1994 holdings, by December 1997 holdings of foreign securities were underestimated by \$300 billion, or 18%. Our estimates, discussed in detail below, were no closer to the benchmark amounts. Underestimations this large could be taken as an indication that some transactions in foreign securities were likely being missed by the TIC system. Given the variation in equity returns across markets, the underestimation could also be due to the geographical mismatch in the portfolio flows data that would lead to erroneous valuation adjustments.

IV. Methodology for Estimating Cross-Border Holdings

We use the monthly transactions data to estimate holdings between two benchmark survey dates: December 1994 to March 2000 for the liabilities surveys, and March 1994 to December 1997 for the asset surveys. A comparison of estimated holdings with those given by the benchmark surveys—keeping in mind the strengths and weaknesses of each system—provides insight into the accuracy of U.S. data on cross-border holdings and transactions.

For both U.S. holdings of foreign long-term securities and foreign holdings of U.S. long-term securities, we start with holdings opposite 44 countries as well as a handful of regions as given by the Treasury Department's 1994 benchmark surveys—the March 1994 asset survey and the December 1994 liabilities survey. Monthly data on net international transactions are from the TIC reporting system. Data on stocks acquired via mergers are from Securities Data Corporation (SDC). Valuation adjustments are made using indexes from MSCI, J.P. Morgan, and Lehman Brothers. Transaction costs are estimated using data from Elkins-McSherry, the Bank for International Settlements, and J.P. Morgan.¹⁴

¹⁴ The benchmark survey and TIC data are available through the TIC web site, www.treas.gov/tic/. MSCI price indexes can be found at www.ms_cidata.com. Stocks swaps data are available by subscription from SDC, but often also appear in the financial press.

To estimate holdings at the end of a month, we adjust the previous month's holdings for estimated price and exchange rate changes, and add the current month's (transaction cost-adjusted) net purchases and, in the case of equities, equities acquired through stock swaps (discussed below). Specifically, we estimate cross-border holdings of a particular type of instrument (foreign equity, foreign bond, U.S. equity, U.S. Treasury bond, U.S. agency bond, U.S. corporate bond) at the end of period t by the formula:

$$A_{i,t} = A_{i,t-1} * R_{i,t}/R_{i,t-1} + NP_{i,t} - (GP_{i,t} + GS_{i,t}) * T_i + SS_{i,t} \quad (1)$$

In Equation (1), the i subscript denotes the foreign country. When estimating U.S. holdings of foreign securities, it denotes the country in which the issuer of the security resides; when estimating foreign holdings of U.S. securities, it denotes the country of the foreign investor. The variables in (1) are defined as follows, with the case of estimating foreign holdings of U.S. securities in parentheses:

- $A_{i,t}$ estimated U.S. holdings of country i 's securities at the end of month t
(country i 's estimated holdings of U.S. securities at the end of month t)
- $NP_{i,t}$ net U.S. purchases of country i 's securities during month t
(net purchases by country i 's residents of U.S. securities during month t)
- $R_{i,t}$ an appropriate price index to revalue last period's holdings
- $GP_{i,t}$ gross purchases of country i 's securities by U.S. residents during month t
(gross purchases of U.S. securities by country i 's residents during month t)
- $GS_{i,t}$ gross sales of country i 's securities by U.S. residents during month t
(gross sales of U.S. securities by country i 's residents during month t)
- T_i adjustment factor for transaction costs
- $SS_{i,t}$ country i 's equities acquired by U.S. residents through stock swaps during month t
(U.S. equities acquired by country i 's residents through stock swaps during month t)

The last variable, $SS_{i,t}$, is used only when estimating equity holdings. The initial values of all A_i are given by the 1994 benchmark surveys. We next discuss each variable in more detail.¹⁵

Valuation adjustments

The calculation of valuation adjustments is a major source of uncertainty in our holdings estimates. For example, in 2000 the S&P500 fell by 10.1 percent, while the MSCI U.S. index fell 13.6 percent. In terms of a valuation adjustment for the year, that 3.5 percentage point difference translates into a \$50 billion difference in estimated foreign holdings of U.S. equities. Not knowing the evolution of the exact composition of cross-border holdings, we use readily available indexes that are comprised of securities that, in theory, are consistent with the types of securities held by international investors, but we leave for future work a more complete examination of which index is more appropriate.

For foreign equities, we use MSCI indexes, which are composed of large, liquid equities, the type of equities that are likely held by international investors (Kang and Stulz (1997) and Dahlquist and Roberttson (2001)). For foreign bonds from industrial countries, we use MSCI fixed income price return indices, which are comprised of local-currency denominated sovereign bonds. In emerging market countries, U.S. investors more likely hold dollar-denominated debt, so we use J.P. Morgan Emerging Market Bond Index (EMBI) Global price return indices, which include only dollar-denominated sovereign debt.

For U.S. equities, we use the MSCI U.S. index, largely to be consistent with the indexes we use for revaluing holdings of foreign equities, but also because the S&P500 contains a handful of non-U.S. stocks. For U.S. bonds, we use three Lehman Brothers indexes: Lehman Brothers U.S. Treasury Index, Lehman Brothers U.S. Agency Index, and Lehman Brothers U.S. Corporate Investment Grade Index.

Further details on these indexes are provided in the appendix.

¹⁵ The nature of the holdings and transactions data are discussed above in Section II.

Transaction Costs

The TIC transactions data are reported gross at cost including commissions and taxes. Hence, to get the value of the securities purchased and sold, one must subtract transaction costs from the gross purchases and gross sales.

For one-way transaction costs in equities, we use Elkins-McSherry estimates of commissions and fees charged institutional investors.¹⁶ For round-trip transaction costs in U.S. debt securities, we use the bid-ask spread and rely on ballpark estimates provided by market participants of 5 basis points (bp) on U.S. Treasury debt, 10bp on U.S. agency debt, and 25bp on U.S. corporate debt. For round-trip transactions in foreign debt securities, we use information on bid-ask spreads from Inoue (1999) and J.P. Morgan's web site where available; where not available, we assume 25bp on industrial countries' foreign debt, and 50bp on developing countries' foreign debt.

Stock Swaps

The TIC data on long-term securities capture market transactions between U.S. and foreign residents, but equities are also acquired through merger-related stock swaps. For example, when a foreign company acquires a U.S. firm, one form of financing the deal is an exchange of equity in which shareholders of the target (U.S.) firm are given stocks in the acquiring (foreign) firm. Such acquisitions of foreign stocks are not reported to the TIC system. To continue with this example, if the acquisition of foreign stocks through swaps results in a greater-than-desired weighting on foreign stocks in U.S. equity portfolios, U.S. residents will subsequently sell foreign stocks to rebalance their portfolios, and such sales are reported to the TIC system. Since the TIC system does not capture the initial acquisition, but should capture subsequent sales, measures of stock swaps must be included in any analysis of capital flows or asset holdings.¹⁷

The use of stock swaps to finance cross-border mergers and acquisitions is a relatively recent phenomenon that has been an important component of the financing of foreign acquisitions of U.S. firms. Stock swaps swelled in importance in 1998 and 1999, when U.S. residents acquired over \$100 billion each year in foreign stocks through swaps, due largely to the megamergers of Daimler

¹⁶ See Willoughby (1998), Domowitz, Glen, and Madhavan (2001), and www.elkins-mcsherry.com for discussions of the Elkins-McSherry data.

¹⁷ In their presentation of U.S. capital flows data, BEA includes estimates of stock swaps.

Chrysler, BP Amoco, and Airtouch Vodafone. Data from SDC indicate that prior to 1998 only one deal involved a substantial exchange of stocks, the 1989 Beecham/SmithKline Beckman merger. In the period we investigate for foreign equities, 1994 to 1997, stock swaps were relatively small; including stock swaps increases our aggregate end-1997 holdings estimate by about \$8 billion, or less than one percent.

U.S. firms also use stock swaps to finance acquisitions, but to a much lesser extent. A recent example is the Citigroup takeover of Banemex for a reported \$12 billion, of which about half was financed with Citi stock. In 1999, foreigners acquired an estimated \$19 billion in U.S. stocks through merger-related swaps.

V. Aggregate Estimates of Cross-Border Holdings

In this section we present our aggregate estimates of cross-border holdings, which are presented in Figure 1 and Tables 1 and 2. We use equation (1) to estimate holdings as of the most recent benchmark survey—March 2000 for U.S. liabilities and December 1997 for U.S. assets—starting with amounts from a previous survey. As Table 1 shows, our estimate of foreign holdings of U.S. securities as of March 2000 is \$4.2 trillion, 17 percent higher than the (preliminary) amount provided by the most recent benchmark survey. Most of the difference is due to the very high estimate of foreign holdings of U.S. debt securities, which in turn appears to be due to the amount of net purchases (almost \$1.5 trillion) reported to the TIC system.

The apparent overcounting of net foreign purchases of U.S. debt securities has at least two possible explanations. The first is associated with asset-backed securities. Many U.S. debt securities are backed by pools of loans (such as residential mortgages, automobile loans, or credit card receivables) placed in trust. On these securities, both the principal and interest are repaid on a regular basis (usually monthly), so the amount of principal held by foreign (and domestic) owners of these securities decreases each month. If these principal paydowns are not accurately captured in the transactions data, net purchases of asset-backed securities will be overstated.

Our overestimation of foreign holdings of U.S. agency debt (much of which is asset-backed) is 57 percent (Table 1), suggesting that the extent of the problem with principal paydowns is large.¹⁸ But we also overestimate foreign holdings of corporate and Treasury debt securities by 15 and 20 percent, respectively, suggesting that a miscounting of principal paydowns is not the whole story. Another possible explanation for the apparent overcounting of net foreign purchases of U.S. debt securities is overcounting of securities involved in repurchase and securities lending agreements.¹⁹

In contrast, our estimate of foreign holdings of U.S. equities is very close to the amount given by the benchmark survey, especially considering the large amount of the valuation adjustment. That is, the \$186 billion overestimation could be due to a 19 percent overestimation of the cumulative valuation adjustment on foreigners' holdings of U.S. equities over the five-year period—not a great amount given the 240 percent increase in U.S. equity prices over the period.

Table 2 shows that we underestimate U.S. holdings of foreign securities by about \$280 billion. It is likely that the differences between our estimates and the amounts from the surveys in Table 2 are due to some combination of inaccurate valuation adjustments and undercounting of transactions, although the latter is likely the more significant culprit. Transactions would be missed by the TIC system if U.S. investors are participating directly in foreign securities markets (Stekler, 1990; Stekler and Truman, 1992). Moreover, automatic purchases, such as DRIPs, are likely undercounted. If all U.S. investors use DRIPs and no DRIP transactions are reported to the TIC system, a total returns index (i.e., with dividends reinvested) would be appropriate when estimating holdings; this would increase our estimates of U.S. holdings by \$84 billion, bringing us within 13 percent of the benchmark amounts (as opposed to 19 percent without the adjustment).

¹⁸ U.S. agencies include government-sponsored enterprises, such as Federal National Mortgage Association (Fannie Mae), Federal Home Loan Mortgage Corporation (Freddie Mac), and Government National Mortgage Association (Ginnie Mae), and government corporations, such as the Tennessee Valley Authority.

¹⁹ Other reasons for the overcounting of bond inflows that are plausible but have not been investigated include short-term securities being reported as long-term, dollar-denominated foreign bonds reported as U.S. debt, and flows into bond mutual funds incorrectly reported as bond inflows. Also, if a U.S. firm relocates to a “country of convenience” for tax purposes prior to a liabilities survey, it becomes a foreign company and the survey will not capture foreigners' holdings of its securities. The TIC data, however, would include foreign purchases of the company's securities until its relocation, resulting in an apparent overestimation.

VI. Bilateral Estimates of Cross-Border Holdings

While we view the aggregate results presented in the preceding section as informative, the main goal of this paper is to provide a measure of the geographical mismatch in the capital flows data. To that end, in this section we compare our bilateral estimates with benchmark amounts.

