



# IMF Working Paper

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## Bilateral Financial Linkages and Global Imbalances: a View on The Eve of the Financial Crisis

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**IMF Working Paper**

Research Department

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November 2010

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**Abstract**

We present a novel and comprehensive dataset of bilateral gross and net external positions in various financial instruments for the main advanced and emerging economies and regions, designed to improve our understanding of cross-border financial linkages. The data show no strong correspondence between country or region pairs with the largest gross versus net external positions, and the importance of international financial centers, including offshore centers, in intermediating financial flows. We also highlight some important data gaps in completing a network of cross-border holdings, related to the limited available information on the size and geographical pattern of external claims and liabilities of offshore centers, oil exporters, and other mostly emerging markets.

JEL Classification Numbers: F31, F32

Keywords: International financial integration; global imbalances

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<sup>1</sup> We thank Stijn Claessens, John Joice, Swapan-Kumar Pradhan, Pat McGuire, Filipa Sá, and participants to an IMF seminar and to the Banco de España conference on Shifting Balances”, particularly our discussant Frank Warnock, for helpful comments. Katharina Ferl, John Kowalski, and Mi Wu provided excellent research assistance. We are also grateful to the Bank of International Settlements, and particularly to Swapan-Kumar Pradhan, for sharing data on locational banking statistics on a bilateral basis, as well as for useful clarifications on BIS data, and to UNCTAD for sharing data on bilateral FDI holdings. All remaining errors are our own. The data described in this paper are available on the Internet at [http://www.imf.org/external/pubs/cat/wp1\\_sp.cfm?s\\_year=2010](http://www.imf.org/external/pubs/cat/wp1_sp.cfm?s_year=2010)

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## I. INTRODUCTION

During the last 15 years international financial integration has increased dramatically. This process was characterized in particular by two related trends: an explosion in the size of cross-border capital inflows and outflows, reflected in rapidly expanding stocks of external assets and liabilities; and the emergence of global imbalances, reflected in an increased dispersion in world current account positions and a sharp widening of global net debtor and creditor positions. With cross-border financial linkages becoming much stronger, measuring them accurately is essential to understand the impact and international transmission of shocks, as the global financial crisis has clearly shown. However, while research on causes and consequences of global imbalances and international financial integration has been extensive, and recent pioneering work by Kubelec and Sa (2010) has documented the increase in bilateral financial linkages among 18 advanced economies and emerging markets, we still lack a comprehensive global picture of bilateral net and gross positions across countries. This paper takes a first step towards filling that gap.

Specifically, we construct a dataset of bilateral holdings of assets and liabilities, broken down by type of financial instrument, as of end-2007, for all the main “actors” in financial globalization: large countries or regions, such as the United States, the euro area, and Japan; important financial centers, such as the United Kingdom and Switzerland; rapidly growing emerging markets, such as Brazil, China, India, and Russia; other emerging market country groups that play an important role in international trade and global imbalances, such as oil exporters and emerging Asia; and offshore centers, that play an important role in the intermediation of international capital flows. Overall, our sample covers some 70 countries, representing over 97 percent of global external assets and liabilities, and a global set of partner countries.

Our data provide a snapshot of cross-border gross and net holdings after over a decade of expansion in cross-border financial activity, just before the inception of the most virulent phase of the global financial crisis. It brings together the analysis of gross positions, associated with increased cross-border portfolio diversification, with the analysis of net positions, which reflect the period of widening global imbalances. For example, it allows establishing whether the most important financial trading partners of the United States are also the countries holding the largest net claims on the United States. It also provides a measure of what we don’t know: for each asset class, we compare total external holdings (or liabilities) by a country with those that we can actually “attribute” to specific financial trading partners to assess gaps in our information by type of financial instrument, and make inferences about their possible sources.

A simple example can illustrate the usefulness of these data. The trigger of the financial crisis originated in a segment of the U.S. bond market—namely, U.S. mortgage-backed securities. An analysis based on aggregate data could have suggested that countries with large net creditor positions—the counterpart to the large U.S. current account deficits—would have

been affected more severely, and all the more so since these countries had large holdings of U.S. debt securities. Instead, overseas holdings of U.S. “toxic” assets were concentrated in highly leveraged financial institutions in advanced economies such as Germany, France, Switzerland, and the United Kingdom (including through vehicles in offshore centers) rather than emerging economies (Figure 1), which held primarily Treasury securities and agency bonds. As a result, the initial shock affected financial institutions in advanced European countries, leaving emerging markets unaffected. This example illustrates several key points: the importance of looking at gross exposures, and not just net exposures; the importance of the composition of cross-border holdings, and not just their level; and the importance of sectoral exposures.

Most available data on bilateral external positions (and hence our data) are based on the concept of residence, the guiding principle of balance of payments statistics: that is, it identifies a claim of country X on country Y if an entity resident in country X holds a claim on an entity resident in country Y. In order to gain a better understanding of the transmission of shocks across borders, it is important to complement data based on the concept of residence with consolidated data (to identify stresses to banks’ balance sheets) as well as with data on ultimate exposures and currency of denomination. For example, residence-based data will overstate exposures to and of small financial centers that play an important role as international financial intermediaries. Also, currency mismatches can arise even without net creditor or debtor positions vis-à-vis specific geographical areas. Unfortunately, data on ultimate exposures are so far only available for bank assets of a group of mostly advanced economies (“consolidated foreign claims” reported by the Bank of International Settlements) and information on the currency of denomination of cross-border holdings is still incomplete (see Lane and Shambaugh, 2010 for progress on this front). We discuss the links between these types of data later in the paper (see also McGuire and von Peter, 2009 and Kubelec and Sa, 2010).

Another obstacle to our analysis is the lack of data on the size and geographical composition of external balance sheets in certain countries—particularly Middle-Eastern oil exporters and offshore centers. In this respect, the strength of our work consists in clearly documenting where the major data shortfalls are, including by type of financial instrument. In turn, this provides useful information as to the likely ultimate holders of claims and liabilities that are not properly identified. In addition, our data can also highlight cases where reported total positions appear at odds with partner-country information.

Our work is related to a number of existing papers in the literature. The closest ones are Kubelec and Sa (2009, 2010). These authors construct data on bilateral external positions for 18 countries for the period 1980–2005 to describe the evolution of the “global financial network” and estimate the degree of international trade and financial spillovers in a vector autoregression model. The time-series coverage of this pioneering work is impressive, but the cross-sectional coverage (18 countries, 5 of which belong to the euro area) is considerably more limited than ours. The data work is also different. Kubelec and Sa assume that claims

and liabilities between these 18 countries “span” the entirety of their cross-border external claims and liabilities, and rely on data estimation to fill in missing data. We instead construct bilateral positions vis-à-vis all financial trading partners, and we instead rely almost entirely on “measured” data, thereby helping establish and characterize the extent of data shortfalls. In related work, Kubelec, Orskaug, and Tanaka (2007) construct bilateral external positions of 3 countries (the United States, the United Kingdom, and Canada) and describe the degree of financial integration among them and exposures to financial shocks. Daude and Fratzscher (2008) use an extensive data set of bilateral external positions to examine the role of information frictions and institutional factors in determining the composition of capital flows. Our work is also related to McGuire and von Peter (2009), who focus on the structure of global banking operations, and in particular the funding needs of the ultimate holders of bank claims, to understand the factors which led to global dollar shortages during the crisis.

Our data analysis identifies a number of important stylized facts:

- As the data on countries’ aggregate external balance sheets suggests, we find that countries’ main financial partners are not necessarily their main net creditors (or debtors).
- The degree of financial integration and the magnitude of global imbalances vary considerably across regions, level of income, and types of financial instruments. In general, advanced economies have large *gross* bilateral positions vis-à-vis other advanced economies, particularly within Europe and between Europe and the United States. In contrast, some emerging markets as well as Japan have sizable *net* bilateral positions vis-à-vis major advanced economies.
- As documented by Lane and Milesi-Ferretti (2010) and Kubelec and Sa (2009, 2010), financial and offshore centers are major players in the global financial system. We show that linkages between offshore centers and the United States and the United Kingdom are particularly strong.
- There is a significant data gap in the identification of holders of euro area portfolio liabilities. This likely reflects holdings by countries that do not report the allocation of their asset holdings (China; oil exporters; several offshore centers) but may also reflect an under-reporting of portfolio claims (particularly on Ireland and Luxembourg) by individual euro area countries.
- Countries’ exposures to foreign financial shocks vary considerably, reflecting the degree of their financial integration with foreign countries and the nature of financial instruments they trade with them.
- As also highlighted by McGuire and von Peter (2009), when bank claims on nonresidents are measured on a consolidated basis the nature of bank exposures

changes considerably. In particular, claims by euro area and especially Swiss banks on U.S. residents are much larger than those measured on a residence basis.

The rest of the paper is organized as follows. Section II describes the data. Section III presents the key stylized facts related to aggregate data and data coverage, while Section IV describes the structure of the bilateral external portfolio for the main countries and regions. Section V discusses exposures to external financial shocks, and Section VI provides a comparison of bilateral bank exposures measured on a residence basis and on a consolidated, ultimate risk basis. Section VII concludes.

## **II. BILATERAL DATA ON EXTERNAL ASSETS AND LIABILITIES**

We construct bilateral international investment positions for those countries and regions playing a more prominent role in the global financial system for end-2007.<sup>2</sup> Such positions describe the financial relationship between domestic residents and residents of other countries. The data cover about 70 countries, including 15 source countries or regions (the United States; Japan; the United Kingdom; Switzerland; Canada; China; Hong Kong S.A.R.; Singapore; the euro area; Brazil, Russia, and India; other advanced countries; oil exporters; offshore centers; the rest of emerging Asia; and “other Europe”—including mostly emerging European economies) and 19 partner countries or regions (15 source countries or regions, 3 residual groups, including other Latin America and Caribbean countries, other Asia and Pacific countries, and other African countries; and international organizations). Appendix 1 provides more details on the composition of regional groups.

The choice of the countries and regions for which we collected data was driven by three primary considerations: i) their economic size; ii) the size of their overall external portfolios (for example, financial and offshore centers); and their importance in global net creditor and debtor positions (for example, oil exporters). We use statistics for the aggregate euro area—rather than individual euro area countries—in light of the extensive data availability on bilateral external positions and the role of the euro as a global currency. Considering the euro area as a whole also helps attenuate some biases in assessing bilateral financial linkages that are due to the financial center role of small euro area countries such as Ireland and especially Luxembourg.<sup>3</sup> We discuss the implications of this choice further in the following sections.

### **A. Instrument breakdown**

The instrument breakdown of our external assets and liabilities data follow the conventions of balance of payments reporting. Specifically, we report data for foreign direct investment

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<sup>2</sup> Comprehensive statistics on bilateral cross-border holdings typically become available with a significant lag with respect to data on aggregate cross-border holdings, the exception being banking data.

<sup>3</sup> For example, Feletigh and Monti (2008) show that while a substantial fraction of Italian portfolio asset holdings are equity claims (mutual fund shares) on Ireland and Luxembourg, their ultimate destination tends to be outside the euro area and the underlying instruments skewed towards debt rather than equity.



(FDI), portfolio equity, portfolio debt, and other investment (which includes bank loans and deposits), plus holdings of official reserves. For the remaining balance of payments category—financial derivatives—information is much more limited: bilateral data are only available for the United States, and several countries do not yet report even the aggregate value of their holdings of financial derivatives. Data for portfolio equity assets and liabilities are at market prices, while the reporting convention for FDI data varies between book and market value across countries. Our bilateral data identifies total claims of residents of country Y on residents of country X in the form of financial instrument Z, but not the currency of denomination of the financial instrument.<sup>4</sup> Still, in several cases we can make inferences about currency composition: for example, virtually the entire stock of cross-border portfolio equity and FDI holdings in the form of equity are denominated in the currency in use in the residence of the issuer.<sup>5</sup> The dataset is assembled using a variety of sources, summarized below. Appendix II provides more details on data sources and assumptions made in constructing the data set.

### **Foreign direct investment**

Statistics on bilateral FDI claims and liabilities come from Eurostat, OECD, UNCTAD, as well as national sources. As we discuss later, these statistics are less than ideal: they are not uniformly available for our sample, they use a variety of valuation methods (historical cost; book value; market value), and show at times significant differences between the claims reported by country X in country Y and country Y's reported liabilities vis-à-vis country X.

### **Portfolio investment: equity securities**

The main source of data is the IMF's Coordinated Portfolio Investment Survey (CPIS), which reports bilateral portfolio assets for about 70 reporting countries, broken down into portfolio equity and portfolio debt securities. For those countries, the breakdown of total reported portfolio assets into bilateral claims is virtually complete, although—as will become clear in the discussion in Section III—reported portfolio assets may underestimate actual claims because of incomplete coverage (particularly of assets held by households). These data also allow us to derive portfolio equity liabilities vis-à-vis CPIS-reporting countries. We integrate these data with national-source data on reported bilateral portfolio liabilities (available for the United States and a few other countries).

### **Portfolio investment: debt securities**

For portfolio debt assets, we also make use of the IMF's CPIS, which also allows us to derive portfolio debt liabilities vis-à-vis CPIS-reporting countries. As for portfolio equity, we integrate these data with national-source data on bilateral portfolio liabilities (available for the United States and a few other countries). In addition, we use estimates of portfolio debt

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<sup>4</sup> See Lane and Shambaugh (2010) for an attempt to estimate cross-border currency exposures.

<sup>5</sup> FDI also includes intercompany debt, which is more likely to be denominated in a foreign currency.

liabilities that partner countries hold as foreign exchange reserves, using information on a survey of reserves in the form of securities conducted in parallel to the CPIS.