Since we have confidence in the country attribution on the asset surveys (of U.S. holdings of foreign securities), we can assess the geographic accuracy of published U.S. transactions data by comparing country-level estimates with survey data. If the country-level holdings estimates are accurate, it is likely that the transactions data are also accurate. Inaccuracies in country-level holdings estimates are likely due to geographical mismatches in published transactions data, provided the composition of U.S. holdings in a given country is similar to the composition of the price index we use to make valuation adjustments.

We undertake the same exercise with the liabilities survey (of foreign holdings of U.S. securities). However, we are less confident that differences between our constructed estimates and the benchmark survey amounts are due to a geographical mismatch in the transactions data, because the holdings data in the benchmark are subject to a custodial center bias, as discussed above in Section II. Nevertheless, some insights can be gleaned from this comparison, particularly for large financial centers.

U.S. Holdings of Foreign Long-Term Securities

Benchmark surveys of U.S. holdings of foreign securities accurately indicate the country of the issuer. Thus, for bilateral holdings, deviations of estimated from measured amounts are primarily due to the limitations in the transactions data resulting from the current TIC reporting conventions.²⁰ Table 3 (and the bottom panels of Figures 2-7) shows our estimates of U.S. holdings of foreign securities in selected countries and regions as of December 1997, the date of the latest benchmark asset survey.²¹

²⁰ Deviations of the composition of the country indexes we used to make valuation adjustments from the composition of actual U.S. holdings in a country will also cause estimation errors.

²¹ Complete country-level details of our estimates of U.S. holdings of foreign debt and equities are presented in Appendix Tables A.1 and A.2.

Though overall U.S. holdings of foreign equities are underestimated by \$235 billion, a \$26 billion overestimation in one financial center, the United Kingdom (Figure 2), suggests that significant underestimations must be prevalent elsewhere. In the euro area (Figure 3), the underestimations total \$120 billion, or roughly 30 percent, suggesting that many transactions in European equities are being missed altogether. Japan (Figure 4) also has a large underestimation (\$43 billion). For East Asian emerging markets (Figure 7), given the severity of the decrease in valuations that coincided with their financial crisis, estimated holdings are rather close to actual ones. For most countries in the Western Hemisphere (Figures 5 and 6), the holdings estimates are quite accurate.

The picture for foreign bonds is very different. Our aggregate estimate is only \$43 billion below the amount given by the benchmark survey, much closer than for equities, likely because valuation adjustments are much smaller. Hence, we do not see the pattern of underestimation in all countries that are not financial centers. The main underestimations are in U.S. holdings of German and Canadian (Figure 5) bonds. Partially offsetting these underestimations is a slight overestimation of holdings of U.K. bonds. For U.S. holdings of bonds in the rest of the countries, overestimation is just as likely as underestimation.

Foreign Holdings of U.S. Long-Term Securities

Contrasting with the underestimation of U.S. holdings of foreign equities and bonds is a large overestimation of foreign holdings of U.S. securities. As noted, much of this is due to overestimation of foreign holdings of U.S. bonds, and the large amount of net purchases suggests overcounting by the TIC system.

Table 4 (and the top panels of Figures 2-7) indicates that the overestimation of foreign holdings of U.S. securities is entirely due to a vast overestimation of holdings by U.K. residents.²² Holdings of U.S. debt by U.K. investors are overestimated by \$448 billion, or over 200 percent.²³

²² Complete country-level details of our estimates of foreign holdings of U.S. equities, agency, corporate, and Treasury bonds will be available on the IFDP web site when the March 2000 survey is finalized.

²³ The vast majority of the \$282 billion in debt securities attributed to “Country unknown” in Table 4 are bearer, or unregistered, securities. Typically, little or no information is available on the owners of such securities, who do not have to make themselves known. Bearer

U.K. holdings of U.S. equities are also greatly overestimated (\$176 billion, or 54 percent). As we will argue in the next section, researchers need to be aware of this feature of the capital flows data.

For each instrument, the overestimation is in the \$100-\$200 billion range and is mostly due to overestimation of holdings by the United Kingdom. For bonds, there are also sizable overestimations of holdings by Japan and the Caribbean; for equities, overestimations for the Caribbean are also evident. There are substantial underestimations in Belgium-Luxembourg.

As noted in Section II, the country attribution of the benchmark liabilities surveys is influenced by countries that have large international custodians. This helps explain our underestimations in Belgium-Luxembourg; the benchmark survey amounts are inflated because large custodians located in those countries hold securities on behalf of investors from other countries. For the United Kingdom, however, to the extent that benchmark survey amounts are inflated by the presence of global banks in London, the already sizeable overcounting of U.S.-U.K. capital flows is even greater than our numbers indicate.

VII. Implications

Our results have implications for U.S. data collection efforts and for the research community. We discuss, in turn, the implications of our aggregate and bilateral results.

Implications of the Aggregate Results

That U.S. holdings of foreign securities are underestimated and foreign holdings of U.S. securities are overestimated has important implications for the U.S. net foreign asset position. For example, if as of end-2000 U.S. holdings of foreign securities were underestimated by 10 percent and foreign holdings of U.S. securities were overestimated by 10 percent—not inconceivable amounts given our analysis—the U.S. position as a net debtor would have been overstated by about \$600 billion, or over 30 percent.²⁴ Moreover, investment income from cross-border holdings, which

securities cannot be issued in the United States, but U.S. firms can and do issue such securities abroad. An unknown portion of “Country unknown” holdings may be attributable to bearer bonds held by U.K. residents.

²⁴ These calculations use the net IIP with foreign direct investment valued at current cost.

is calculated using dividends and interest rates and estimates of holdings, feeds into both the national income and balance of payments accounts. Underestimation of U.S. holdings of foreign securities (and, thus, investment income receipts from these holdings) and overestimation of foreign holdings of U.S. securities (and the associated income payments) results in underestimation of gross national product, overestimation of the current account deficit, and underestimation of national savings. To put it another way, underestimating U.S. assets and overestimating U.S. liabilities leads to an overestimation of the financing required for the current account deficit and underestimation of its availability.

Going forward, this is not likely to persist as benchmark surveys become more frequent. Currently, the BEA revises past position estimates as soon as new benchmark survey data are available, which has been about every five years. If surveys become annual, large revisions will become less likely.²⁵

Poor aggregate holdings estimates have adversely affected academic research. For example, Tesar and Werner (1995) document that investors turn over their foreign portfolio faster than their domestic portfolio. Many papers subsequently developed models that explain this puzzling stylized fact (see, for example, Rowland (1999) and Guidolin (2001)) and researchers subsequently dismissed high transaction costs as a feasible explanation for the observed home bias in equity holdings. However, Tesar and Werner used official cross-border holdings estimates as of end-1989, when the United States was already conducting benchmark surveys of foreign holdings of *U.S. securities*, but none of the other countries in their sample were, and no country—U.S. included—had conducted a survey of residents' holdings of *foreign securities*. Hence, the denominators in their analysis, cross-border holdings, were in all but one case official estimates based almost entirely on transactions data. As shown in Warnock (forthcoming), data released after the Tesar-Werner analysis show that the official estimates of holdings of foreign equities used in the study were off by a factor of two for the U.S. and by a factor of about 10 for Canada—thus their turnover estimates

²⁵ Note, however, that increasing the frequency of benchmark surveys will not directly improve the quality of the capital flows data.

were too high by factors of two and ten. The new data effectively eliminates the high turnover puzzle.²⁶

Implications of the Bilateral Results

Many researchers have analyzed the monthly U.S. capital flows data. For example, Chuhan, Claessens, and Mamingi (1998) examines the effects of country-specific and U.S. factors on U.S. net purchases of emerging market stocks during the initial surge of portfolio investment in these countries, 1988 to 1992; Edison and Warnock (2002) extend the sample to include the entire decade of the 1990s and examine the important roles of cross-border listings and capital controls in flows to emerging markets. Taylor and Sarno (1997) use the TIC transactions data to examine the long- and short-term determinants of U.S. portfolio flows to emerging markets. Bekaert and Harvey use the TIC data to determine structural breaks in capital flows to emerging markets; see, for example, Bekaert and Harvey (1999) and Bekaert, Harvey, and Lumsdaine (forthcoming). Linda Tesar has used both the TIC data and estimated holdings in a number of studies; see, for example, Tesar and Werner (1995). IMF (2001) examines the effect of net equity flows from the euro area to the United States on the euro-U.S. dollar exchange rate. Although not the main focus of their paper, Portes and Rey (1999) analyze the bilateral TIC data on inflows into U.S. securities to examine the information content of capital flows.²⁷

A problem in using these data, our results imply, is that researchers may attribute economic causes to flows that are assigned to an intermediary country that differs from the country of the ultimate buyer or issuer. One look at Figure 2 on inflows from the United Kingdom suggests that results using bilateral TIC data should be interpreted cautiously. Evidence provided in this paper

²⁶ Ahearne, Grier, and Warnock (2000) show that the intuition of Tesar and Werner (1995) was correct: Transaction costs have at best only a second-order impact on home bias.

²⁷ Capital flows from sources other than the TIC system have also been analyzed. For example, Choe, Kho, and Stulz (1999) examine the behavior of foreign investors in Korea using trade-level data from the Korean Stock Exchange. Froot, O'Connell, and Seasholes (2001), who analyze daily cross-border flows of State Street Bank's clients. Froot et al. limit their analysis to trades that settle in local currencies and exclude American Depositary Receipts (ADRs). Since ADR listing is not uniform across countries—see Ahearne et al. (2000) for amounts—the distribution of the State Street flow data may differ significantly from that of total transactions.

suggests that, especially in the case of the United Kingdom, relating flows to other economic information may be extremely misleading.

When analyzing the bilateral flows between the United States and other areas, caution should still rule, but there is less evidence of egregious geographical mismatches. Flows from the euro area into U.S. securities, for example, seem surprisingly consistent with amounts from the benchmark survey, although net flows from the United States into euro-area securities—especially equities—appear to be vastly undercounted. Moreover, flows to emerging markets seem to be pretty well represented by the TIC data, with the notable exceptions of Brazil and Taiwan (see Tables A1 and A2).

Given the influence of financial centers on the country attributions in the TIC data, panel estimation of portfolio flows poses a potential problem, because the influence of misleading county-level data may be hidden. On the other hand, when researchers estimate individual country-level regressions, it may be possible to detect the effects of the geographical mismatch in the transactions data. For example, Brennan and Cao (1997), in explaining anomalous results in their U.K. regressions, conclude that U.S. investors have better information than U.K. residents on U.K. equities, counter to their results for equities from other countries. In the Brennan and Cao study, the anomalous results are evident only because country-level regressions are reported. In a panel framework, the effects of transactions counted opposite countries like the United Kingdom are unknown; researchers should drop one or more countries to determine if the relationships change substantially.

With respect to U.S. data on portfolio flows, we do not view our results as suggesting that these data should not be used in research. Yet since we have no true measure of transactions—there are no comprehensive benchmark surveys of transactions data—we cannot know the extent to which the geographical mismatch in the capital flows data influence results, so care should be taken to ensure results are not unduly influenced by data opposite financial centers in particular.

For holdings, unlike transactions, we have actual data, so the effect of using erroneous bilateral holdings estimates can be analyzed. One example of the effect can be illustrated by re-estimating the regressions of Ahearne, Grier, and Warnock (2000) using estimated rather than actual holdings. Table 5 shows that using survey data there is no evidence that goods trade plays a role in the geography of U.S. holdings of foreign equities. Yet, if *estimated* rather than actual holdings were used, one would conclude that trade does indeed matter.

Our results also have important implications for the collection of U.S. data on transactions in, and holdings of, foreign securities. As Table 3 shows, country-level holdings estimates that are based on transactions data can be inaccurate. Over the period between benchmark surveys, estimated holdings for many countries deviated greatly from actual holdings. One way to increase the accuracy and timeliness of the estimates is to increase the frequency of the benchmark surveys; indeed, the United States has recently committed to conducting annual surveys. Another possibility is to extend the current monthly reporting system to include information on the country of the issuer of a security, not just of the transactor.²⁸

VIII. Conclusion

Bilateral data on cross-border purchases and sales of long-term securities, readily available at a relatively high frequency, are used by many. Data users should know that these data were designed for balance of payments purposes to track the flow of money between countries. Most academic researchers and practitioners, though, implicitly assume that the geography of these data is determined by the country in which the security's issuer, purchaser, or seller is resident. This discrepancy between the design of the system and what is useful for most users of the data could well result in researchers making claims that the data cannot possibly support. The premise in this paper is that the discrepancy between the design and use of the data results in a geographical mismatch in the data, even if the data accurately portray BOP flows.

We quantify the extent of the geographical mismatch in the capital flows data by using the data to estimate holdings, which we then compare with data from benchmark surveys. We presented estimated U.S. holdings of foreign securities and foreign holdings of U.S. securities across a wide range of countries. In some cases—such as foreign holdings of U.S. equities and U.S. holdings of foreign bonds—our aggregate estimates were quite accurate, suggesting that the capital flows data accurately portray cross-border transactions. But in other cases—notably foreign holdings of U.S.

²⁸ This is not feasible for foreign purchases of U.S. securities.

bonds and U.S. holdings of foreign equities—we found great discrepancies between our estimates and actual holdings, suggesting some problems with the capital flows data.²⁹

At the country level, our overestimation of U.K. holdings of U.S. securities was enormous, providing evidence of the geographical mismatch in the capital flows data. For other countries, estimated holdings of U.S. securities were rather accurate. For U.S. holdings of foreign securities, a slight overestimation of holding of U.K. securities is swamped by underestimations elsewhere, especially the euro area.

For foreigners' transactions in U.S. securities, the accurate country attribution is never likely to be attainable, because the U.S. reporter knows only the location of its counterparty, not the residence of the ultimate investor. For U.S. investors' transactions in foreign securities, accurate country attribution is possible if the U.S. system is extended to be based also on the country of the issuer, as well as the country of the transactor.³⁰

We formed holdings estimates only to gauge the accuracy of the capital flows data. The reader should note that the best way to determine amounts of cross-border holdings is to measure them directly through comprehensive benchmark surveys. In the United States, benchmark surveys have recently been conducted every four to five years. Going forward, they may well become annual, improving the quality of annual cross-border holdings data.

²⁹ Interagency working groups, consisting of economists and statisticians from the Bureau of Economic Analysis, Treasury Department, Federal Reserve Board, and the Federal Reserve Bank of New York, meet regularly to discuss how to maintain and improve the quality of U.S. data on capital flows (subject to the constraint of not unduly burdening data reporters).

³⁰ The transactor basis is important in order to maintain the consistency of the BOP data. One country, Canada, collects securities data on both a transactor and an issuer basis.

Bibliography

- Ahearne, A., W. Grier, and F. Warnock, 2000. Information costs and home bias: an analysis of U.S. holdings of foreign equities. Federal Reserve Board, International Finance Discussion Paper #691.
- Bach, C. U.S. international transactions, revised estimates for 1974-96. *Survey of Current Business*, 77(7), 43-55
- Bekaert, G., and C.R. Harvey, 1999. Capital flows and the behavior of emerging market equity returns, in S. Edwards, *Capital Inflows to Emerging Markets*, NBER and University of Chicago Press.
- Bekaert, G., C.R. Harvey and R. Lumsdaine, forthcoming. The dynamics of emerging market equity flows. *Journal of International Money and Finance*.
- Bohn, H., and L. Tesar, 1997. The U.S. international investment portfolio and mean-variance optimization. Santa Barbara: University of California. Working paper.
- Brennan, M., and H. Cao, 1997. International portfolio investment flows. *Journal of Finance*, 52(5), 1851-1880.
- Choe, H., B-C Kho, and R. Stulz, 1999. Do foreign investors destabilize stock markets? The Korean experience in 1997. *Journal of Financial Economics*, 54(2), 227-264.
- Chuhan, P., S. Claessens, and N. Mamingi, 1998. Equity and bond flows to Latin America and Asia: the role of global and country factors. *Journal of Development Economics*, 55:439-463.
- Dahlquist, M., and G. Robertsson, 2001. Direct foreign ownership, institutional investors, and firm characteristics. *Journal of Financial Economics*, 59: pp. 413-440.
- Domowitz, I., J. Glen, and A. Madhavan, 2001. Liquidity, volatility, and equity trading costs across countries and over time. *International Finance*, 4 (2), 221-255.
- Edison, H., and F. Warnock, 2002. Cross-border listings, capital controls, and equity flows to emerging markets. Federal Reserve Board, International Finance Discussion Paper (forthcoming).
- Froot, K., P.G. O'Connell, and M. Seasholes, 2001. The portfolio flows of international investors. *Journal of Financial Economics*, 59:151-193.
- Gehrig, T., 1998. Cities and the geography of financial centres. *CEPR Discussion Paper No. 1894*.

- Griever, W., G. Lee, and F. Warnock, 2001. The U.S. system for measuring cross-border investment in securities: a primer with a discussion of recent developments. *Federal Reserve Bulletin*, 87(10), 633-650.
- Guidolin, M., 2001. Home bias and high turnover in an overlapping generations model with learning. mimeo, University of Virginia.
- Inoue, H., 1999. The Structure of Government Securities Markets in G10 Countries: Summary of Questionnaire Results, in *Market Liquidity: Research Findings and Selected Policy Implications*. mimeo, Bank for International Settlements.
- International Monetary Fund, 2000. Analysis of the Results of the 1997 Coordinated Portfolio Investment Survey and Plans for the Next Survey.
- International Monetary Fund, 2001. World Economic Outlook.
- Kang, J., and R. Stulz, 1997. Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan, *Journal of Financial Economics*, 46:3-28.
- Lane, P., and G. Miles-Ferretti, 2001. The external wealth of nations: measures of foreign assets and liabilities for industrial and developing countries. *Journal of International Economics*, 55: 265-294.
- Portes, R., and H. Rey, 1999. The determinants of cross-border equity flows: the geography of information. NBER Working Paper #7336, updated 2001.
- Rowland, P., 1999. Transaction costs and international portfolio diversification. *Journal of International Economics*, 49(1), 145-170.
- Stekler, L., 1990. Adequacy of international transactions and position data for policy coordination, in W. Branson, J. Frenkel, and M. Goldstein, eds., *International Policy Coordination and Exchange Rate Fluctuations*, NBER and University of Chicago Press.
- Stekler, L. and E. Truman, 1992. The adequacy of the data on U.S. international financial transactions: a Federal Reserve perspective. Board of Governors of the Federal Reserve System, International Finance Discussion Paper 430.
- Taylor, M., and L. Sarno, 1997. Capital flows to developing countries: long- and short-term determinants. *World Bank Economic Review*, 11(3), 451-470.
- Tesar, L., and I. Werner, 1995. Home bias and high turnover. *Journal of International Money and Finance*, 14: 467-493.
- Tschoegl, A., 2000. International banking centers, geography, and foreign banks. *Financial Markets, Institutions, and Instruments*, 9(1), 1-32.

- Treasury Department, various years. *Report on Foreign Portfolio Investment in the United States*.
- Treasury Department and Federal Reserve Board, 2000. United States Holdings of Foreign Long-Term Securities as of December 31, 1997 and December 31, 1999.
- Walter, I., 1998. Globalization of markets and financial center competition. NYU Salomon Center Working Paper S-98-23.
- Warnock, F., forthcoming. Home bias and high turnover reconsidered. *Journal of International Money and Finance*.
- Warnock, F., and M. Mason, 2001. The geography of capital flows. *Emerging Markets Quarterly*, 5(1), 15-29.
- Willoughby, J., 1998. Executions song. *Institutional Investor*, 31(11), 51-56.

Data Appendix:

In this appendix we discuss data choices made when forming holdings estimates. For descriptions and sources of other data used in this paper, see the main text Sections II and IV.

Countries

The initial criterion for country choice was that there be MSCI price index, monthly TIC data, and 1994 and 1997 benchmark survey data for each country. Since the TIC and survey data are available for a wider range of countries than are the MSCI indexes, at times we used regional MSCI indexes to make valuation adjustments; these are noted below. We omitted many smaller countries that in sum amount to one percent of the March 1994 U.S. portfolio of foreign equities. New Zealand and Sri Lanka are not included because monthly TIC data are not available for these countries. New Zealand is by far the largest country we omit; in 1994, U.S. holdings of New Zealand stocks were \$4.3 billion, or over half of our omitted holdings.

MSCI Indexes

MSCI equity indexes are constructed by the selection of roughly 60% of each country's market capitalization. Three price indexes are available for each country: a straight dollar returns index that does not include dividend reinvestment, a net index with dividends net of estimated taxes reinvested, and a gross index with gross dividends reinvested. For this study the straight dollar returns index is used. For emerging markets, we used "free" indexes where available, which exclude companies and share classes that are not available to foreign investors.

For Israel, we used the MSCI Israel price index, which includes a mixture of their domestic and non-domestic indices. Israeli law precluded any company that cross-listed on a foreign exchange from listing domestically. Although this law has recently been repealed, the indices are broken down between domestic indices, which include stocks contained in the country's domestic exchange, and non-domestic indices that only include stocks that are listed on foreign exchanges.

When matching data from each of the three sources could not be found, substitutions or adjustments are made, and each is case specific. We note these here.

Belgium and Luxembourg were combined in the TIC transaction data and in the 1994 survey results, but separate in the indices. In order to estimate holdings in Belgium-Luxembourg, the return

ratio is weighted between the Belgium and Luxembourg price series based on a ratio of the 1993 GNPs.

The Caribbean Basin includes Bermuda, Bahamas, Netherlands Antilles, Panama, and the British West Indies. These are combined in the 1994 survey, but separate under the 1997 survey. In addition, in the 1997 survey the British West Indies is divided into the British Virgin Islands, the Cayman Islands, and Turks and Caicos Islands. These all were summed in our work to obtain the 1997 survey number and net purchases. We use the MSCI World index to make valuation adjustments, which is appropriate if the majority of holdings in the Caribbean are not in domestic stocks, but rather in trusts that invest primarily in large institutions throughout the world.

The African countries we include are Morocco, Egypt, Ghana, and Liberia. We sum their net purchases and calculate valuation adjustments using the Emerging Market Europe and Middle East price index, which appears to be the most applicable of the MSCI regional indices. Our 1994 starting value consists only of holdings of Liberian stocks, as this is the only one of the four countries listed in the 1994 survey.

“Other Latin America” consists of Uruguay, Trinidad & Tobago, Jamaica, and Ecuador; valuation adjustments use the Latin America Free index.

The MSCI price index for Hungary starts in December 1994, so we splice it with the International Finance Corporation Global (IFCG) price index to cover April 1994 to December 1994.

The price indices for Russia and the Czech Republic start in December 1994, but there is no IFCG data for April to December 1994. Therefore, valuation adjustments are made starting January 1995. Although this is not ideal, holdings before December are not large enough to change our estimates significantly.

The MSCI United States equity index was used as a valuation adjustment to foreign holdings of U.S. equities.

Bond Indices

We use Lehman Brothers bond indexes as valuation adjustments for foreign holdings of U.S. bonds. Since Lehman Brothers indexes are available for agency, corporate, and Treasury bonds, we separated U.S. bonds into these three components to obtain a more accurate estimate. All three Lehman Brothers indexes used in this study mandate that securities in the index are non-convertible,

investment grade, denominated in U.S. dollars, and carry a fixed rate. Additionally, each security must have at least one year to final maturity and \$150 million par amount outstanding. All Lehman Brothers fixed income indexes treat returns as cumulative for the entire period. Intramonth cash flows contribute to monthly returns but are neither reinvested nor earn a reinvestment return for that month. Rather they are reinvested the next month to reflect monthly compounding.

The *Lehman Brothers U.S. Treasury Index* is used as a valuation adjustment for foreign holdings of U.S. Treasury bonds. This index includes U.S. Treasuries with a remaining maturity greater than one year, following the criteria common to all three indexes, and thus excludes Treasury bills. Other exclusions include special issues such as flower bonds, targeted investor notes, and state and local government series bonds. To avoid double counting, coupon issues that have been stripped are included in the index only based on the underlying coupon issue rather than in stripped form.

The *Lehman Brothers U.S. Agency Index* is used as a valuation adjustment for foreign holdings of agency bonds. This index is comprised of publicly issued debt of U.S. Government agencies and quasi-federal corporations, as well as corporate or foreign debt backed by the U.S. Government. The index includes both callable and noncallable agency securities.