### **Other investment**

Our primary source of data is bilateral locational banking statistics on residence basis reported by individual countries to the Bank for International Settlements. These statistics capture banks' external assets and liabilities on a bilateral basis, broken down along two dimensions:

1. Instruments. Data is reported for total claims and liabilities, as well as for loans and deposits (a sub-category that excludes portfolio and FDI claims and hence lines up with "other investment");
2. Sectors. Claims and liabilities are reported vis-à-vis banks and nonbanks for a given instrument.

In particular, for countries whose banks report to the BIS the data on banks' "loans and deposits" identifies banks' other investment claims and liabilities vis-à-vis foreign banks and foreign nonbanks. BIS data can also be used to estimate claims and liabilities of domestic nonbanks vis-à-vis foreign banks (using partner-country data on loans and deposits of other BIS-reporting countries' banks vis-à-vis resident nonbanks). This implies that the only missing data are claims and liabilities of resident nonbanks vis-à-vis foreign nonbanks, as well as claims and liabilities of resident nonbanks vis-à-vis non-BIS-reporting banks and non-banks. For countries whose banks do not report data to the BIS, we use instead total claims and liabilities of BIS-reporting countries' banks vis-à-vis the country's residents, implying a more partial coverage (since we only cover residents' positions vis-à-vis foreign banks from BIS-reporting countries). In a few cases national sources provide a direct geographical breakdown for other investment assets and liabilities—this is the case, for example, for the euro area and the United Kingdom.

### **Foreign exchange reserves**

Data on the composition of foreign exchange reserves is only available for a relatively limited set of countries (for details, see, for example, Truman and Wong, 2006). The data generally refers to the composition of reserves by currency, rather than by residence of the counterpart. There are two exceptions. The first is provided by data on the issuers of securities held as reserves published by the IMF in its Coordinated Portfolio Investment Survey jointly with data on securities held by international organizations. These data report the destination of reserves held in the form of securities for a group of countries whose precise composition is confidential but which overlaps to a significant extent with participation to the CPIS. The second is the U.S. Treasury survey of U.S. portfolio liabilities, which provides information on foreign holdings of U.S. securities by country and type of security. While the report does not provide a breakdown between private and official holdings, the data can be used in conjunction with country-reported data on holdings of portfolio assets in the United States (which do not include reserves) to infer the amount of securities held as reserves in the United States. We combine these data with information on

the currency allocation of reserves, based on national sources and data on the currency composition of reserves published by the IMF (“COFER data”) to infer their geographical allocation. This is the main instance in which we partially depart from the exclusive use of reported or derived bilateral positions. For example, for those CPIS-reporting countries for which we have no other information on the composition of reserves we assume that reserves held as securities for each country are held in different countries in the same proportion as the aggregate.<sup>6</sup>

## B. Other data issues

The construction of data involves addressing several thorny issues. The first concerns differences between reported claims and reported liabilities. Specifically, there can be differences between what country X reports to be holding in country Y in financial instrument Z and the liabilities reported by country Y vis-à-vis country X. In these cases, our general approach is to rely primarily on what is reported by the “creditor country”, particularly for traded financial instruments. For example, it is much easier for asset surveys to ascertain the residence of the issuer of a bond owned by a country resident than for borrowers’ surveys to ascertain the ultimate ownership of their bonds (Bertaut and Grier, 2003). In our dataset, large differences can also arise for estimates of foreign direct investment between the two “FDI partners” (as also discussed in Kubelec and Sa, 2010). These differences can relate to different methods of estimation (book value versus market value) but also different principles in establishing the partner country.<sup>7</sup> In a number of cases, we use for each country its own reported data, thus facilitating comparisons with total external assets and liabilities reported by the country. However, this also implies that in those few instances our dataset is not perfectly symmetric.<sup>8</sup>

A second problem relates to the use of banking data. In line with our use of balance of payments statistics conventions, the bilateral data on external assets and liabilities of banks needs to be split among different asset categories: “other investment” for loans and deposits, and portfolio investment for holdings of securities. Unfortunately, a proper split between these two categories is not always available on a bilateral basis. In addition, some countries (such as Japan and Switzerland) have significant differences in their total reported bank holdings through BIS and those inferred from the IIP, primarily due to the inclusion of banks’ trustee business in banking data reported to the BIS (reported in “other sectors” in the

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<sup>6</sup> While it is reasonable to assume that, say, most dollar-denominated securities are issued by the United States, BIS data on bank liabilities vis-à-vis central banks show that as of end-2007 over 2/3 of dollar deposits by central banks were held in banks outside the United States. On this issue, see McCauley (2005).

<sup>7</sup> For example, a U.S. firm can have a direct investment position in, say, Poland through an affiliate domiciled in Ireland. U.S. reported data will show a claim of the United States on Ireland, but Polish data may show a FDI liability vis-à-vis the United States.

<sup>8</sup> There are some large differences in reported FDI positions between the United Kingdom and the euro area. Also, creditor and debtor positions vis-à-vis Switzerland tend to exceed Swiss reported positions in a number of cases, for reasons discussed further below. The forthcoming results of the first Coordinated Direct Investment Survey should help address these asymmetries.

IIP).<sup>9</sup> For countries for which we only have data on total bilateral bank positions we either use data on the composition of their portfolio assets, if available, to infer the portion of bank claims that reflect portfolio assets, and amend bank holdings accordingly to avoid double-counting. In the few cases where data on the level or sectoral composition of portfolio assets are not available (for example, for some offshore centers) we classify all bank claims and liabilities as “other investment”, which may imply some overestimate of other investment claims and liabilities and a corresponding underestimate of portfolio claims or liabilities.

The data on bilateral asset and liability positions is complemented by data on total external assets and liabilities of countries (the so-called “International Investment Position”). The source of data for aggregate external positions is the updated EWN II database (described in Lane and Milesi-Ferretti, 2007b and updated to 2008 for some 180 countries) and a new database on external assets and liabilities of small offshore centers (Lane and Milesi-Ferretti, 2010). Several countries in our sample report official estimates of their external assets and liabilities, and those are used by the EWN II database. However, for a number of countries and territories (ranging from several major oil exporters to small offshore centers) no data on the International Investment Position are available. In those cases, the EWN II database and the offshore center database construct estimates on the basis of a variety of methods and sources, detailed in the papers cited above. In the context of this paper, the data on total external assets and liabilities provides the starting point for establishing “global stylized facts” that the bilateral data will help us understand, and also allows us to measure the extent to which our bilateral data “spans” total external holdings.

### III. STYLIZED FACTS: AGGREGATE POSITIONS AND DATA COVERAGE

Before turning to bilateral data, it is useful to highlight some key stylized facts concerning gross and net external positions of the countries and regions in our sample.

#### A. Aggregate positions

The trend towards increased international financial integration accelerated rapidly in the 1990s, especially in advanced economies, where the ratio of external assets and liabilities to GDP more than tripled between 1990 and 2007 (Figure 2, top panel). The increase in external positions in emerging markets was more gradual, and the overall size of their external portfolio is much lower in relation to the countries’ GDP than it is for advanced economies (Figure 2, bottom panel). Figure 3 summarizes the geographical distribution of world external assets and liabilities as of end-2007. The figure, which specifically highlights the countries and regions of our sample, shows that claims and liabilities of advanced economies and offshore centers were well over 80 percent of the world total, a much higher share if compared to their share of world GDP or world trade. On the other hand, the evolution of net creditor and debtor positions underscores a much more important role played by emerging

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<sup>9</sup> For Switzerland, a significant fraction of cross-border trustee business activity is conducted on behalf of non-residents, and hence does not enter in the Swiss external position. We therefore adjust Swiss data accordingly. However, partner countries record this activity as occurring vis-à-vis Switzerland, implying that reported creditor and debtor positions vis-à-vis Switzerland appear higher than those in our adjusted Swiss data.

markets (Figure 4). Emerging Asian countries and oil exporters were among the main counterparts to the increased external liabilities accumulated by the United States, and 7 of the 10 largest net creditors at the end of 2007 were emerging markets.

What lies behind these trends? Are global net creditors' claims primarily vis-à-vis net debtors? What is the pattern of international financial integration across countries and regions? Is there a correlation between gross and net positions? Which countries hold larger claims on emerging markets, and where do emerging markets invest? These are some of the questions our data can help address. But of course the first question is how well our bilateral data can track the aggregate external positions described in Figures 2-4.

### **B. Bilateral data coverage**

As noted earlier, the main obstacle in comparing bilateral data on cross-border assets and liabilities with totals at the country level is that a number of countries in our sample—primarily oil exporters and offshore centers—do not report total external assets and liabilities, and available estimates are subject to very significant uncertainty.

With this caveat in mind, Figure 5 shows what fraction of a country or region's external assets and liabilities our bilateral dataset is able to explain.<sup>10</sup> Overall, the bilateral data coverage for advanced economies is very satisfactory. This reflects the more extensive reporting of bilateral data by individual advanced economies, as well as the availability of partner-country data (given the extensive financial linkages among advanced economies that we will document shortly).

At the other extreme, data coverage is particularly poor for Middle-Eastern oil exporters. These countries generally do not report any geographical breakdown of their external assets and liabilities—indeed, in most cases they do not report their total external assets and liabilities either. Hence for the vast majority of countries in this group we rely on partner countries' data to identify bilateral holdings. Still, since advanced economies are likely to be the destination of most of the financial claims of these countries, why is the data coverage so scant? One reason are the (likely very extensive) securities holdings by these countries (foreign exchange reserves, sovereign wealth funds, and other holdings). These are hard to capture in our data because the availability of bilateral portfolio liabilities data is limited to a few advanced economies (the most prominent being the United States). In addition, these data are likely to underestimate holdings by oil exporters because of a “custodial bias”—the destination country's survey only identifies the first holder in the chain.

Coverage for other emerging markets is less complete than for advanced economies, but better than for oil exporters. In general, obstacles to coverage reflect a variety of factors: lack of information on the geographical allocation of foreign exchange reserves, incomplete

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<sup>10</sup> In order to maintain consistency with aggregate country data, bilateral assets and liabilities include those within the same region (for example, emerging Asian countries' claims on other emerging Asian countries) with the exception of the euro area, for which we have aggregate data on external assets and liabilities that exclude intra-euro area holdings.

coverage of other investment claims and liabilities (hampered by the fact that several emerging markets do not report locational bilateral banking statistics to the BIS) as well as incomplete statistics on bilateral FDI claims and liabilities. Also, no bilateral data are available for some large holders of external portfolio assets (for example, Taiwan province of China, in addition to oil exporters such as the United Arab Emirates). Still, existing data combined with partner-country data ensure that our data covers between 2/3 and 3/4 of the external portfolio of Brazil, Russia, and India as well as of emerging Asia. The data coverage for China appears even higher, but this occurs because partner-country data on Chinese FDI and portfolio equity holdings overseas exceeds by a significant margin total reported Chinese external assets in those categories. The same phenomenon occurs, albeit to a less significant extent, for FDI in China.<sup>11</sup> Conversely, the geographical coverage of portfolio debt assets, other investment assets, and reserves is much more limited. Finally, the sum of bilateral assets and liabilities for Singapore exceeds total assets and liabilities as reported in the IIP; while a sectoral decomposition of Singapore's total external assets and liabilities is not available, the difference may reflect offshore bank activity not fully recorded in the IIP.

While Figure 5 suggests full coverage for offshore centers' external positions, true coverage is likely to be incomplete, because total external assets and liabilities of these centers are likely to be significantly underestimated (see Lane and Milesi-Ferretti, 2010, for a more extensive discussion). For example, total external assets and liabilities for offshore centers in Lane and Milesi-Ferretti (2010) (which are used in the denominator of the top panel) reflect only those claims and liabilities that can be attributed to individual offshore centers, while in some cases our bilateral partner data identifies exposures to groups of offshore centers, without identifying them separately (for example, in the case of the euro area). In addition, incomplete partner-country reporting likely implies a significant under-estimate of portfolio assets and liabilities in some large offshore centers with significant mutual fund activity.<sup>12</sup>

The bottom panel of Figure 5 summarizes the absolute size of our "gaps" in terms of bilateral data coverage. The largest absolute value—some \$3.5 trillion, is for the euro area's external liabilities. Its lion share is accounted for by portfolio liabilities, the only category in the euro area's external position for which the European Central Bank does not provide a geographical breakdown, in light of the difficulty in ascertaining the residence of foreign holders of tradable financial instruments issued by euro area residents. In our data, the counterpart of euro area portfolio liabilities is identified on the basis of partner-country data, primarily coming from the Coordinated Portfolio Investment Survey. Since not all countries participate to the CPIS, a significant part of the missing data could plausibly be accounted for by the main holders of portfolio assets that do not participate or participate only partially to the CPIS. These include oil-exporting countries with large sovereign wealth funds, such as

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<sup>11</sup> Different valuation methods (book value in China's IIP versus market value in partner-country data) likely account for this large discrepancy.

<sup>12</sup> For example, the portfolio equity liabilities of the Cayman Islands derived from the CPIS portfolio survey were around \$770 billion at end-2007, but a Cayman Islands Monetary Authority's survey of investment fund activity in the Cayman Islands found net asset values totaling over \$2.2 trillion and gross asset values exceeding \$3 trillion. Only the banking sector of the Cayman Islands has so far participated in the CPIS, and therefore the information on the geographical distribution of portfolio claims by the Cayman Islands is severely incomplete.