As a valuation adjustment for holdings of corporate bonds, we use the *Lehman Brothers U.S. Corporate Investment Grade Index*, which has since been renamed the *U.S. Credit Index*. This index is made up of subordinated issues, publicly underwritten medium-term notes, 144A securities, and SEC-registered global issues. It specifically excludes structured notes with embedded swaps, private placements, floating rate securities, and Eurobonds.

Table 1: Foreign Holdings of U.S. Securities (billions of dollars)

Type of security	December 1994	January 1995 - March 2000				March 2000		
	Measured (1)	Net purchases (2)	Transaction costs (3)	Stock swaps (4)	Valuation adjustments (5)	Estimated (1)+(2)-(3)+(4)+(5)	Measured* (6)	(Estimated - measured) (7)
Debt	846	1,444	16	...	5	2,279	1,849	430
Agency	107	303	2	...	0	409	261	148
Treasury	463	588	11	...	23	1,063	884	179
Corporate	276	553	3	...	-18	807	703	104
Equity	398	314	14	66	1,132	1,895	1,709	186
Total	1,244	1,758	30	66	1,137	4,174	3,558	616

* March 2000 measured amounts are based on preliminary data from the most recent benchmark survey of foreign holdings of U.S. long-term securities.

... not applicable

Table 2: U.S. Holdings of Foreign Securities (billions of dollars)

Type of security	March 1994	April 1994 - December 1997				December 1997		
	Measured (1)	Net purchases (2)	Transaction costs (3)	Stock swaps (4)	Valuation adjustments (5)	Estimated (1)+(2)-(3)+(4)+(5)	Measured (6)	(Estimated - measured) (7)
Debt	304	159	7	...	48	504	547	-43
Equity	567	181	8	5	228	973*	1,208	-235*
Total	871	340	14	5	276	1,477	1,755	-278

* If a total returns index (with dividends reinvested) is used for valuation adjustments, estimated equity holdings are \$1,056 billion, or \$152 billion below measured holdings.

... not applicable

Table 3. U.S. Holdings of Foreign Securities as of end-1997, Selected Countries
(billions of dollars)

Country	Debt		Equity		Total	
	Estimated	Measured	Estimated	Measured	Estimated	Measured
<i>Financial centers</i>						
U.K.	68	54	244	218	311	272
Caribbean	25	22	32	49	57	71
Hong Kong	0	4	27	28	27	32
Belgium-Luxembourg	6	6	3	11	9	17
<i>Industrial countries</i>						
Euro area	110	116	256	376	366	492
Other Europe	24	27	99	125	123	153
Japan	36	30	94	136	130	166
Canada	91	107	73	71	164	178
<i>Emerging markets</i>						
Asia	26	30	14	30	40	60
Latin America	83	89	76	89	159	178
Other	35	62	56	75	91	136
Total	504	547	973	1,208	1,477	1,755

Table 4. Foreign Holdings of U.S. Securities as of March 2000, Selected Countries
(billions of dollars)

Country	Debt		Equity		Total	
	Estimated	Measured	Estimated	Measured	Estimated	Measured
<i>Financial centers</i>						
U.K.	660	212	497	321	1,157	533
Caribbean	212	165	181	145	393	310
Hong Kong	66	58	15	18	81	76
Belgium-Luxembourg	48	72	75	97	123	169
<i>Industrial countries</i>						
Euro area	298	287	433	453	731	740
Other Europe	54	58	241	196	295	254
Japan	372	286	112	144	484	430
Canada	50	36	182	174	232	210
<i>Emerging markets</i>						
Asia	123	152	8	10	131	162
Latin America	46	37	29	14	75	51
<i>Country unknown</i>	...	282	...	39	...	321
Other	350	204	122	98	472	302
Total	2,279	1,849	1,895	1,709	4,174	3,558

* Measured amounts are based on preliminary data from the March 2000 benchmark survey of foreign holdings of U.S. long-term securities.

... not applicable

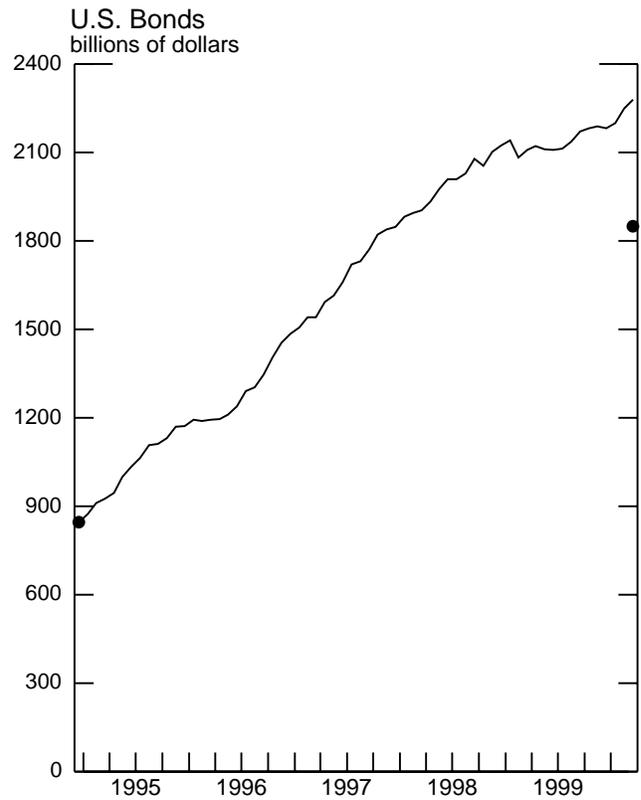
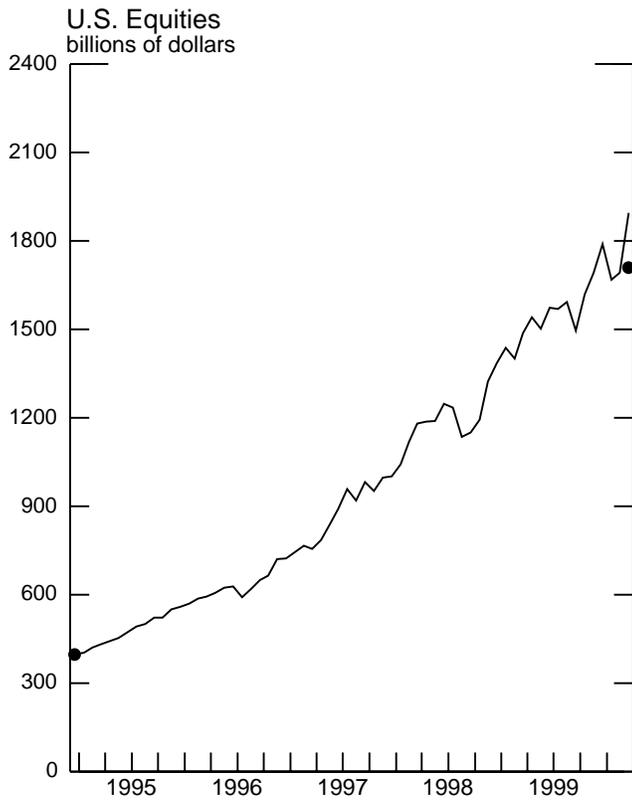
Table 5. Explaining U.S. Holdings of Foreign Equities: The Importance of Trade

	(1)	(2)
	<i>Dependent Variable: US Holdings</i>	
	<i>(using actual holdings)</i>	<i>(using estimated holdings)</i>
USLISTED	0.20*** (0.03)	0.17*** (0.02)
RESTRICT	-0.04** (0.02)	-0.04*** (0.01)
TRADE	0.04 (0.06)	0.11** (0.06)
N	48	42
Adjusted R ²	0.53	0.65

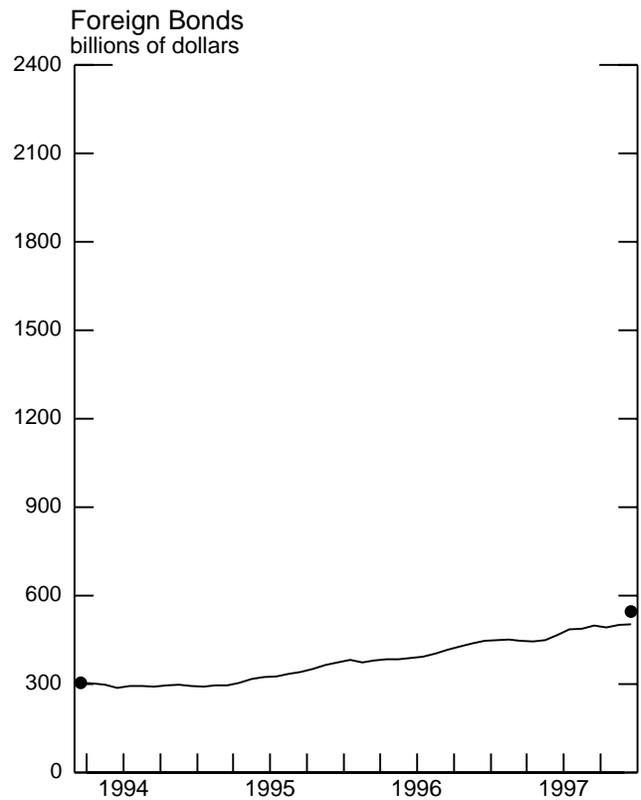
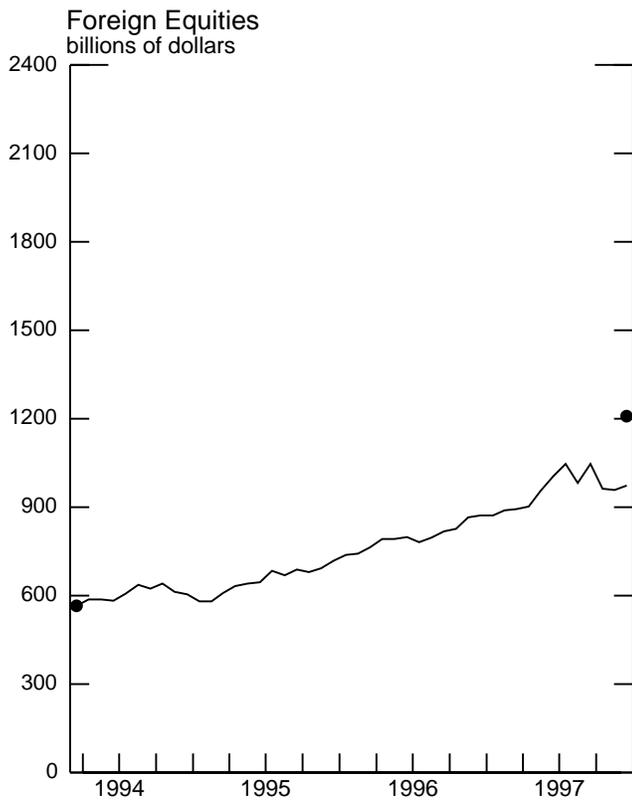
Notes. All variables are as of end-1997. See Ahearne, Grier, and Warnock (2000) for a full description. Dependent variable is U.S. investors' holdings in a country divided by that country's market capitalization. Constants are included but not reported. USLISTED is the share of the foreign market that is cross-listed on U.S. exchanges. RESTRICT is a measure of foreign ownership restrictions. TRADE is trade with the United States expressed as a share of the foreign country's GNP. White (1980) standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Figure 1. All Countries*

(a) Foreign Holdings of U.S. Securities



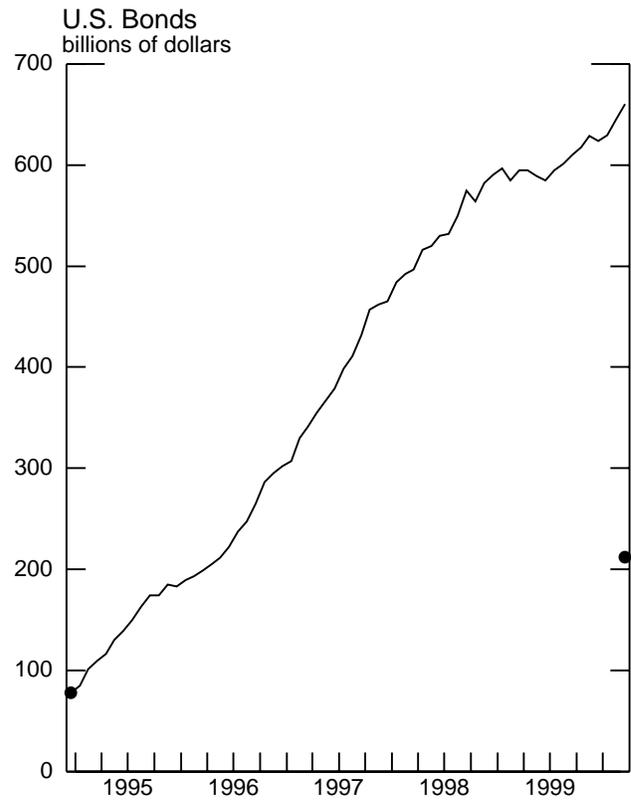
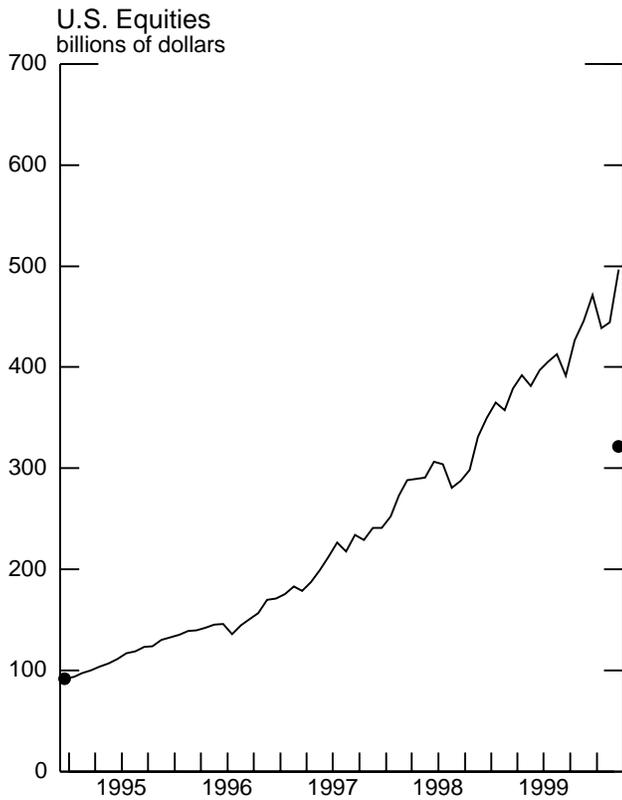
(b) U.S. Holdings of Foreign Securities



* In this and all subsequent figures, the dots and solid lines correspond to benchmark survey amounts and our estimates of holdings, respectively.

Figure 2. United Kingdom

(a) U.K. Holdings of U.S. Securities



(b) U.S. Holdings of U.K. Securities

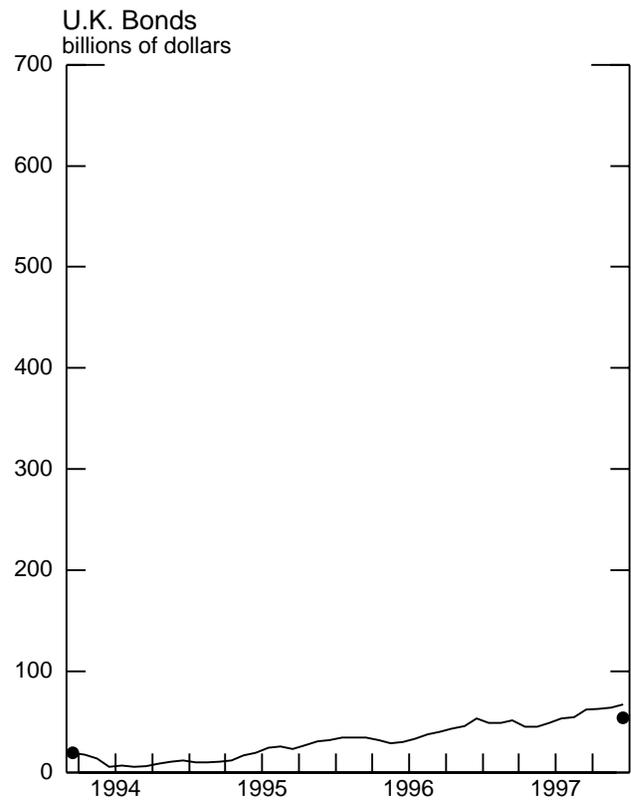
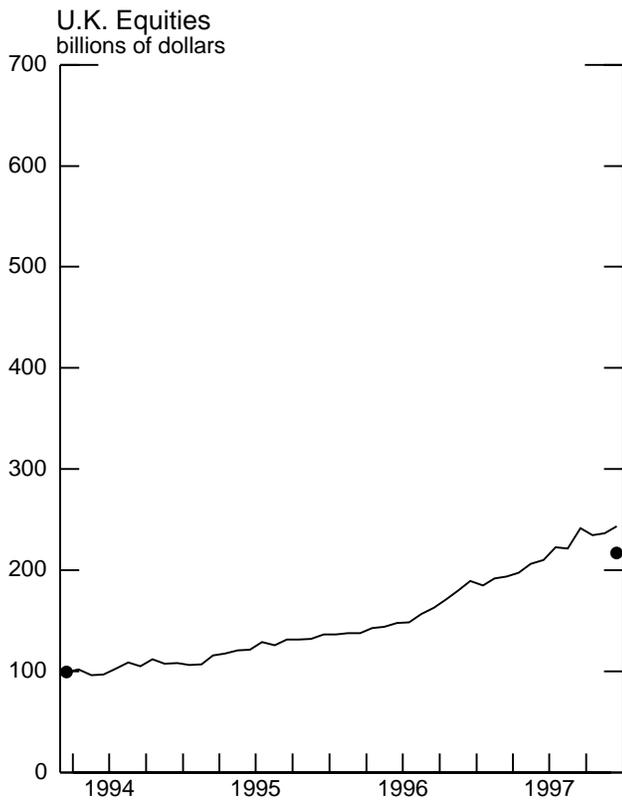
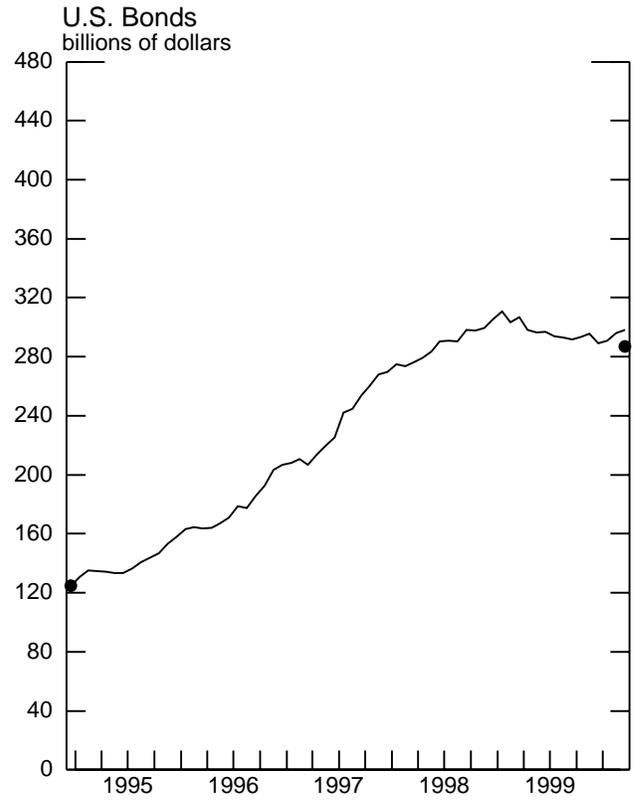
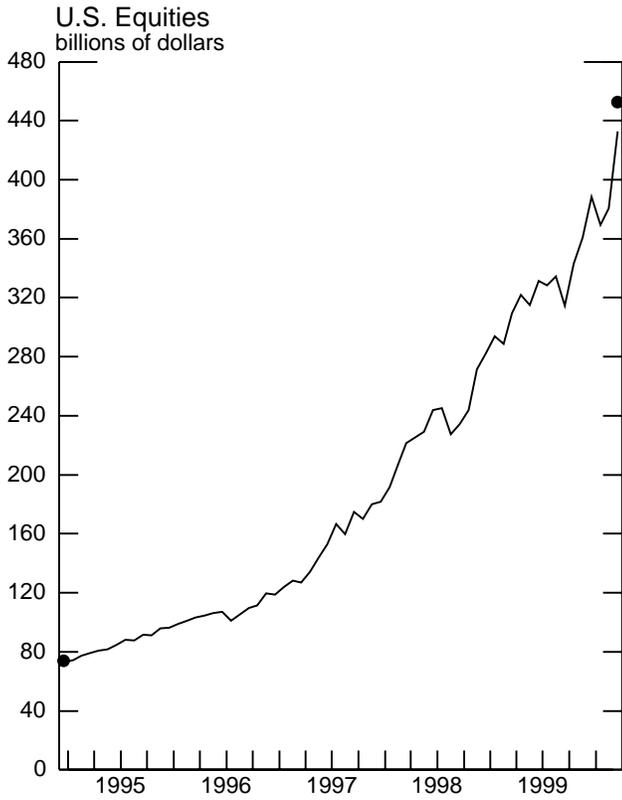