Kuwait and the United Arab Emirates; offshore centers with a large presence of investment funds, such as the Cayman Islands; and economies in emerging Asia that are holders of large reserves and/or large portfolio assets, such as China and Taiwan province of China. For example, the sum of China's foreign exchange reserves and portfolio debt assets at the end of 2007 was over \$2.2 trillion. The United States reported around \$1 trillion in portfolio debt liabilities to China, and portfolio debt claims on the euro area are likely to account for part of the balance.

We explore this issue in more detail in Table 1, breaking down the "coverage gap" for euro area portfolio liabilities  $PL_{euro}^{GAP}$  by type of financial instrument (equity and debt) and by euro area member country. Specifically, for each euro area country (indexed by  $j$ ) we calculate the difference between total portfolio liabilities reported by the country ( $PL_j$ ) and the total portfolio claims on the country reported by CPIS participants  $\sum_{i \in CPIS} PA_{ij}$ :

$$PL_j^{GAP} = PL_j - \sum_{i \in CPIS} PA_{ij}$$

where  $PA_{ij}$  measures portfolio claims of country  $i$  on country  $j$ . Clearly  $PL_j$  includes liabilities of country  $j$  vis-à-vis other euro area countries, which are excluded from the portfolio liabilities of the euro area as a whole. However, since all countries which were part of the euro area at end-2007 (with the exception of Slovenia, a country with very modest portfolio asset holdings) participate in the CPIS, the term  $\sum_{i \in CPIS} PA_{ij}$  includes the claims of other euro area countries on country  $j$ . Therefore the difference  $PL_j^{GAP}$  nets out the intra-euro area liabilities of each euro area country and the sum of these differences corresponds to the "coverage gap" for the euro area as a whole:

$$\sum_{j \in euro} PL_j^{GAP} = PL_{euro}^{GAP}$$

If bilateral portfolio claims were measured perfectly, each term  $PL_j^{GAP}$  would measure exclusively portfolio claims on the euro area by countries not participating in the CPIS (for example, sovereign wealth funds holding euro area equity instruments).

For holdings of portfolio debt instruments in the euro area, Table 1 indicates a total "coverage gap" of over \$1.3 trillion. The likelihood that the "coverage gap" reflects primarily holdings by CPIS nonreporters (such as China, Taiwan province of China, and Middle-Eastern oil exporters) is high, in light of the very high level of foreign exchange reserves (and in some cases of other portfolio assets) held by these economies. However, the estimates presented in Table 1 suggest a more complex picture for portfolio equity holdings.

Specifically, the data show a sizable "portfolio equity gap" (over \$2 trillion) which is particularly large for Luxembourg and Ireland, two countries which host a sizable fraction of the European mutual fund industry. While these countries may well correctly identify the shares of their mutual funds held by nonresidents (implying that  $PL_j$  is measured correctly) the CPIS coverage of portfolio assets held by households is spottier, and holdings of mutual funds are likely an important component of these household assets. As a result, it is possible that intra-euro area portfolio claims are not fully captured by the term  $\sum_{i \in CPIS} PA_{ij}$  and

therefore that our estimated “coverage gap” reflects *inter alia* some under-reporting by other European countries of their claims on financial centers in the euro area. In turn, this would imply somewhat lower external portfolio liabilities for the euro area as a whole. There is clearly scope for an improvement in data coverage in this area.

#### IV. NET AND GROSS EXTERNAL POSITIONS

We turn now to a characterization of bilateral net and gross external positions for the countries and regions in our sample.

##### A. Net and Gross External Positions: the United States

U.S. data is of particular interest for several reasons: the United States is the largest net debtor, reflecting its large current account deficits during the past decade; the role played by financial linkages with the United States in the transmission of the global financial crisis; and the fact that our bilateral data spans almost the full range of U.S. external assets and liabilities.

The upper panel of Figure 6 shows bilateral net external positions vis-à-vis the United States. The countries and regions with the largest net claims on the United States—China, Japan, oil exporters—are also among the largest “net creditors” in an absolute sense, as shown in Figure 3 on global imbalances. Another noteworthy feature is the net liability position of the United States vis-à-vis offshore centers, which likely captures indirectly additional claims on the United States by other country groups. The U.S. is instead a net creditor vis-à-vis a number of other advanced economies, as well as Brazil, India, and Russia taken together.

The lower panel, which depicts bilateral external assets and liabilities, clearly illustrates how the dominant share of the U.S. external portfolio is accounted for by the euro area, the United Kingdom, and offshore centers—each having external claims and liabilities vis-à-vis the U.S. exceeding 20 percent of U.S. GDP. In contrast, the size of direct U.S. claims on China or oil exporters is quite modest. A particularly noteworthy feature is the importance of international financial centers as “financial trading partners” for the United States. Collectively, the United Kingdom, Hong Kong S.A.R., Singapore, Switzerland, and offshore centers had external claims and liabilities vis-à-vis the U.S. exceeding 50 percent of U.S. GDP in 2007. This makes it more difficult to infer the transmission of U.S. financial shocks to the rest of the world and vice versa.

Figure 7 depicts the composition the bilateral external position of the United States by financial instrument. The upper panel of the figure shows that the United States has a positive net portfolio equity position vis-à-vis virtually all country groups, with the exception of oil exporters (where foreign access to domestic equities is limited) and Singapore (a financial center with very large net foreign assets). The U.S. also tends to have a positive net FDI position vis-à-vis its financial trading partners. Conversely, the United States has a negative portfolio debt position vis-à-vis all countries and regions, with the exception of Canada, with net debt positions being particularly large vis-à-vis the euro area, China, and Japan. In many cases, this reflects large holdings of U.S. debt securities in the form of foreign exchange reserves, while for the euro area holdings of U.S. debt securities were primarily in the form



of corporate bonds. Overall, the bilateral U.S. positions exhibit the “long equity, short debt” pattern of the overall U.S. external portfolio.

The bottom panel of Figure 7 depicts the composition of the entire external portfolio (the sum of external assets and liabilities). The figure clearly shows the large role played by banking flows (primarily reflected in the category “other investment”) in cross-border financial holdings vis-à-vis the United Kingdom and offshore centers. For the euro area instead FDI and portfolio positions play a more important role, and portfolio holdings also account for the lion share of claims and liabilities vis-à-vis Japan.

### **B. Net and gross external positions: the euro area**

The euro area is the largest holder of external assets and liabilities in our sample—a remarkable stylized fact since these data net out all cross-border holdings within the region.<sup>13</sup> The bilateral net and gross external positions of the euro area are summarized in Figure 8. In interpreting these data, it is useful to keep in mind that for the euro area bilateral data coverage is virtually complete on the asset side but has a significant gap on the liability side, reflecting incomplete information on the residence of holders of euro area securities (as discussed earlier). As a result, the sum of the net bilateral positions in our dataset is close to balance, while the euro area’s overall net external position at the end of 2007 was around –15 percent of GDP. As discussed at the end of the previous section, it is likely that some countries in emerging Asia, oil exporters, and offshore centers account for a sizable portion of the unidentified claims on the euro area.

With this caveat in mind, the top panel of the Figure shows that the largest identified net creditor position of the euro area, and by a significant extent, is vis-à-vis “Other Europe”—a group including primarily countries from Central and Eastern Europe. The euro area has also smaller net creditor positions vis-à-vis the United Kingdom and the United States, while the net creditor position vis-à-vis offshore centers is likely to reflect in part incomplete information on bilateral portfolio liabilities of the euro area.<sup>14</sup> The bottom panel of Figure 8 highlights the striking size of cross-border claims and liabilities of the euro area vis-à-vis the United Kingdom, which exceed considerably even those vis-à-vis the United States. The euro area also has large external positions vis-à-vis offshore centers, Switzerland, and other advanced economies (the latter reflecting primarily positions vis-à-vis Denmark, Norway, and Sweden). In contrast, bilateral positions vis-à-vis emerging countries outside Europe are considerably smaller in size.

Figure 9 provides a characterization of the euro area net and gross positions in terms of the underlying financial instruments. Its top panel shows that FDI accounts for a significant portion of net claims on “other Europe.” For other countries, the euro area has generally a

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<sup>13</sup> Total external assets of the 13 countries that were euro area members at end-2007 were over US\$37 trillion, of which some \$17 trillion consisted of holdings in other euro area countries.

<sup>14</sup> The United Kingdom and United States report their bilateral portfolio holdings vis-à-vis the euro area, and are hence not likely to account for the missing euro area liability data.

positive net FDI positions vis-à-vis emerging markets and negative positions vis-à-vis advanced economies—with the exception of Canada and Switzerland. Also noteworthy are the large net creditor position in portfolio debt instruments vis-à-vis the United States, and the large negative portfolio debt position vis-à-vis Japan and Switzerland. Figure 9’s bottom panel shows the importance of “other investment” positions in explaining the size of the external portfolio vis-à-vis the United Kingdom, as well as vis-à-vis offshore centers and Switzerland. As discussed further in Section VI, these positions reflect to a significant extent the cross-border activity of euro area banks conducted through their London subsidiaries (see also McGuire and von Peter, 2009).

### **C. Net and gross positions: Japan**

Figure 10 summarizes the bilateral net and gross positions of Japan. As shown by the top panel, the country is a large net creditor, with particularly large net claims on the United States (close to 30 percent of Japan’s GDP), as well as the euro area and offshore centers. The pattern of gross positions (depicted in the bottom panel) shows a comparatively smaller external portfolio relative to the euro area or the United States, with fewer instances of very large asset and liability positions vis-à-vis the same partner.

The composition by instrument of Japan’s external portfolio (Figure 11) shows that net portfolio debt holdings account for the lion share of Japan’s net claims, while foreign holdings of Japanese equities tend to exceed Japan’s holdings of foreign equities. As was the case with the euro area, Japan’s gross positions vis-à-vis the United Kingdom (bottom panel of Figure 11) are dominated by “other investment”, primarily reflecting cross-border banks’ claims and liabilities. In relative terms, other investment claims and liabilities are also an important component of the external portfolio vis-à-vis Hong Kong S.A.R., Singapore, and Switzerland, but in general play a smaller role for Japan than they do for the United States and the euro area, reflecting more modest cross-border activity by banks.

### **D. The external portfolios of emerging markets**

As documented earlier (Figure 5) our bilateral data coverage for emerging markets, while high, is less complete than for advanced economies. Among other things, this reflects on the asset side the difficulty in establishing the geographical allocation of reserve claims (and, for some oil exporters, of claims held by sovereign wealth funds). With this caveat in mind, the two panels of Figure 12 provide a snapshot of the bilateral allocation of emerging market portfolios (including in this group the financial centers of Hong Kong S.A.R. and Singapore).

One first striking stylized fact is the overall size of the external portfolio of Hong Kong S.A.R., the largest of the entire group. Also, the figures highlight significant heterogeneity among these countries and regions. For example, the identified bilateral claims and liabilities of oil exporters and especially of Brazil, Russia, and India are to a very large extent vis-à-vis advanced economies (with oil exporters having significant claims and liabilities vis-à-vis the United Kingdom, considered in the figure together with other advanced economies). In contrast, emerging markets in Asia have much larger bilateral positions vis-à-vis other emerging markets, as well as offshore centers (particularly from Hong Kong S.A.R.). With regard to China, bilateral claims vis-à-vis the United States account for over half of external

claims, with Hong Kong S.A.R. accounting for a significant portion of the remainder. Hong Kong S.A.R. is by a significant extent the largest holder of claims on China, where FDI plays a particularly important role. Finally, the external portfolio of countries in “Other Europe” is mostly vis-à-vis the euro area, with other advanced countries (primarily Denmark and Sweden) also playing an important role.

### **E. The role of offshore and financial centers**

The previous sub-sections have already documented the important role of offshore centers as financial trading partners of the main world economies. Figure 13 summarizes the estimated net and gross bilateral positions of these centers. Unlike for other countries, these positions are reported in billions of U.S. dollars, given that they represent very high multiples of the GDP of these economies.

It is interesting to note that while other investment positions, relating to a significant extent to banking activity, constitute a significant share of the external portfolio of offshore centers, other asset and liability types—including FDI, portfolio equity, and portfolio debt—are also of significant size. For example, portfolio equity positions are related to the presence of a significant mutual and hedge fund industry in some offshore centers, as well as to the fact that some major firms are incorporated in offshore centers. FDI positions are related both to the activities of large firms incorporated in offshore centers, as well as to the use of offshore centers to route FDI.<sup>15</sup> Finally, portfolio debt positions are also related to the large presence of structured finance vehicles, particularly in the Cayman Islands—for example, as discussed in the introduction, the Cayman Islands are the largest nonresident holders of U.S.-issued asset-backed securities.

## **V. IMPACT OF ASSET PRICE SHOCKS IN PARTNER COUNTRIES**

Our bilateral dataset allows us to examine what would be the impact of asset price declines in partner countries on the value of a country’s external claims. Specifically, we conduct two simple exercises. The first consists in examining the impact of a 20 percent decline in the value of portfolio claims (equity and debt) as well as other investment claims on the countries with the largest external balance sheets (the euro area, the United Kingdom, and the United States). The second exercise examines the impact on the value of external assets in partner countries and regions of a generalized 20 percent decline in asset values in emerging markets (including FDI, portfolio claims, and other investment claims).<sup>16</sup>

Before turning to the results, it is important to point out that the results of this exercise significantly overstate the impact of partner-country shocks on financial centers. For

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<sup>15</sup> For example, in 2007 the British Virgin Islands were the largest recipient of Hong Kong’s FDI (ahead of China) and the second largest source of FDI in Hong Kong (after China).