Figure 3. Euro-Area

(a) Euro-Area Holdings of U.S. Securities



(b) U.S. Holdings of Euro-Area Securities

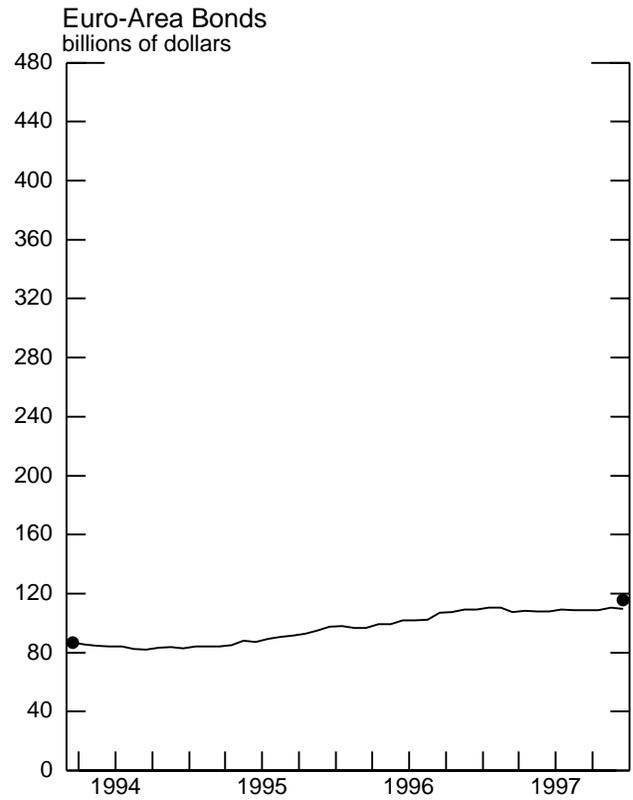
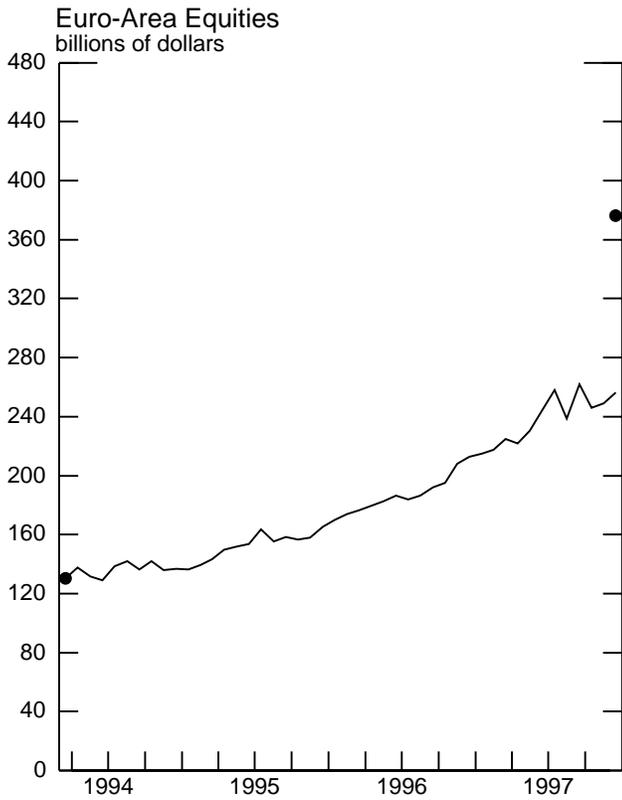
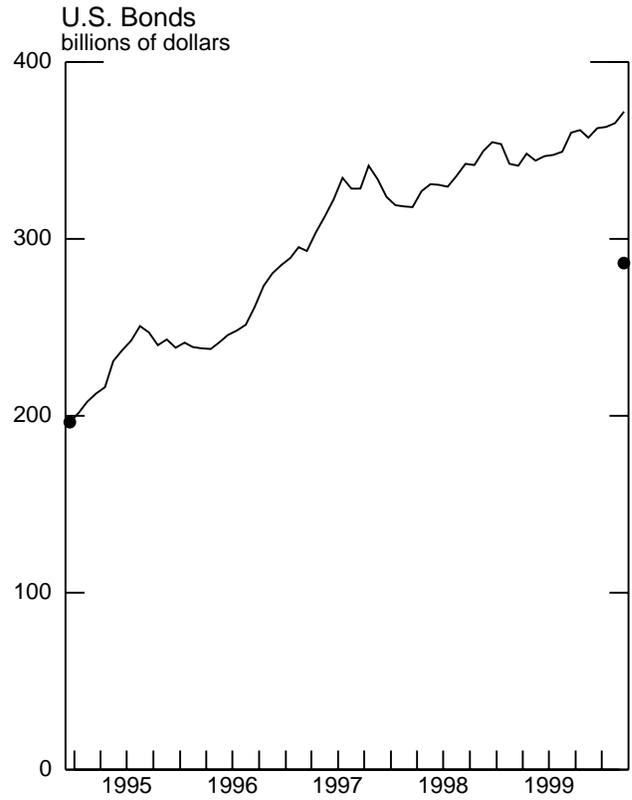
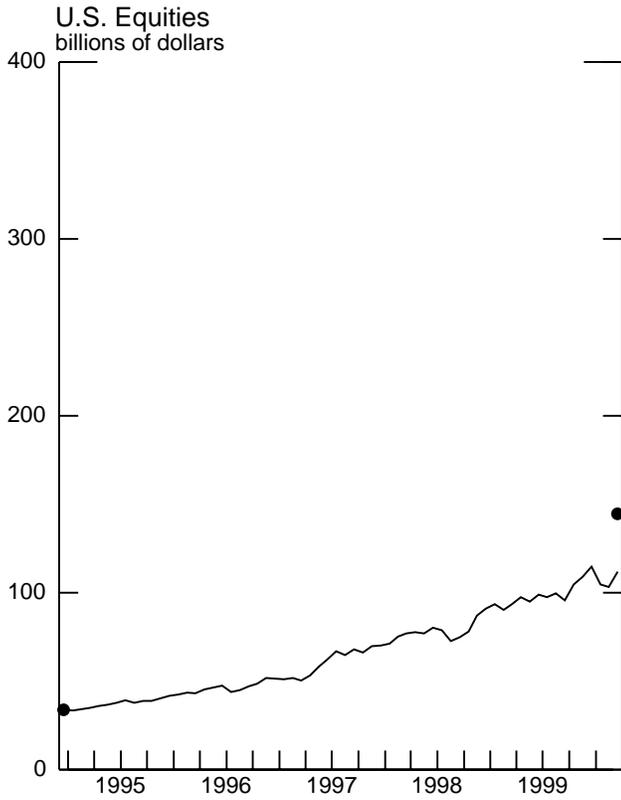


Figure 4. Japan

(a) Japanese Holdings of U.S. Securities



(b) U.S. Holdings of Japanese Securities

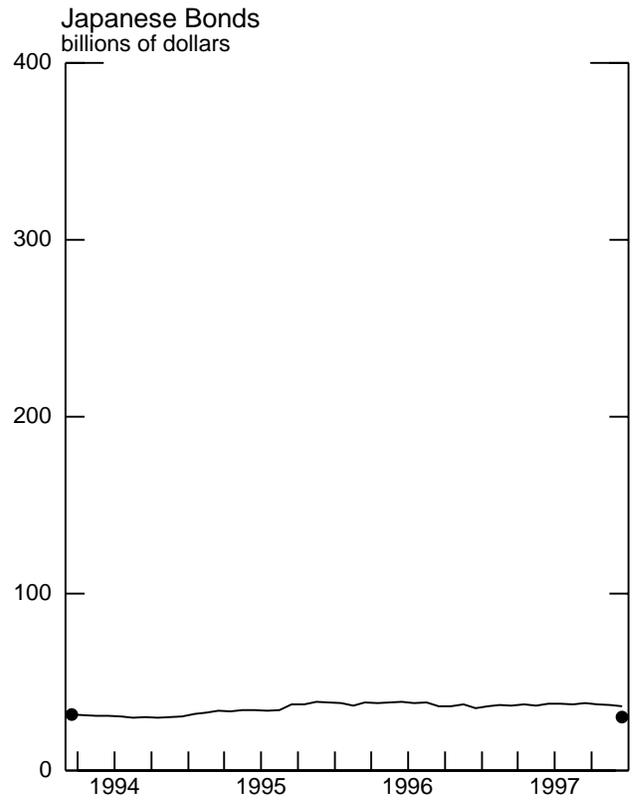
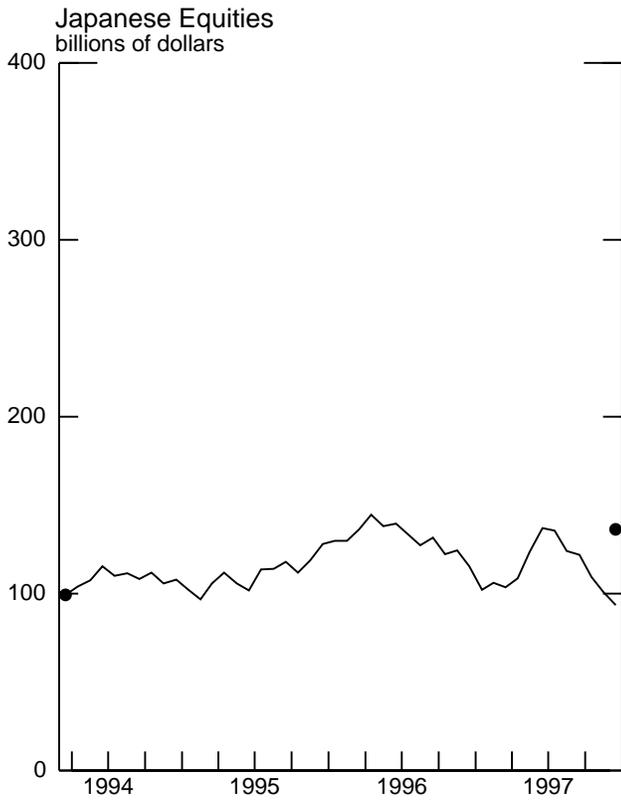
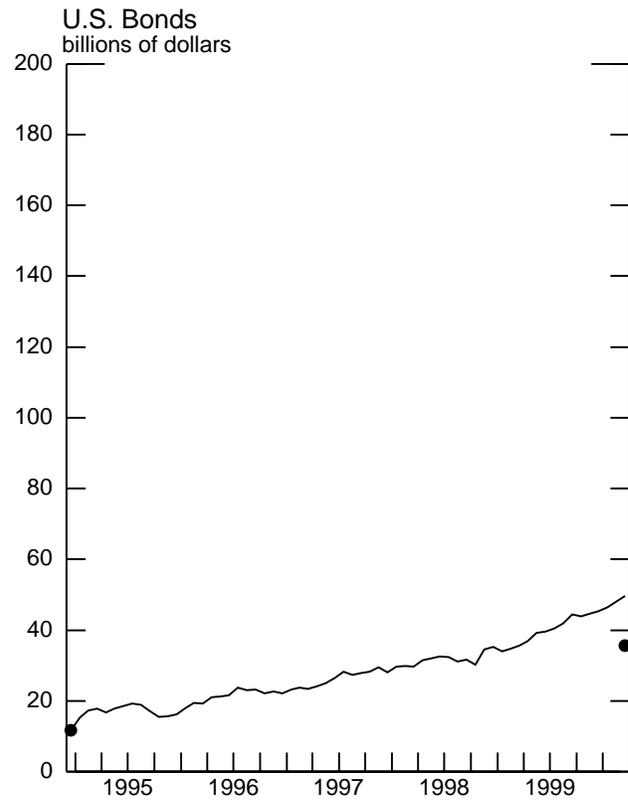
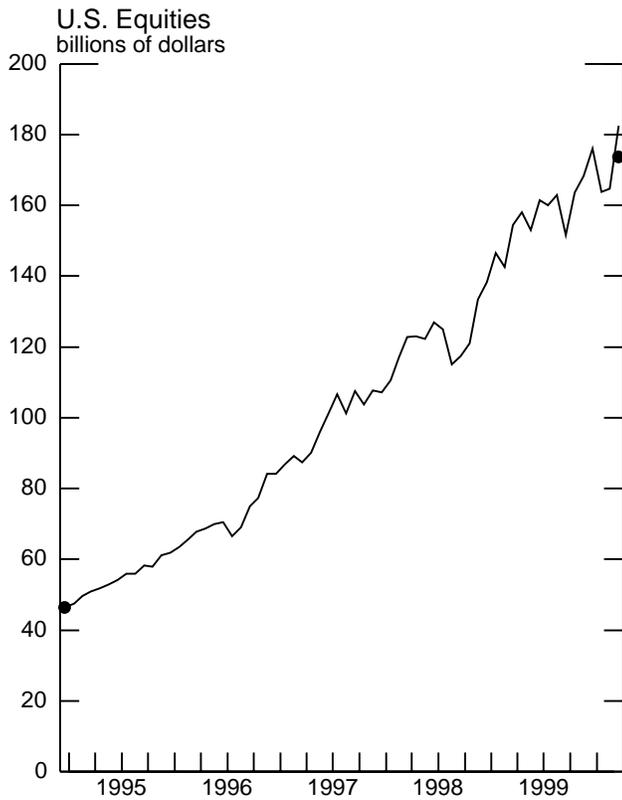