<sup>16</sup> Our exercise is similar in spirit to the one conducted by Warnock (2006), who examines the potential financial spillovers of a decline in the value of claims on the United States. In related work, Lane and Milesi-Ferretti (2007a) examine the impact of large currency adjustments associated with a resolution of global imbalances on the value of external assets and liabilities for the world’s major economies.

example, in economies with a large investment fund industry a decline in the value of portfolio assets due to asset price declines in trading partners will be symmetrically reflected in a decline in the value of external portfolio liabilities in the form of investment fund shares. This notwithstanding, the exercise provides a useful sense of the sensitivity of countries' external asset values to specific countries and regions.

The results are presented in Figure 14. The top left panel shows the effect of a 20 percent decline in the value of portfolio equity holdings in the euro area, United Kingdom, and United States. The effects are strongest for financial centers such as Switzerland (particularly exposed to the euro area) and Hong Kong S.A.R. More generally, the effects are largest for smaller advanced economies, while emerging markets have relatively modest portfolio equity assets overseas. The top right panel shows instead the effect of a decline in the value of bonds issued in the euro area, United Kingdom, and United States. Once again the impact on external holdings of financial center is the largest, but in this case there is also a significant impact on countries that are large holders of reserves or portfolio debt claims, such as Japan and China (particularly exposed to the United States) and the United Kingdom and other advanced economies (exposed primarily to the euro area).

The bottom left panel shows the impact of a 20 percent decline in the value of other investment claims in the euro area, United Kingdom, and the United States. This exercise has a less clear-cut interpretation than the one on portfolio holdings, in light of the importance of cross-border banking positions between parents and affiliates, and the use of financial centers as pure intermediaries in banking activity—issues we discuss more extensively in the next section. With these caveats in mind, the effects are larger in absolute terms, reflecting the size of cross-border banking positions among the main advanced economies. Here the most affected countries are financial centers and advanced economies, particularly in Europe (where the external portfolios of banks are much larger than in the United States, Japan, and Canada) while the impact on emerging markets' holdings is smaller.

Finally, the bottom right panel shows the impact on external assets of a decline in the value of all claims on emerging markets (including FDI positions, portfolio claims, and other investment claims). Claims on emerging markets are divided into claims on Hong Kong S.A.R. and Singapore, claims on emerging Asia (including China and other emerging and developing Asian economies), claims on other European countries, and claims on other emerging markets (including Brazil, Russia, and India, Latin American countries, oil exporters, and other African and Middle-Eastern countries). The chart excludes Hong Kong S.A.R. and Singapore, for which the effects are an order of magnitude larger than for other countries (some 90 percent of GDP for Hong Kong, and over 50 percent of GDP for Singapore), reflecting in particular very large exposures to China and the remainder of emerging Asia. Among the other countries, the effects are generally smaller than those arising from asset price declines in advanced economies. They are largest for financial centers, and European advanced economies more generally, and they reflect primarily exposures to European emerging markets and to Brazil, India, and Russia. Among emerging markets, the effects are largest for China (reflecting almost entirely the effect through Hong Kong) and the rest of emerging Asia (reflecting in particular exposures to China).

In sum, asset price declines in partner countries—particularly if these are advanced economies—can have significant effects on the value of countries’ external portfolios. Of course, a detailed vulnerability analysis would also need to assess the domestic incidence of the external asset price shock: as we learned from the financial crisis, the transmission of shocks depends on the extent of leverage of the holders of external claims. The effects on emerging market countries and regions are generally weaker, given the smaller size of their external claims in relation to GDP. Among asset categories, emerging markets are generally more vulnerable to declines in the value of bonds in advanced economies—particularly the United States and the euro area—in light of their large holdings of foreign exchange reserves in the form of U.S. and euro area debt securities.

## **VI. BILATERAL FINANCIAL LINKAGES: A COMPARISON WITH CONSOLIDATED BANKING DATA**

As discussed earlier, the data presented in this paper are based on the residence principle, which governs balance of payments statistics. In particular, this principle implies that a claim by, say, an affiliate of a Swiss bank located in London on a U.S. resident is an external claim of the United Kingdom vis-à-vis the United States, instead of a Swiss claim. Ideally we would like to be able to compare these data with data that identify exposures on the basis of the nationality of the ultimate creditor and debtor. While existing data does not allow us to undertake this exercise in a comprehensive fashion, we can make use of international banking activity data disseminated by the BIS for a subset of advanced economies to contrast the structure of bilateral bank claims based on the bank’s nationality and the residence of the “ultimate exposure” borrower with bilateral bank claims on a residence basis.<sup>17</sup>

Table 2 presents a comparison of total bank assets in the euro area, Switzerland, United Kingdom, and United States measured from a residency (“locational”) basis with those measured on a consolidated, ultimate risk basis. Specifically, the former include claims by banking institutions and affiliates resident in those countries on borrowers resident in other countries, and are therefore consistent with the balance of payments statistics methodology that our dataset is based on. Among those assets would be assets held by affiliates of foreign banks resident in the domestic country, as well as claims by, say, a parent bank on its overseas affiliate. The latter include foreign claims by “national” banks on a consolidated basis and exclude claims between parent and affiliate banks located in different countries. Therefore they would include neither claims of a parent bank on their overseas affiliate or vice-versa nor claims by a local affiliate of a foreign bank on an overseas borrower. As explained in BIS (2009) guidelines foreign claims include both cross-border claims (for example, claims of an affiliate of a Swiss bank domiciled in the United Kingdom on U.S. residents) as well as local claims (claims of a U.S. affiliate of a Swiss bank on U.S. residents). Both types of claims would instead not be recorded as Swiss bank claims on a residence (locational) basis. The “ultimate risk” basis implies that the borrower is the entity

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<sup>17</sup> See BIS (2010) for a guide to international banking statistics. McGuire and Tarashev (2008) discuss a variety of uses of these data, while McCauley, McGuire, and von Peter (2010) show the importance for a country’s foreign assets and liabilities of banking activity conducted by local affiliates of foreign banks, and contrast consolidated bank exposures with those arising from locational banking statistics.

ultimately responsible for the liability (for example through guarantees or derivatives' contracts).

As highlighted by the 2<sup>nd</sup> column, cross-border bank claims account for a sizable fraction of total external assets—around half for banking centers such as Switzerland and the United Kingdom. Also, there are very significant differences in the absolute magnitude of bank claims for all countries involved (compare columns 1 and 4), a point also underscored by McGuire and von Peter (2009). In particular, foreign claims of Swiss banks are over 40 percent larger when measured on a consolidated basis, reflecting very significant “local” activity by Swiss bank affiliates, particularly in the United States (as discussed below). Similarly, for the euro area foreign claims on a consolidated basis are much higher than cross-border bank claims on a locational basis, also reflecting significant “local” activity by affiliates of euro area banks. On the other hand, U.K. foreign bank claims on a consolidated basis are much lower than cross-border claims on a locational basis, reflecting the large size of cross-border claims by affiliates of foreign banks domiciled in the United Kingdom. Similarly, for the United States foreign bank claims on a consolidated basis are much lower than cross-border claims on a locational basis: a significant fraction of the latter is accounted for by claims of U.S. parent banks on overseas affiliates, which are excluded on a consolidated basis.

Table 3 provides some detail on the geographical breakdown of bank claims. It is striking to see how the claims on U.S. residents of euro area and especially Swiss banks are much higher on a consolidated basis. On the other hand, data on a consolidated basis downplays the size of claims of the United Kingdom on the euro area, since a significant fraction of these claims on a locational basis reflect activity by non-British banks. Other significant differences occur in the exposure of euro area banks to “other Europe”, which is much higher on a consolidated basis (reflecting sizable local activity of affiliates of euro area banks in Central and Eastern Europe), and in bank exposure to offshore centers (particularly for the United States) which is much lower on a consolidated basis. This happens because claims on a locational basis are inflated by the high volume of cross-holdings between U.S. banks and their offshore center affiliates.

It is not feasible to undertake the same analysis for consolidated bank liabilities, because the BIS only reports banks' consolidated foreign claims. However, we can make use of the data on banks' consolidated foreign claims—available for banks of 24 countries—to construct a measure of liabilities of domestic residents to foreign banks from those 24 countries, and compare this measure with liabilities to banks resident in the same 24 countries on a locational basis. This is done in Table 4.<sup>18</sup> The data highlights the much larger liabilities of U.S. residents to foreign banks on a consolidated basis—the mirror image of the much larger “consolidated” foreign claims on U.S. residents of euro area and Swiss banks (see columns 2

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<sup>18</sup> The number of countries and territories that reported bank claims on a locational basis to the BIS at end-2007 (41) was much larger than the number of countries and territories reporting those claims on a consolidated, ultimate risk basis (24). To ensure data consistency, for the purpose of constructing Table 4 we have therefore only made use of locational bank claims on country X arising from banks resident in the 24 countries that also report claims on a consolidated, ultimate risk perspective.

and 4). Also, liabilities to foreign banks are much larger on a consolidated basis for emerging markets (China, emerging Asia, and other Europe) reflecting local lending by affiliates of foreign banks. Conversely, liabilities to foreign banks are much lower on a consolidated basis for euro area, Swiss, and U.K. residents. Here locational liabilities reflect both the liabilities of foreign bank affiliates domiciled in the country and claims of foreign affiliates of domestic banks on domestic residents, which are excluded from liabilities on a consolidated basis.

In sum, the comparison of cross-border bank claims on a locational basis (those used in balance of payments statistics) with bank claims on a consolidated basis highlights some important differences in geographical exposures, which are particularly significant for countries with large banking systems. In particular, data on a consolidated basis show a much larger exposure of euro area and Swiss banks to the United States—helping explain the transmission of the financial crisis—while they downplay to some extent the financial exposure of U.K. banks to the euro area. The banking linkages between advanced economies and emerging markets are generally much stronger—particularly between the euro area and emerging Europe—when bank claims are considered on a consolidated basis and include local claims by bank affiliates. Finally, it is important to highlight that the differences between cross-border bank claims on a locational basis and consolidated, ultimate risk basis documented in Tables 2-4 are primarily driven by differences between the residency and consolidated “view”; the quantitative importance of ‘risk transfers’, which differentiate consolidated data on an immediate borrower and ultimate risk basis, is relatively modest.

## VII. CONCLUSIONS

This paper presents a new comprehensive dataset on bilateral gross and net external positions, which covers all those countries and regions with large external claims and liabilities vis-à-vis the rest of the world for the year 2007. The data document the very large size of financial linkages among the main advanced economies, and in particular the very important role played by financial centers in intermediating international capital flows. For example, the euro area’s external claims and liabilities vis-à-vis the United Kingdom are of the order of 50 percent of euro area GDP, and claims and liabilities of the United States vis-à-vis small offshore centers are close to  $\frac{1}{4}$  of U.S. GDP. The importance of international financial intermediaries complicates the task of assessing the extent of a country’s balance sheet vulnerability to shocks affecting different geographical areas.

With the exception of oil exporters, our data coverage for emerging markets is good, even though not as comprehensive as for the main advanced economies. This evidence suggests that a dominant share of cross-border assets and liabilities for Brazil, India, and Russia are vis-à-vis the main advanced economies, while for emerging Asian economies as well as Asian financial centers such as Hong Kong S.A.R. and Singapore regional financial linkages and linkages to other emerging markets play a comparatively more important role. In absolute terms, the largest ‘data gap’ is for holders of euro area portfolio liabilities, which may reflect a combination of holdings by sovereign wealth funds and reserves holders in the Middle East and emerging Asia, claims held through offshore centers, as well as some under-reporting of holdings by other euro area countries and advanced economies. Given the large size of external portfolios in advanced economies, particularly those in Europe, asset price

declines in individual partner countries can have a significant effect on the value of a country's external claims.

This new dataset has a number of research and policy applications. For example, it can be used to revisit studies attempting to explain bilateral cross-border holdings using gravity-type models. It can also help the calibration of multi-country portfolio models that focus on bilateral financial linkages, both on a net and on a gross basis. On the policy front, it can be used to assess the portfolio impact and cross-border incidence of asset price shocks, or to examine the potential consequences of shocks to capital flows (for example, the impact on destination countries of capital flow retrenchments) along the lines of Tressel (2010).

Looking forward, as more recent bilateral data becomes available it will be interesting to assess how bilateral financial linkages have changed since the onset of the global financial crisis, particularly in light of the retrenchment in cross-border banking positions among advanced economies that has characterized the last two years (Milesi-Ferretti and Tille, 2010). The bilateral FDI data that is being collected by the ongoing Coordinated Direct Investment Survey, which will start to become available in late 2010, will be particularly valuable. A finer breakdown of bilateral positions for individual euro area countries can help shed light on the cross-country implications of the recent disruptions in some euro area bond markets. Increased availability of data on bilateral external positions—particularly for emerging Asian economies, offshore centers, and oil exporters—would help provide a more complete picture of cross-border financial linkages, thus improving our understanding of the international transmission of financial shocks. In that respect, further progress in establishing ultimate exposures, including on a currency and sectoral basis, would also be very important.



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Table 1. Euro Area Portfolio Liabilities:  
coverage gap by country (end-2007), in billions of US dollars

Portfolio equity		Portfolio debt	
Total euro area	2,271	Total euro area	1,357
Luxembourg	1,100	France	415
Ireland	733	Netherlands	260
Netherlands	271	Italy	248
Spain	106	Germany	167

Sources: IMF, Coordinated Portfolio Investment Survey and IMF, Balance of Payments Statistics.

Note: the table reports the difference between countries' total portfolio equity and debt liabilities and the total equity and debt claims on these countries reported by participants to the CPIS.

Table 2. Banks' locational Cross-border Claims versus Consolidated Foreign Claims  
(includes local claims in all currencies): totals (end-2007)

Source country	Locational basis 1/			Consolidated basis 2/ (foreign claims, ultimate exposure basis)	
	billions USD	% of total external assets	% of GDP	billions USD	% of GDP
	(1)	(2)	(3)	(4)	(5)
Euro Area 3/	6,908	32%	55%	9,229	73%
Japan	2,402	45%	55%	2,159	49%
Switzerland	1,539	48%	355%	2,544	586%
United Kingdom	6,844	54%	244%	4,005	143%
United States	2,961	16%	21%	1,667	12%
Australia+Sweden	522	26%	37%	1,122	80%

Source: Bank of International Settlements, Locational Banking Statistics and Consolidated Banking Statistics, ultimate risk perspective.

1/ Cross-border claims of domestic as well as foreign banks located in countries shown in the first column.

2/ Worldwide consolidated foreign claims of banks with headquarter in countries shown in the first column. Foreign claims include local claims of banks' foreign affiliates in all currencies.

3/ The data for euro area claims excludes intra-euro area claims, as well as claims by Slovenian banks, which do not report locational and consolidated banking statistics to the BIS. Luxembourg does not report consolidated banking data on an ultimate risk basis; to construct the euro area total we have used their data on an immediate borrower basis (for all countries that report both sets of statistics, the data were very similar). Luxembourg's banks foreign claims on a consolidated, immediate borrower basis at end-2007 were about \$175 billion.

Table 3. The Geographical Distribution of Banks' Foreign Assets  
(Locational cross-border claims versus consolidated foreign claims, including local claims in all currencies). End-2007, Amounts outstanding in billions of US dollars

Source country → Destination country ↓	<i>Euro Area*</i>		<i>Japan</i>		<i>Switzerland</i>		<i>United Kingdom</i>		<i>United States</i>	
	Locat.	Consolid.	Locat.	Consolid.	Locat.	Consolid.	Locat.	Consolid.	Locat.	Consolid.
Total claims	6,908	9,189	2,402	2,159	1,539	2,544	6,844	4,005	2,961	1,667
Euro Area			572	567	407	518	2,843	1,220	453	421
Japan	129	335			44	175	261	124	93	128
Switzerland	246	226	39	25			371	55	196	23
United Kingdom	2,831	2,465	340	163	428	335			939	311
United States	1,046	2,591	707	844	82	1,021	1,481	1,222		
China	36	63	17	27	1	23	30	58	19	24
Emerging Asia	76	158	43	71	9	46	61	166	39	127
Other Europe	505	1,009	10	13	13	43	114	39	16	42
Offshore	608	492	313	174	487	147	672	220	868	64

Source: Bank of International Settlements, Locational Banking Statistics and Consolidated Banking Statistics, ultimate risk perspective.

\* The data for euro area claims excludes intra-euro area claims, as well as claims by Slovenian banks, which do not report locational and consolidated banking statistics to the BIS. Luxembourg does not report consolidated banking data on an ultimate risk basis; to construct the euro area total we have used their data on an immediate borrower basis (for all countries that report both sets of statistics, the data were very similar). Finland does not report its geographical distribution of foreign claims, but its total holdings for 2007 were below \$8 billion. Luxembourg's banks foreign claims on a consolidated, immediate borrower basis at end-2007 (broadly comparable to the statistics presented here) were about \$175 billion.

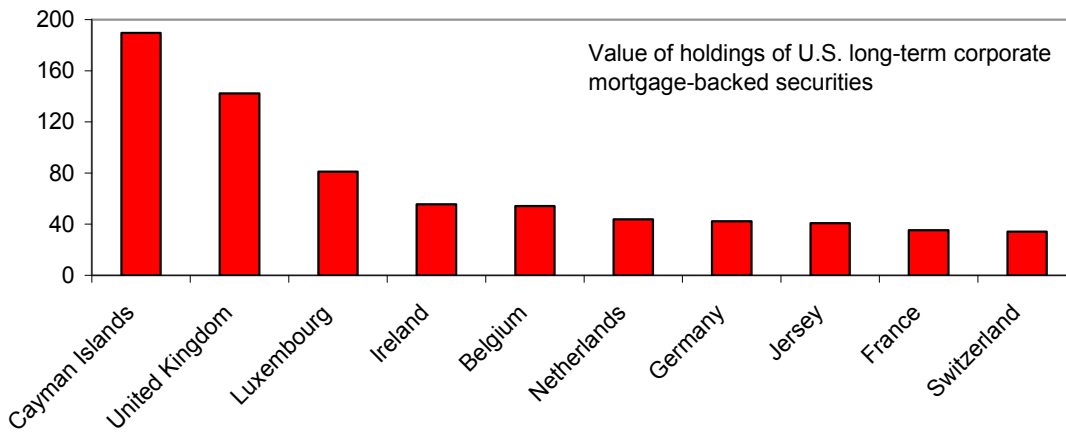
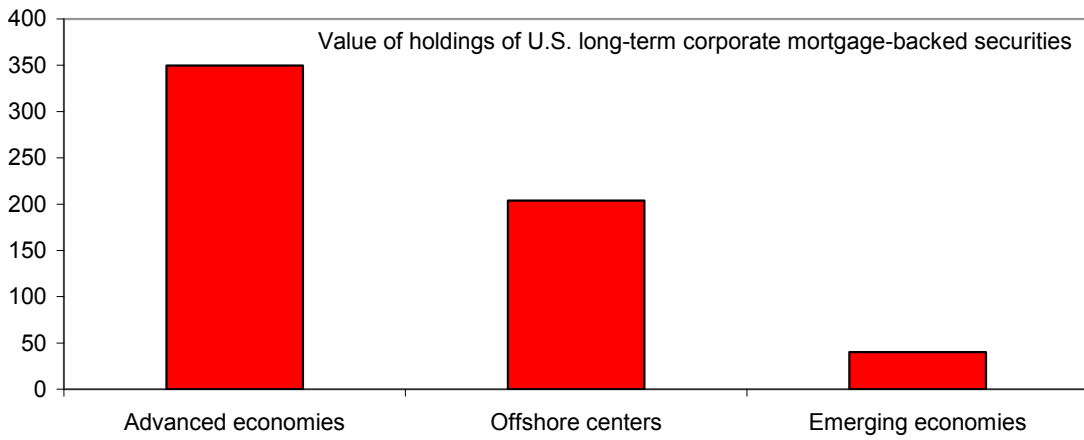
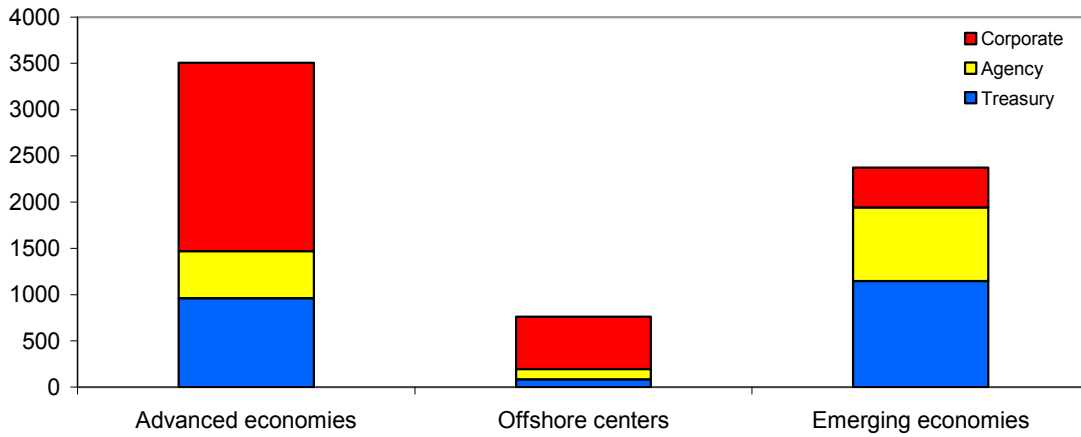
Table 4. Liabilities to BIS-reporting Banks: Locational vs. Consolidated Basis, end 2007

	Locational basis (cross-border liabilities to banks located in BIS reporting countries)			Consolidated basis (foreign liabilities to BIS reporting banks, ultimate exposure basis)	
	billions USD	% of total external liabilities	% of GDP	billions USD	% of GDP
	(1)	(2)	(3)	(4)	(5)
Euro Area	4,607	20%	38%	3,172	26%
Japan	600	19%	14%	779	18%
Switzerland	910	35%	210%	347	80%
United Kingdom	4,798	36%	171%	3,567	127%
United States	3,646	18%	26%	6,257	44%
China	124	8%	4%	214	6%
Emerging Asia	342	17%	14%	655	27%
Other Europe	711	30%	33%	1,269	59%

Source: Bank for International Settlements, Locational Banking Statistics and Consolidated Banking Statistics, Ultimate Risk Basis.

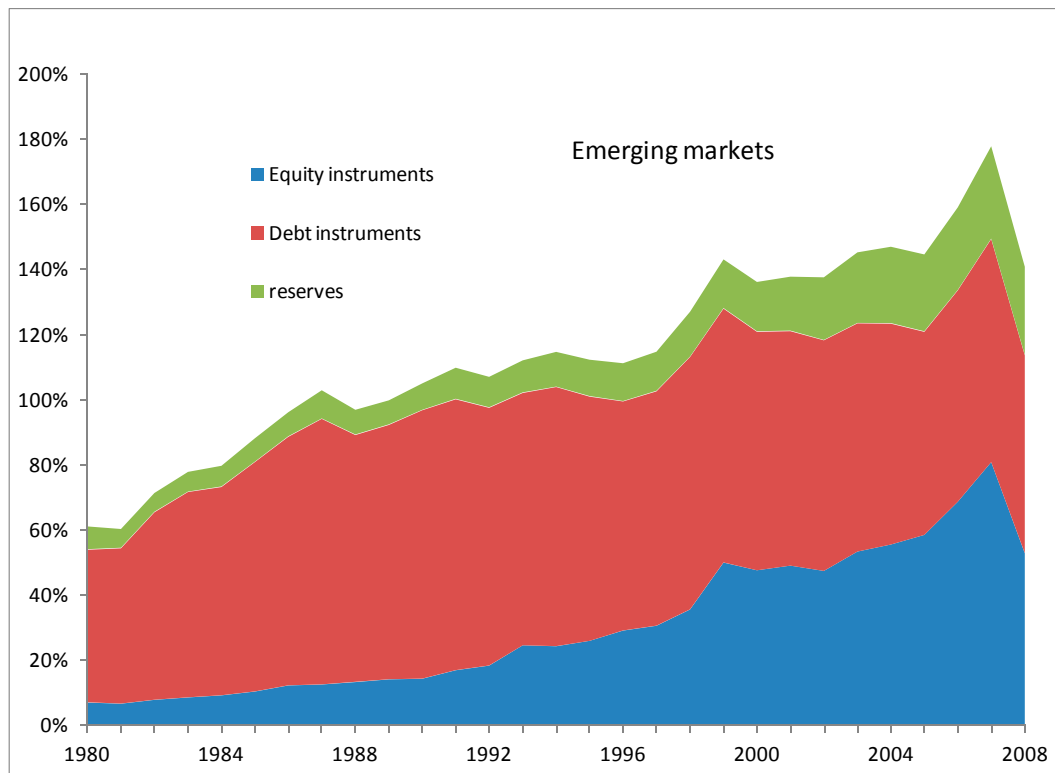
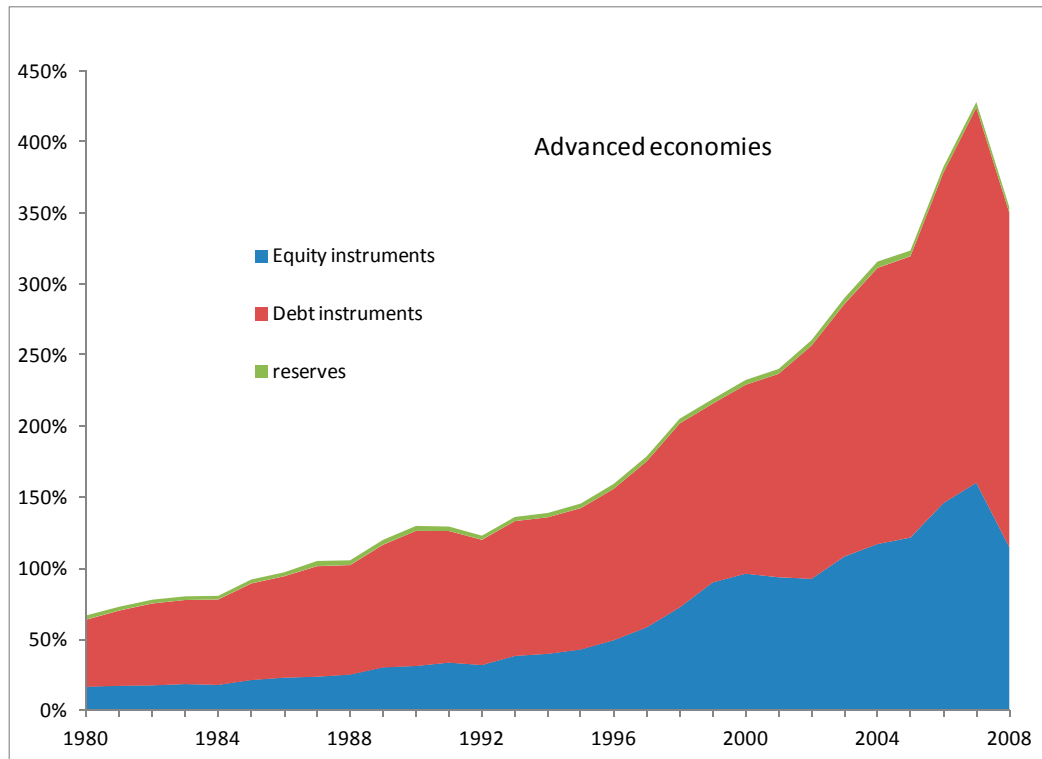
Note: The table reports the liabilities of residents of the listed countries and country groups to banks of the 24 countries and territories that report consolidated bank claims on an ultimate risk basis to the BIS. These are Australia, Austria, Belgium, Canada, Chile, Finland, France, Germany, Greece, India, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Taiwan province of China, Turkey, United Kingdom, and United States. Data for the euro area excludes intra-euro area holdings.