Figure 5. Canada

(a) Canadian Holdings of U.S. Securities



(b) U.S. Holdings of Canadian Securities

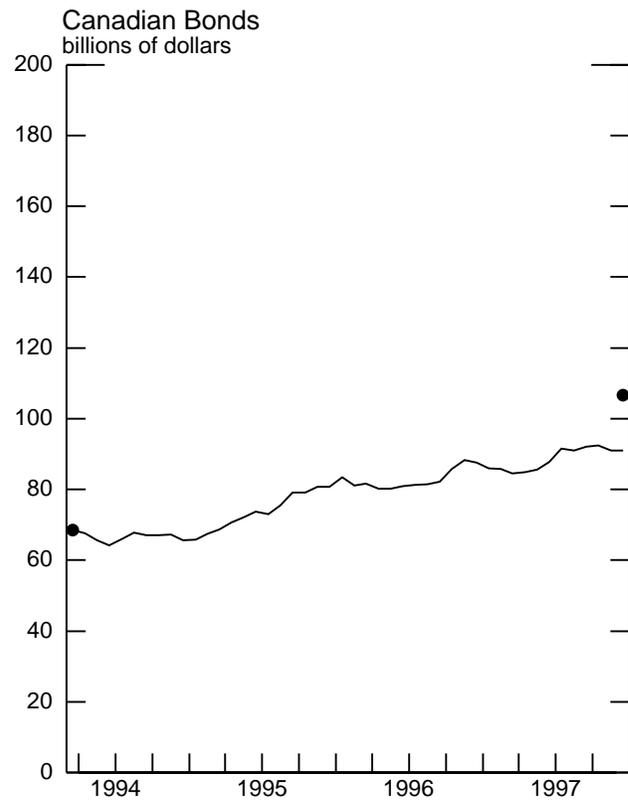
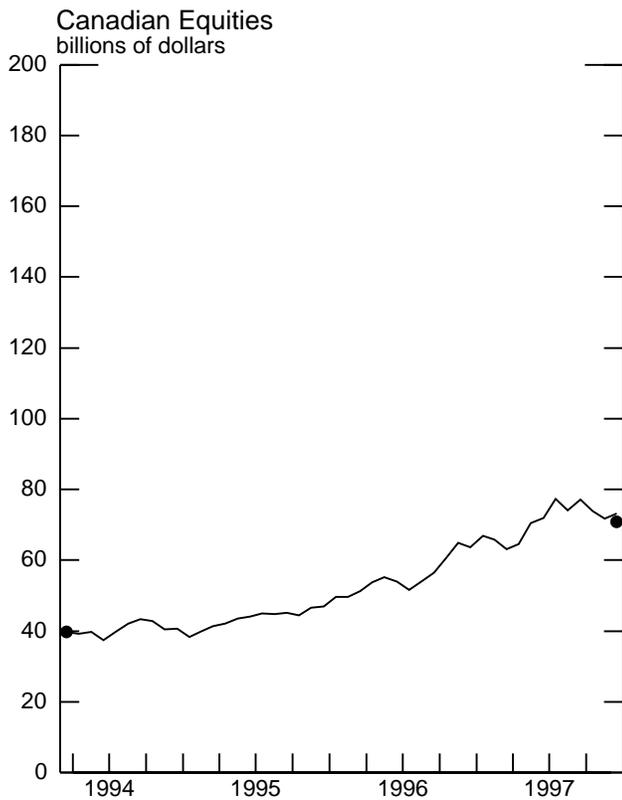
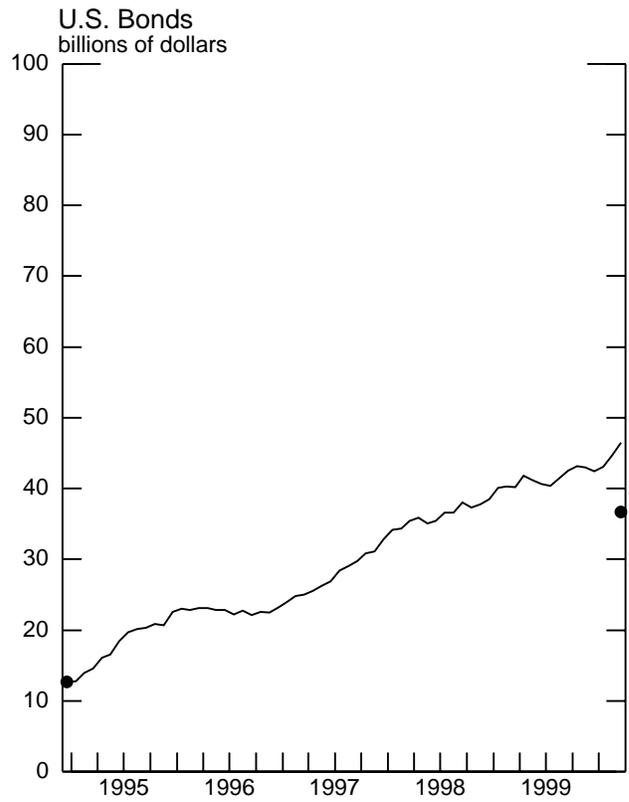
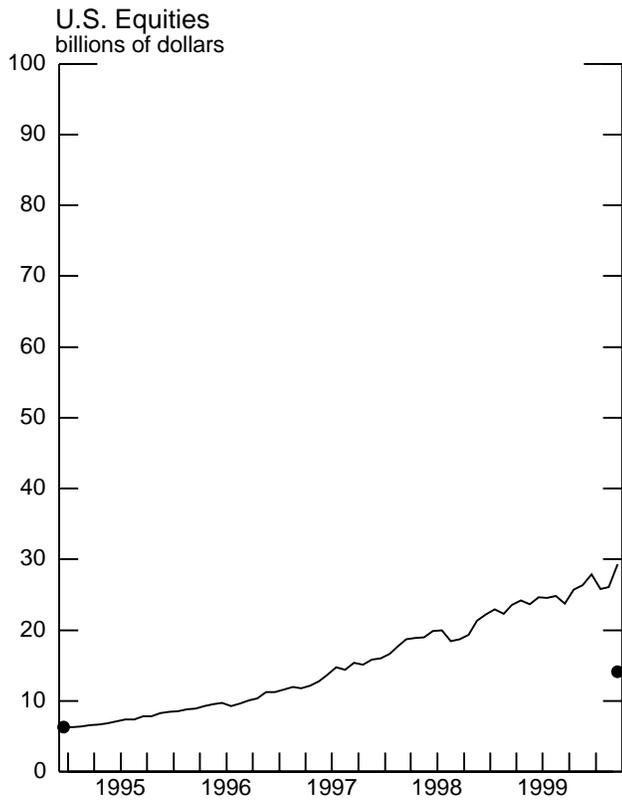


Figure 6. Emerging Latin America

(a) Latin American Holdings of U.S. Securities



(b) U.S. Holdings of Latin American Securities

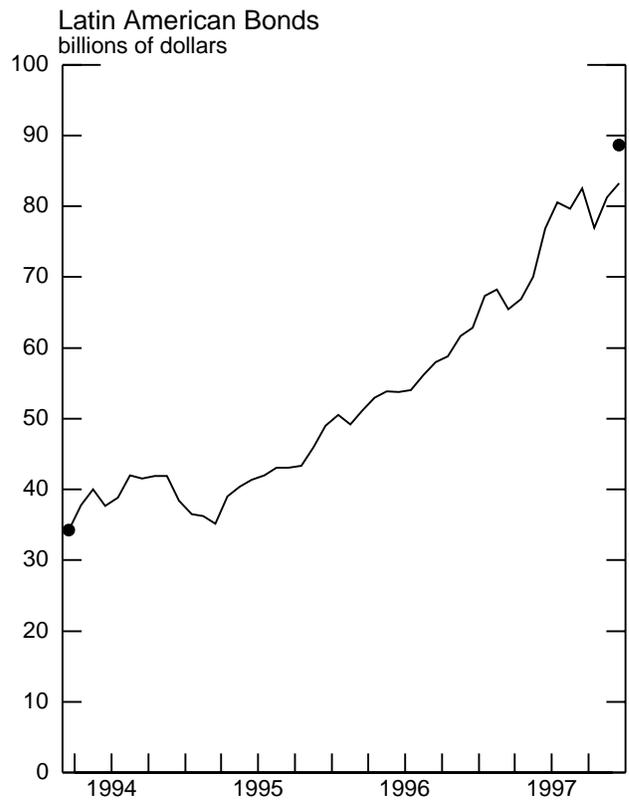
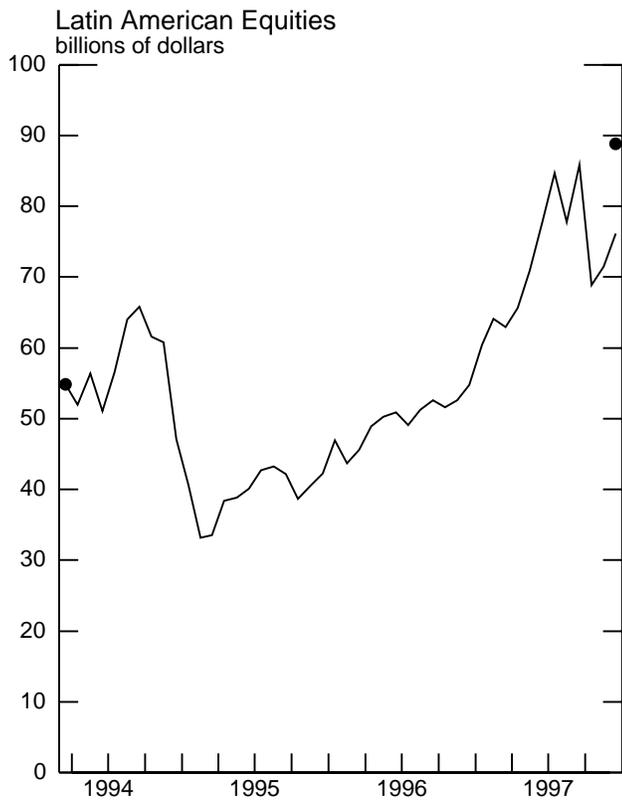
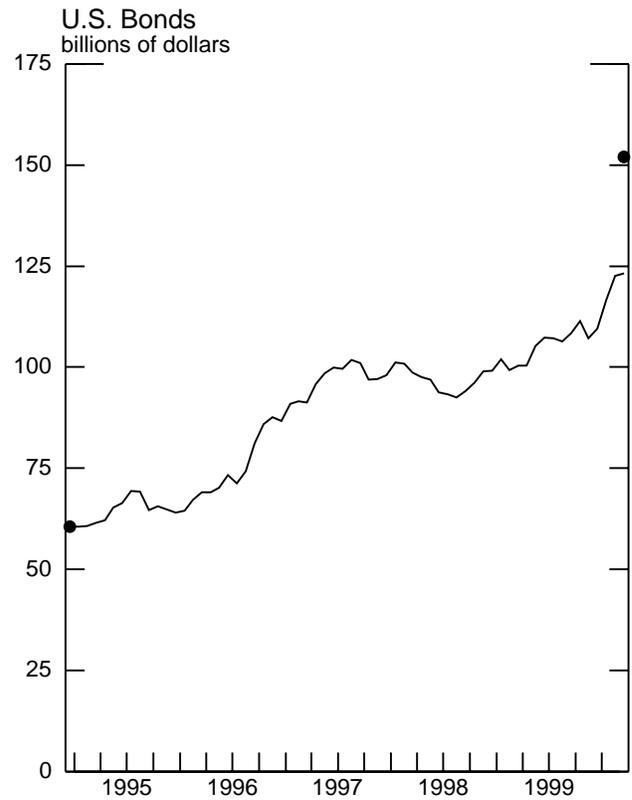
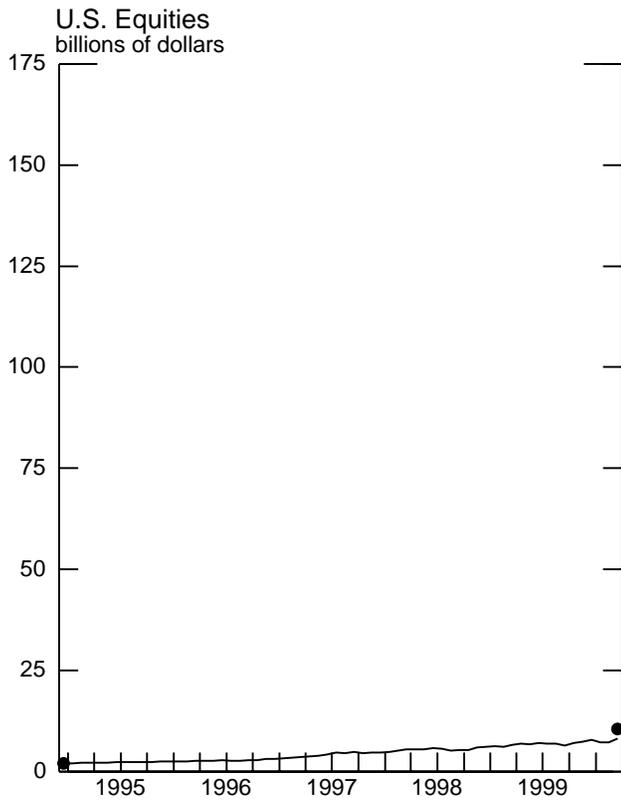
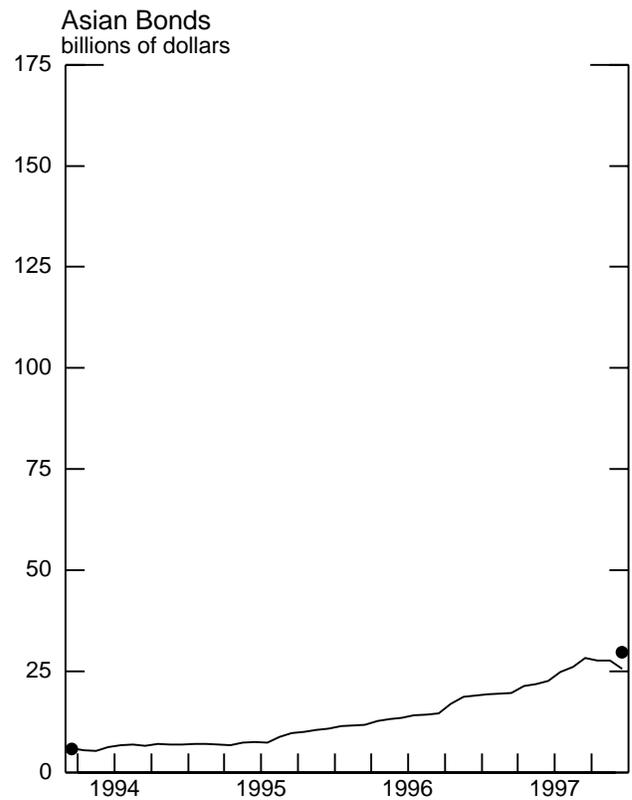
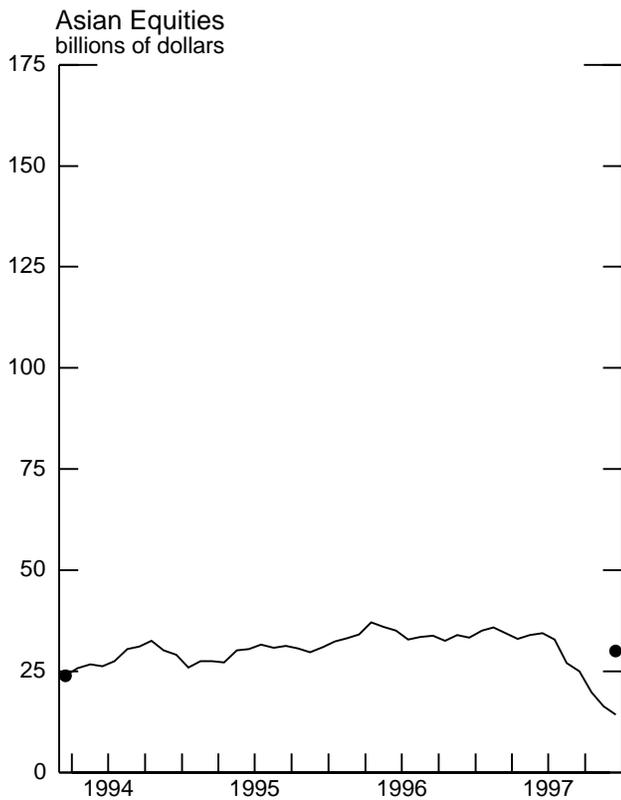


Figure 7. Emerging Asia

(a) Asian Holdings of U.S. Securities



(b) U.S. Holdings of Asian Securities



Appendix: Detailed Tables

Tables with complete country detail

Table A.1 U.S. Holdings of Foreign Bonds

Table A.2 U.S. Holdings of Foreign Equities

Table A.1: U.S. Holdings of Foreign Bonds -- Estimates and Survey Data (\$ millions)

Country	Estimated Transactions				Dec-97		TIC overestimation of holdings
	Mar-94 Holdings	Net Purchases	Transaction Costs	Value Adjustment	Estimated Holdings TIC	Survey	
FINANCIAL CENTERS	28,200	63,059	2,916	4,258	92,601	76,353	21%
Caribbean Basin	8,300	16,934	1,248	883	24,869	22,198	12%
Hong Kong	-	-	-	-	-	-	-
United Kingdom	19,900	46,125	1,669	3,375	67,732	54,155	25%
INDUSTRIAL COUNTRIES	217,800	38,647	1,452	21,174	276,169	295,409	-7%
Canada	68,500	14,181	553	8,926	91,054	106,675	-15%
Euro-Area	86,800	16,316	475	7,161	109,803	115,779	-5%
Austria	1,400	390	7	88	1,871	1,954	-4%
Belgium-Luxembourg	2,300	2,873	61	440	5,552	6,014	-8%
Finland	4,100	2,359	10	203	6,652	5,930	12%
France	16,800	-98	184	767	17,285	14,733	17%
Germany	22,100	2,988	35	844	25,897	43,449	-40%
Greece	100	733	4	94	923	1,228	-25%
Ireland	1,800	-771	37	96	1,088	3,519	-69%
Italy	17,800	-1,682	34	2,158	18,242	17,624	4%
Netherlands	9,400	7,890	61	813	18,041	13,166	37%
Portugal	200	-95	2	16	119	1,240	-90%
Spain	10,800	1,729	40	1,643	14,132	6,922	104%
Other Europe	21,000	1,474	75	1,442	23,841	26,721	-11%
Denmark	8,100	-214	23	607	8,470	7,841	8%
Norway	2,400	2,243	14	98	4,726	4,773	-1%
Sweden	10,200	-543	30	662	10,289	13,102	-21%
Switzerland	-	-	-	-	-	-	-
Turkey	300	-12	7	75	357	1,005	-65%
Asia/Pacific	41,500	6,676	349	3,644	51,471	46,234	11%
Australia	9,700	4,651	141	875	15,084	15,880	-5%
Japan	31,800	2,025	208	2,770	36,387	30,354	20%
Singapore	-	-	-	-	-	-	-
EMERGING MARKETS	43,900	58,646	1,528	22,514	123,532	131,500	-6%
Asia	5,900	21,235	127	-810	26,199	29,847	-12%
China	1,200	-93	8	50	1,150	3,178	-64%
India	200	1,212	4	0	1,408	1,962	-28%
Indonesia	200	3,030	38	107	3,300	1,857	78%
Korea	2,600	6,266	25	-1,501	7,340	10,540	-30%
Malaysia	400	4,837	17	363	5,583	4,365	28%
Philippines	600	3,512	28	72	4,156	4,479	-7%
Taiwan	-	-	-	-	-	-	-
Thailand	700	2,471	7	99	3,263	3,466	-6%
Latin America	34,300	30,526	1,361	19,768	83,234	88,613	-6%
Argentina	8,700	9,088	304	4,437	21,921	25,675	-15%
Brazil	3,600	9,844	734	4,843	17,552	20,318	-14%
Chile	-	-	-	-	-	-	-
Colombia	300	2,321	9	1,082	3,694	3,458	7%
Mexico	16,900	7,345	179	4,705	28,770	28,786	0%
Peru	0	452	5	102	548	1,203	-54%
Venezuela	4,200	-228	47	2,866	6,790	5,852	16%
Other Latin America	600	1,704	81	1,735	3,957	3,321	19%
Other	3,700	6,885	41	3,556	14,100	13,040	8%
Czech Republic	200	-7	1	87	279	45	521%
Hungary	400	-158	0	104	346	1,363	-75%
Israel	1,900	3,906	14	766	6,557	5,262	25%
Poland	0	1,641	17	208	1,832	2,877	-36%
Russia	-	-	-	-	-	-	-
South Africa	700	1,356	0	1,672	3,727	2,604	43%
African Countries	500	147	8	719	1,358	889	53%
OTHER:	13,800	-1,771	786	511	11,754	43,966	-73%
TOTAL:	303,700	158,581	6,683	48,457	504,056	547,228	-8%

Table A.2: U.S. Holdings of Foreign Equities -- Estimates and Survey Data (\$ millions)

Country	Estimated Transactions				Dec-97		TIC
	Mar-94 Holdings	Net Acquisitions	Transaction Costs	Value Adjustment	Estimated Holdings TIC	Survey	overestimation of holdings
FINANCIAL CENTERS	142,400	59,010	4,044	105,023	302,389	294,889	3%
Caribbean Basin	25,200	-2,019	775	9,755	32,161	49,244	-35%
Hong Kong	17,500	9,618	542	78	26,654	28,120	-5%
United Kingdom	99,700	51,411	2,727	95,189	243,574	217,525	12%
INDUSTRIAL COUNTRIES	332,100	91,077	2,597	132,561	553,141	749,782	-26%
Canada	39,700	7,978	457	26,043	73,264	70,798	3%
Euro-Area	130,200	22,784	730	104,013	256,267	376,180	-32%
Austria	1,200	320	6	-76	1,438	3,707	-61%
Belgium-Luxembourg	5,000	-3,328	36	1,633	3,269	11,354	-71%
Finland	3,000	2,152	16	3,863	8,999	14,785	-39%
France	25,600	13,306	126	13,484	52,264	85,019	-39%
Germany	25,600	3,679	153	18,434	47,560	64,965	-27%
Greece	500	113	7	332	938	1,513	-38%
Ireland	2,600	3,035	157	3,803	9,281	14,090	-34%
Italy	13,800	2,851	53	5,099	21,697	41,547	-48%
Netherlands	38,100	-1,092	106	41,304	78,206	106,984	-27%
Portugal	1,100	1,586	10	1,517	4,193	6,993	-40%
Spain	13,700	162	58	14,618	28,422	25,223	13%
Other Europe	39,100	9,099	236	50,635	98,599	125,095	-21%
Denmark	1,800	2,093	16	3,087	6,964	8,917	-22%
Norway	3,900	1,360	21	2,673	7,913	9,493	-17%
Sweden	11,800	3,585	65	18,984	34,305	38,783	-12%
Switzerland	21,000	1,494	125	23,812	46,181	61,897	-25%
Turkey	600	567	9	2,079	3,237	6,005	-46%
Asia/Pacific	123,100	51,216	1,175	-48,130	125,012	177,709	-30%
Australia	16,900	5,375	179	2,202	24,298	31,120	-22%
Japan	99,400	43,640	832	-48,621	93,587	136,404	-31%
Singapore	6,800	2,201	164	-1,710	7,126	10,185	-30%
EMERGING MARKETS	86,300	34,799	769	-12,958	107,372	152,332	-30%
Asia	23,900	13,592	318	-22,768	14,406	30,006	-52%
China	900	1,176	7	-747	1,322	2,256	-41%
India	1,100	1,866	2	-480	2,484	6,176	-60%
Indonesia	1,900	2,095	47	-2,708	1,239	2,488	-50%
Korea	4,400	6,720	78	-8,331	2,711	4,428	-39%
Malaysia	9,100	58	88	-5,322	3,747	4,713	-20%
Philippines	1,900	1,271	34	-1,871	1,266	2,848	-56%
Taiwan	500	144	24	358	978	4,939	-80%
Thailand	4,100	262	37	-3,667	658	2,158	-70%
Latin America	54,800	13,920	398	7,793	76,115	88,770	-14%
Argentina	7,600	2,257	61	2,632	12,427	12,892	-4%
Brazil	8,400	6,572	147	6,212	21,036	31,338	-33%
Chile	2,500	1,306	19	119	3,905	4,555	-14%
Colombia	300	815	5	53	1,163	704	65%
Mexico	34,700	1,141	140	-1,921	33,780	34,965	-3%
Peru	400	1,566	14	401	2,353	2,341	1%
Venezuela	900	263	10	297	1,450	1,975	-27%
Other Latin America	-	-	-	-	-	-	-
Other	7,600	7,287	54	2,018	16,851	33,556	-50%
Czech Republic	300	135	2	-85	348	763	-54%
Hungary	100	360	3	236	693	3,483	-80%
Israel	2,600	2,886	18	655	6,123	7,036	-13%
Poland	100	448	5	-105	438	1,618	-73%
Russia	0	870	13	637	1,494	8,457	-82%
South Africa	4,400	2,291	11	586	7,265	9,937	-27%
African Countries	100	297	3	94	489	2,262	-78%
OTHER:	5,800	747	92	3,594	10,049	10,997	-9%
TOTAL:	566,600	185,633	7,503	228,220	972,950	1,208,000	-19%