Figure 1. Foreign Holdings of U.S. Securities, 2007



Source: US Treasury.

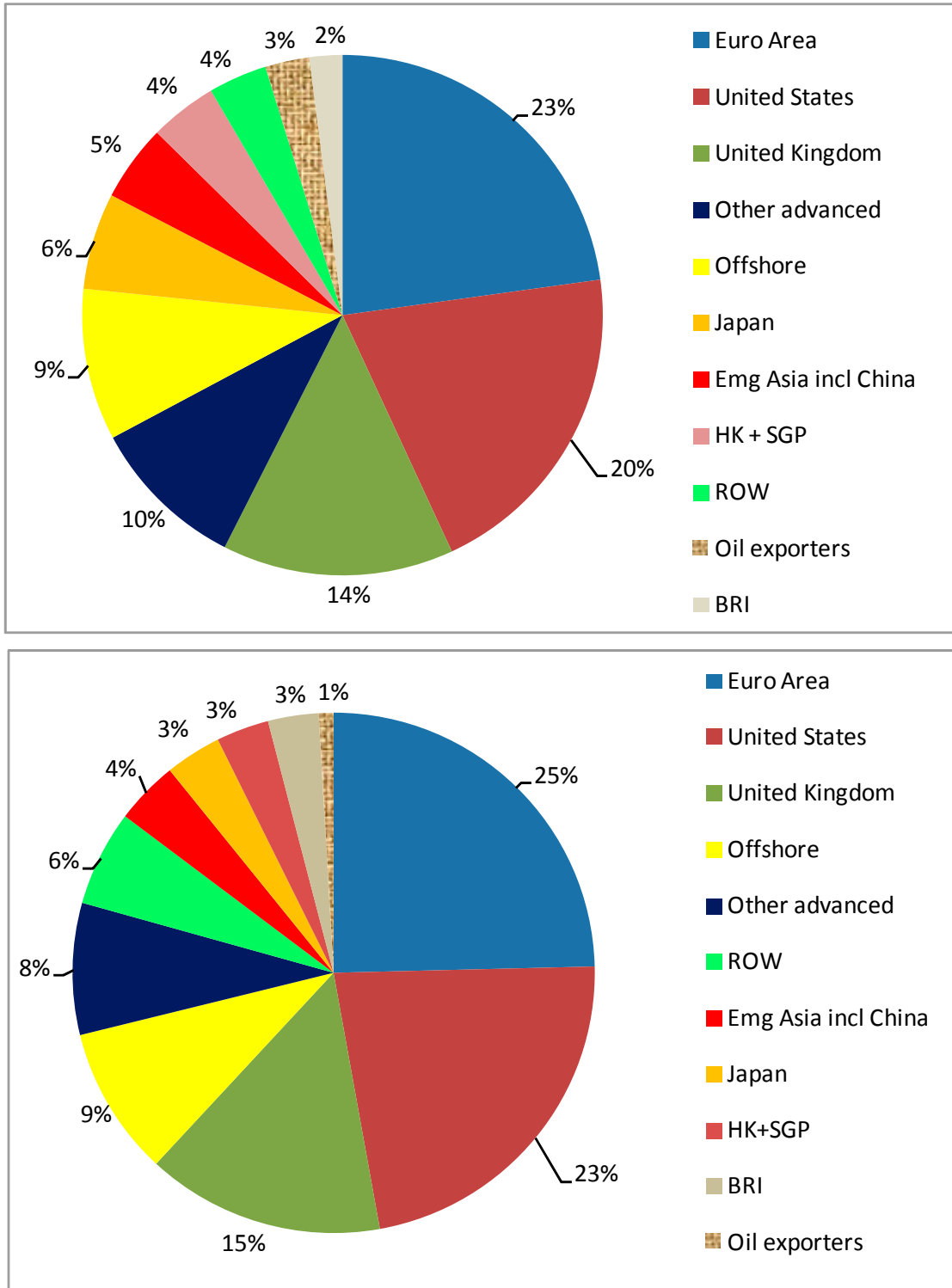
Figure 2. Financial integration: sum of external assets and liabilities, ratio of group GDP



Source: authors' calculations based on the updated External Wealth of Nations database (Lane and Milesi-Ferretti, 2007).



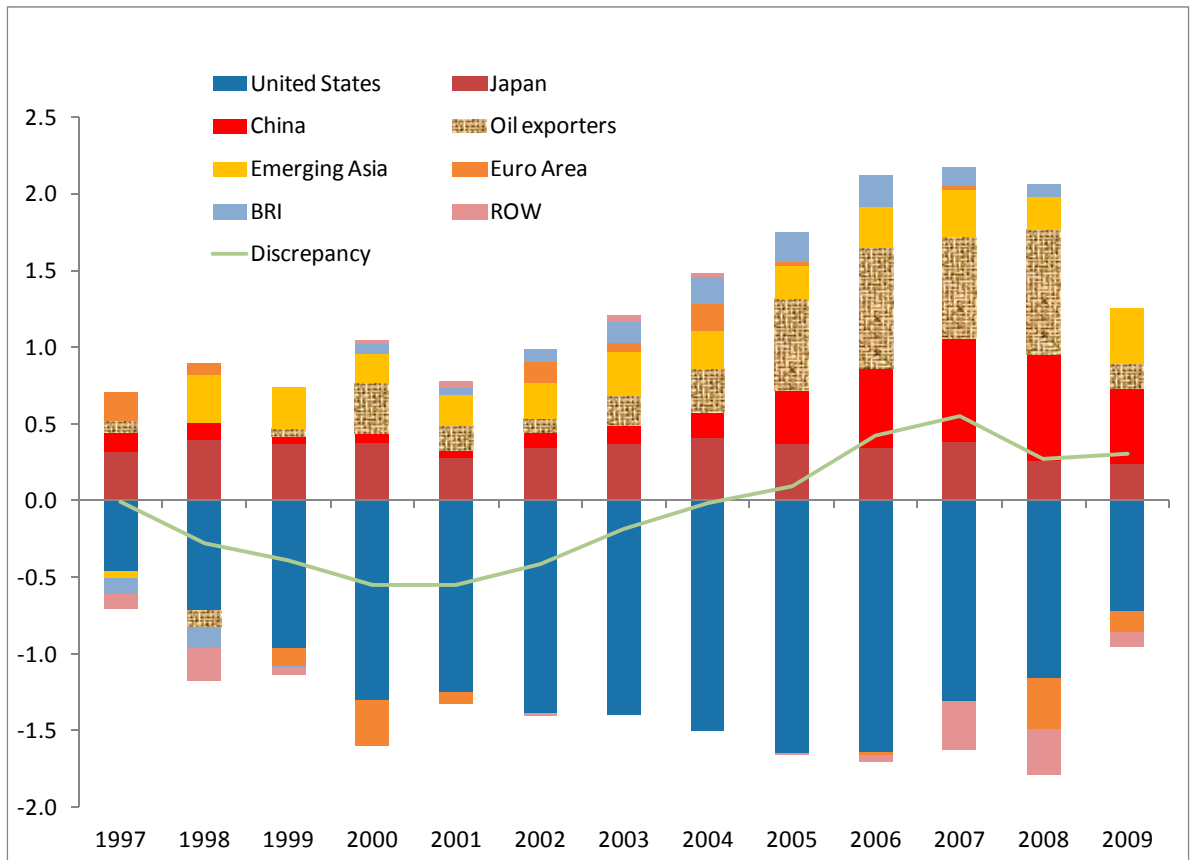
Figure 3. Financial integration: share of world external assets and liabilities, 2007



Source: authors' calculations based on the updated External Wealth of Nations database (Lane and Milesi-Ferretti, 2007).

Note: the "other advanced" group includes Canada and Switzerland (in addition to Australia, Denmark, New Zealand, Norway, and Sweden).

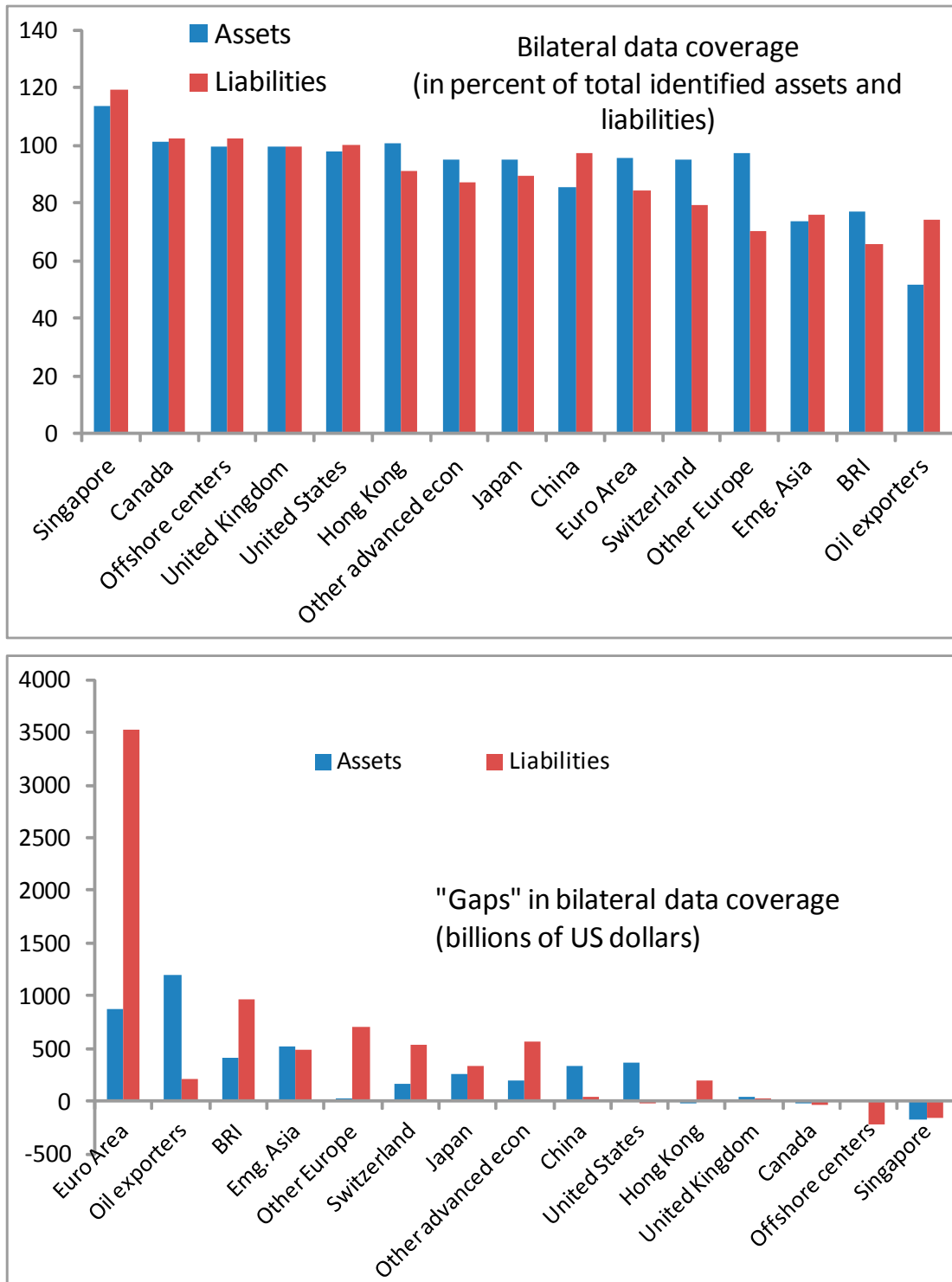
Figure 4. Global Imbalances (in percent of world GDP)



Source: authors' calculations based on IMF, Balance of Payments Statistics.

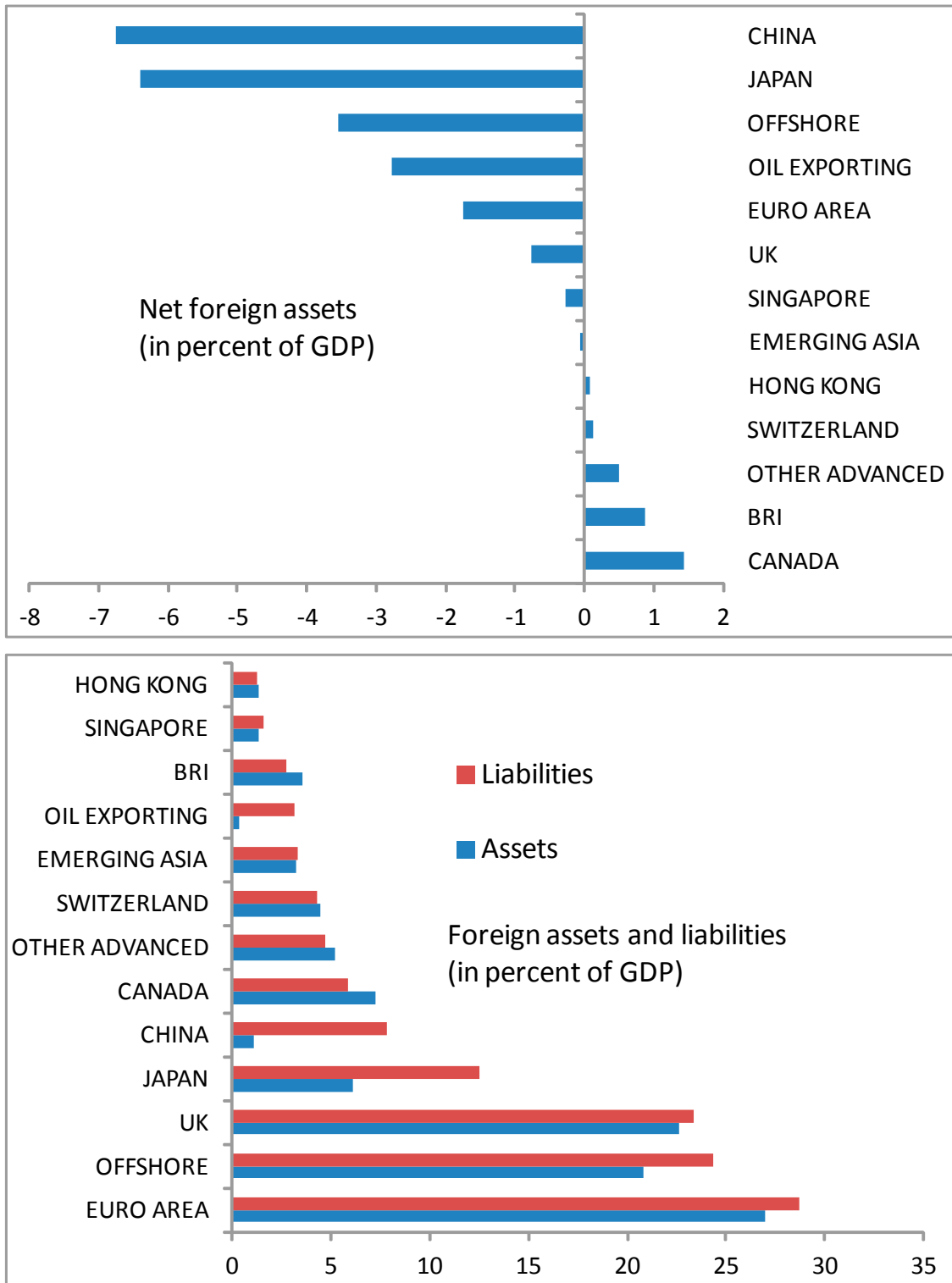
Note: the figure depicts current account balances in percent of world GDP. The aggregate "emerging Asia" also includes Hong Kong S.A.R. and Singapore. For the definitions of the other country groups, see the Appendix.

Figure 5. Coverage of Bilateral Data



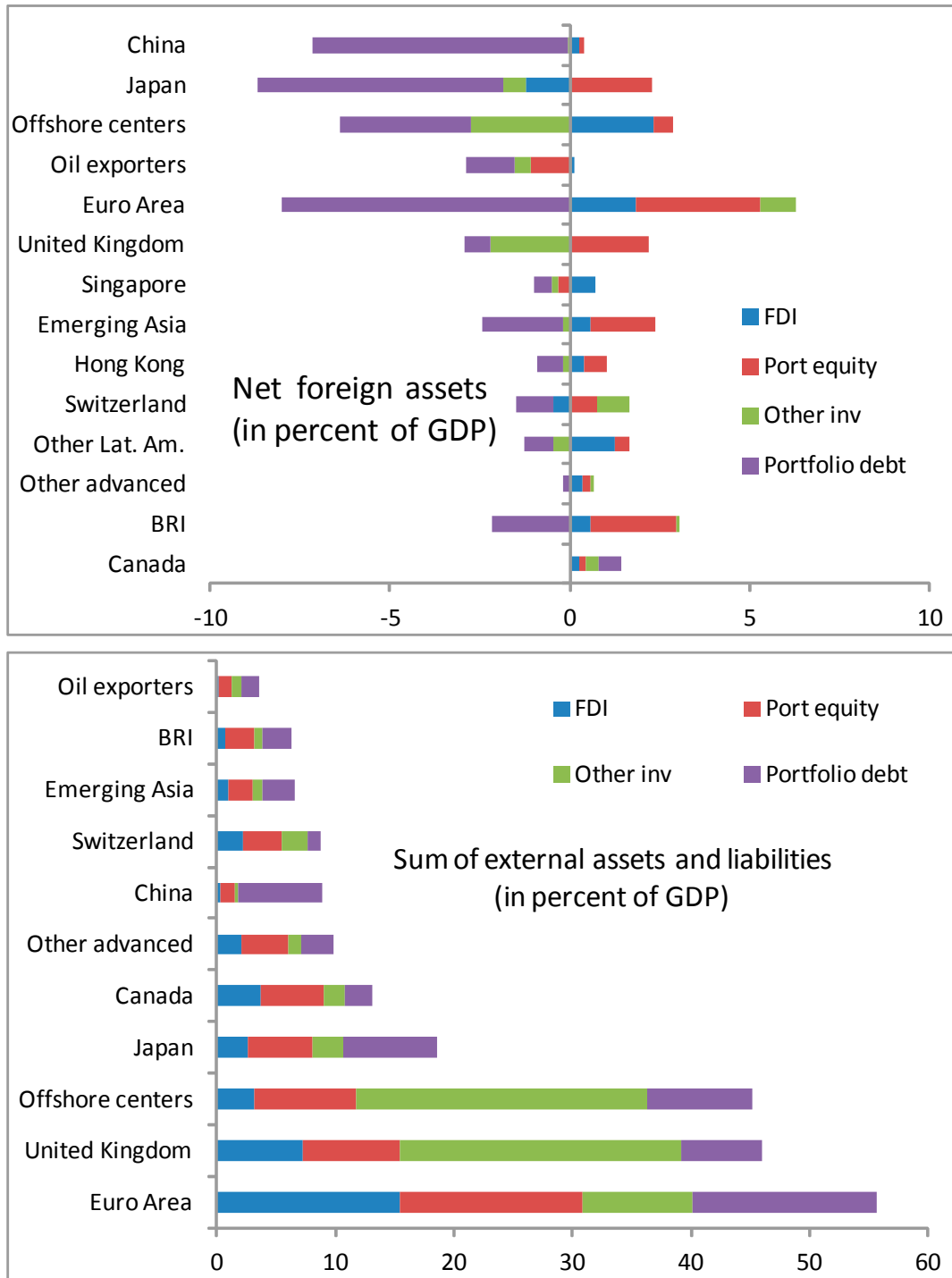
Note: The upper chart shows the ratio between assets and liabilities for which a bilateral counterpart is identified to total external assets and liabilities. The lower chart shows the difference between total external assets and liabilities and those assets and liabilities for which a bilateral counterpart is identified. See Appendix for sample definitions.

Figure 6. United States: net and gross external position (total, in percent of US GDP)



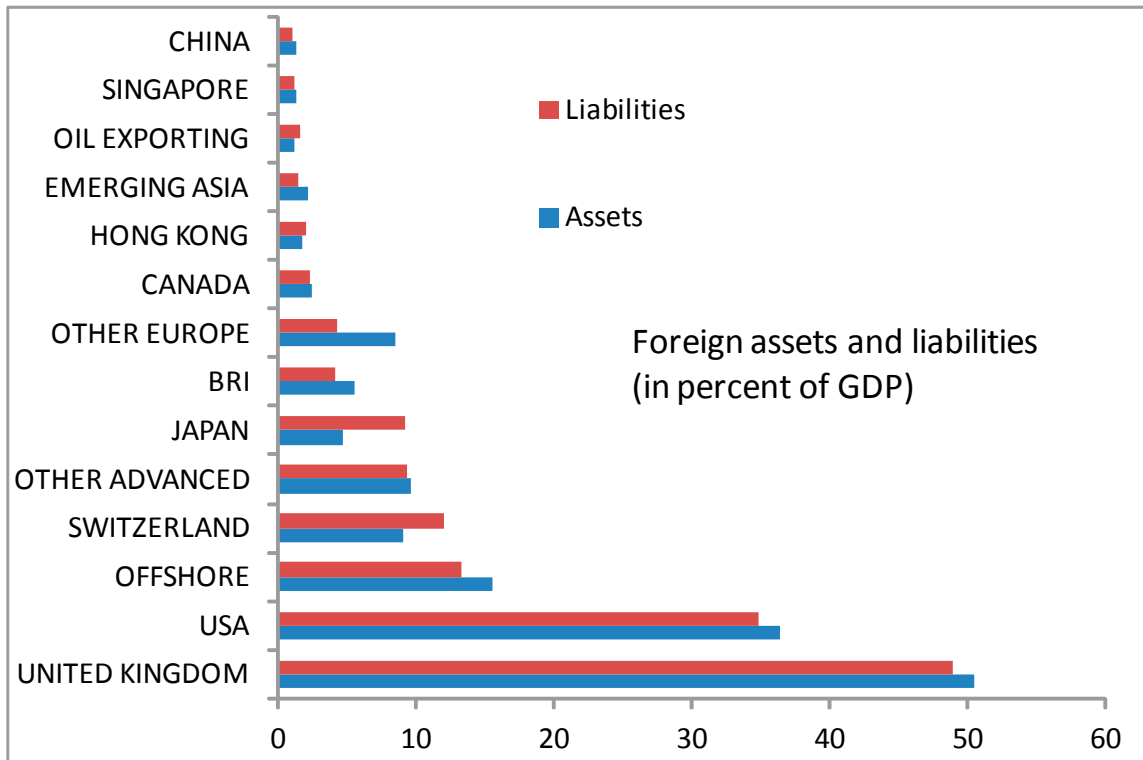
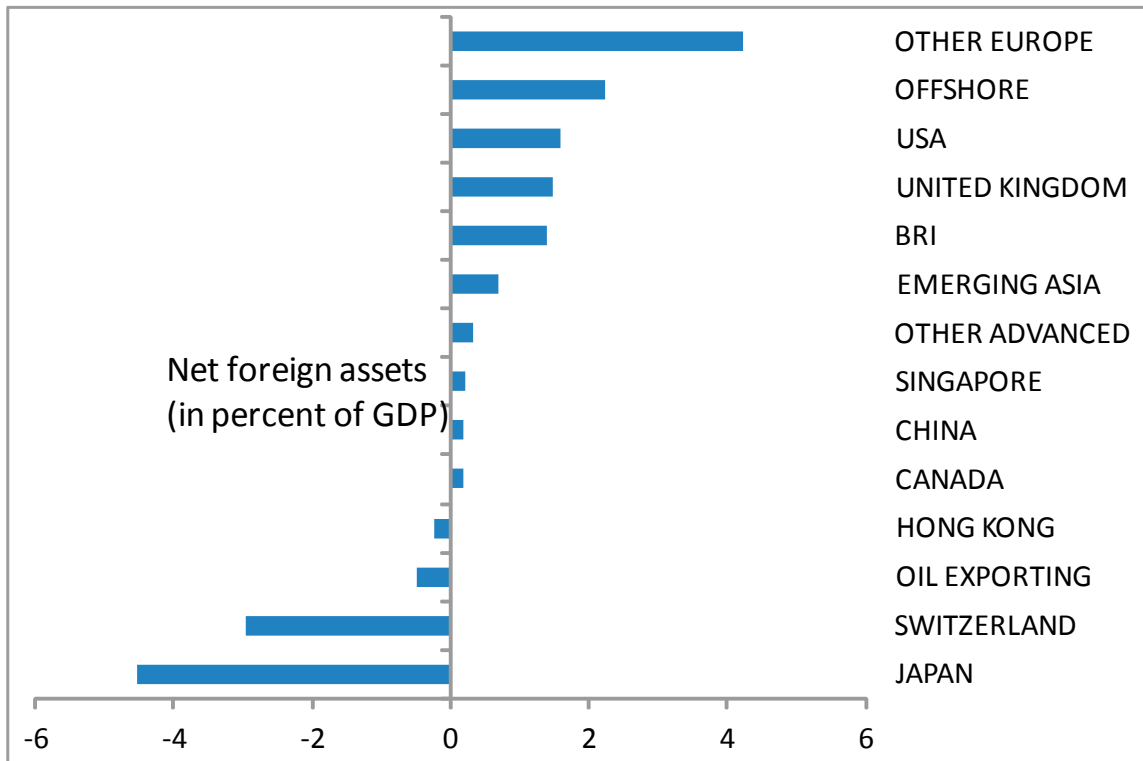
Note: the upper chart displays bilateral U.S. net foreign assets and the bottom chart U.S. bilateral external assets and liabilities, all scaled by US GDP. Source: Authors' database on bilateral external assets and liabilities.

Figure 7. United States: net and gross external position (composition, in percent of US GDP)



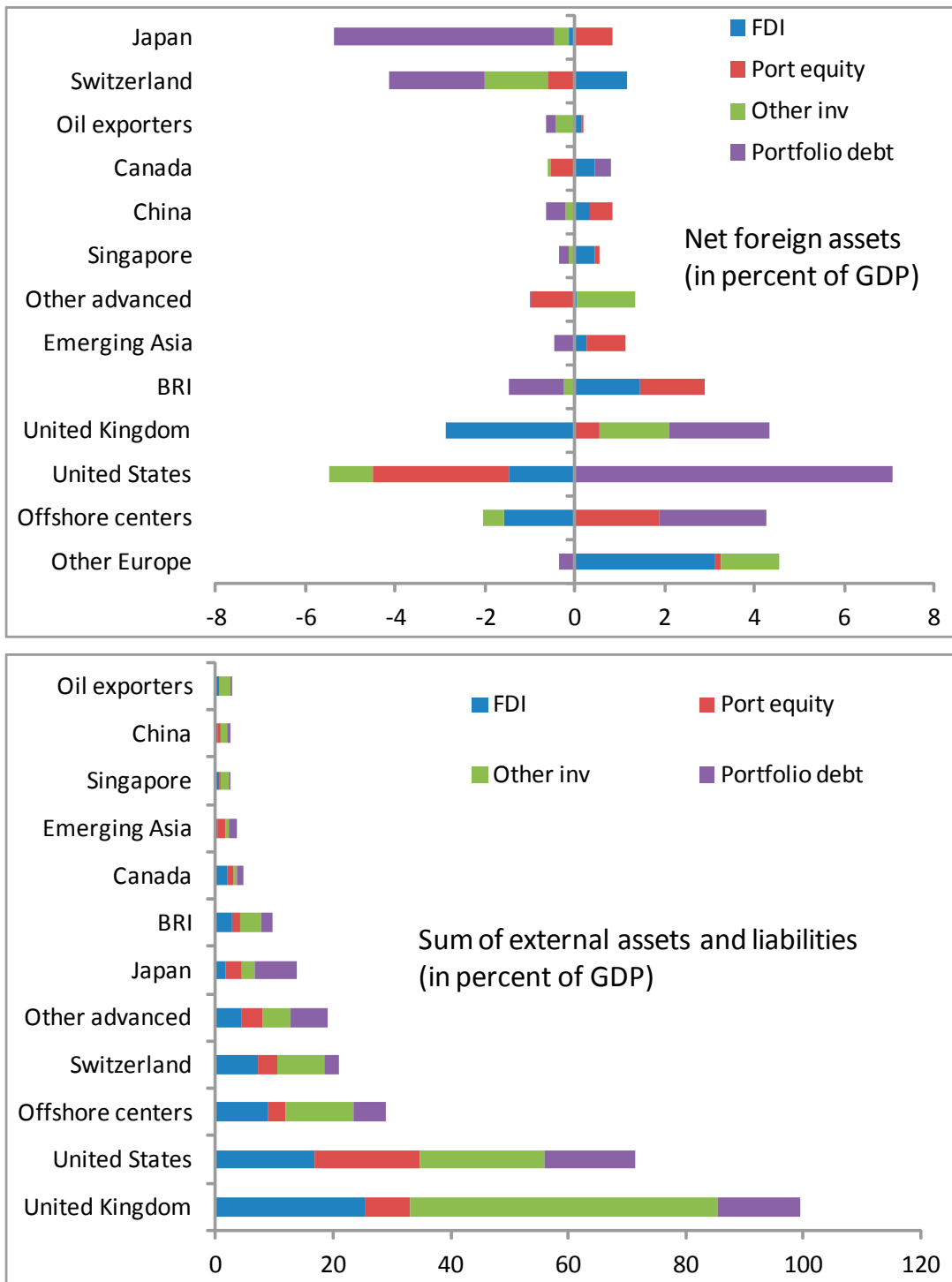
Note: the upper chart displays bilateral U.S. net foreign assets by financial instrument and the bottom chart bilateral U.S. external assets and liabilities by financial instrument, all scaled by US GDP. Source: Authors' database on bilateral external assets and liabilities.

Figure 8. Euro Area: Net and Gross External Positions (total, in percent of euro area GDP)



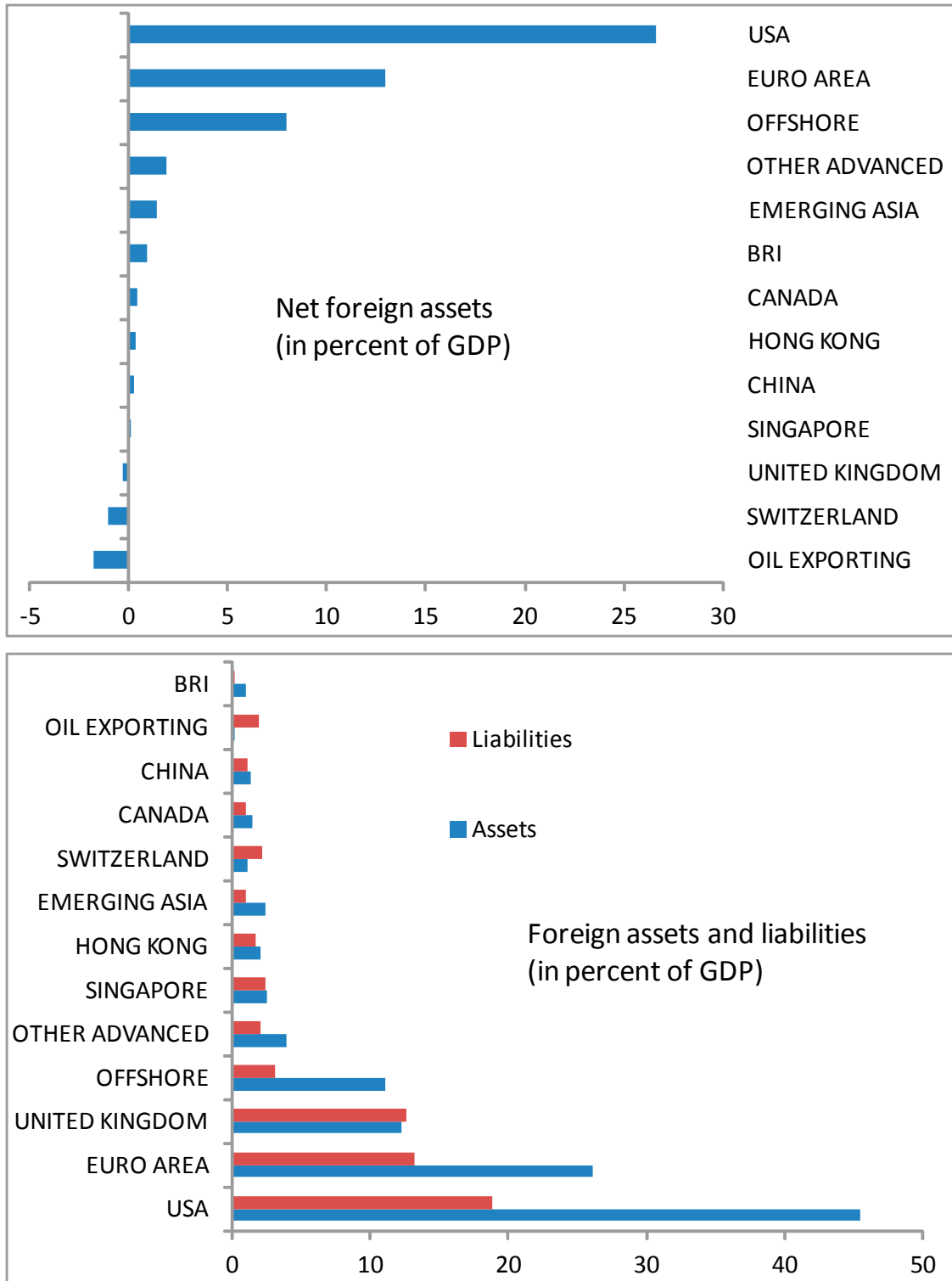
Note: the upper chart displays bilateral euro area net foreign assets and the bottom chart euro area bilateral external assets and liabilities, all scaled by euro area GDP. Source: Authors' database on bilateral external assets and liabilities.

Figure 9. Euro Area net and gross external position (composition, in pct of euro area GDP)



Note: the upper chart displays bilateral euro area net foreign assets by financial instrument and the bottom chart bilateral euro area external assets and liabilities by financial instrument, all scaled by euro area GDP. Source: Authors' database on bilateral external assets and liabilities.

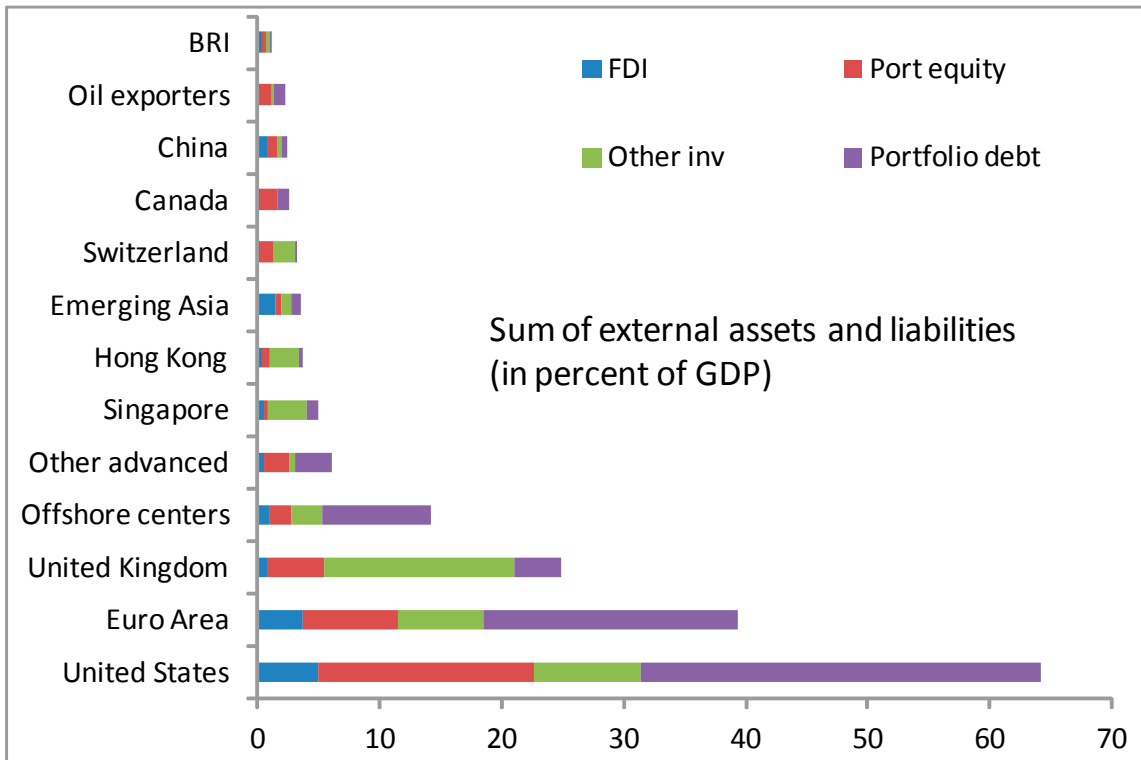
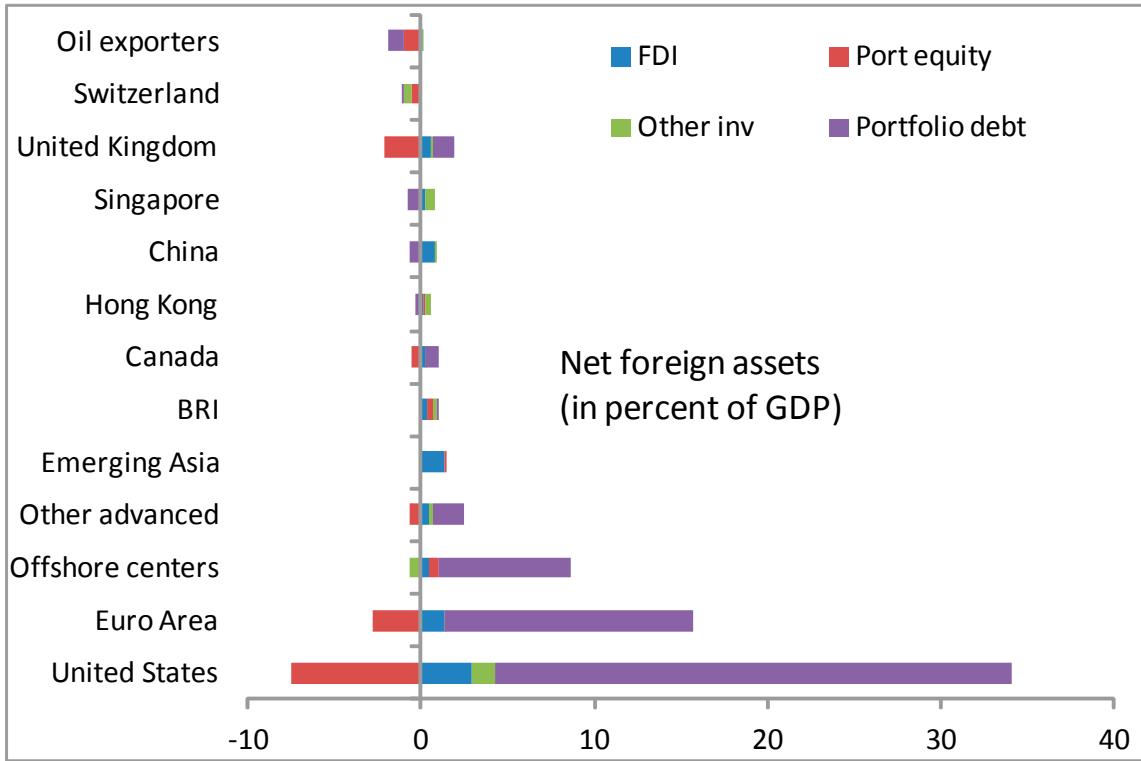
Figure 10. Japan: net and gross external position (composition, in percent of Japan GDP)



Note: the upper chart displays bilateral Japan's net foreign assets and the bottom chart Japan's bilateral external assets and liabilities, all scaled by Japan's GDP. Source: Authors' database on bilateral external assets and liabilities.

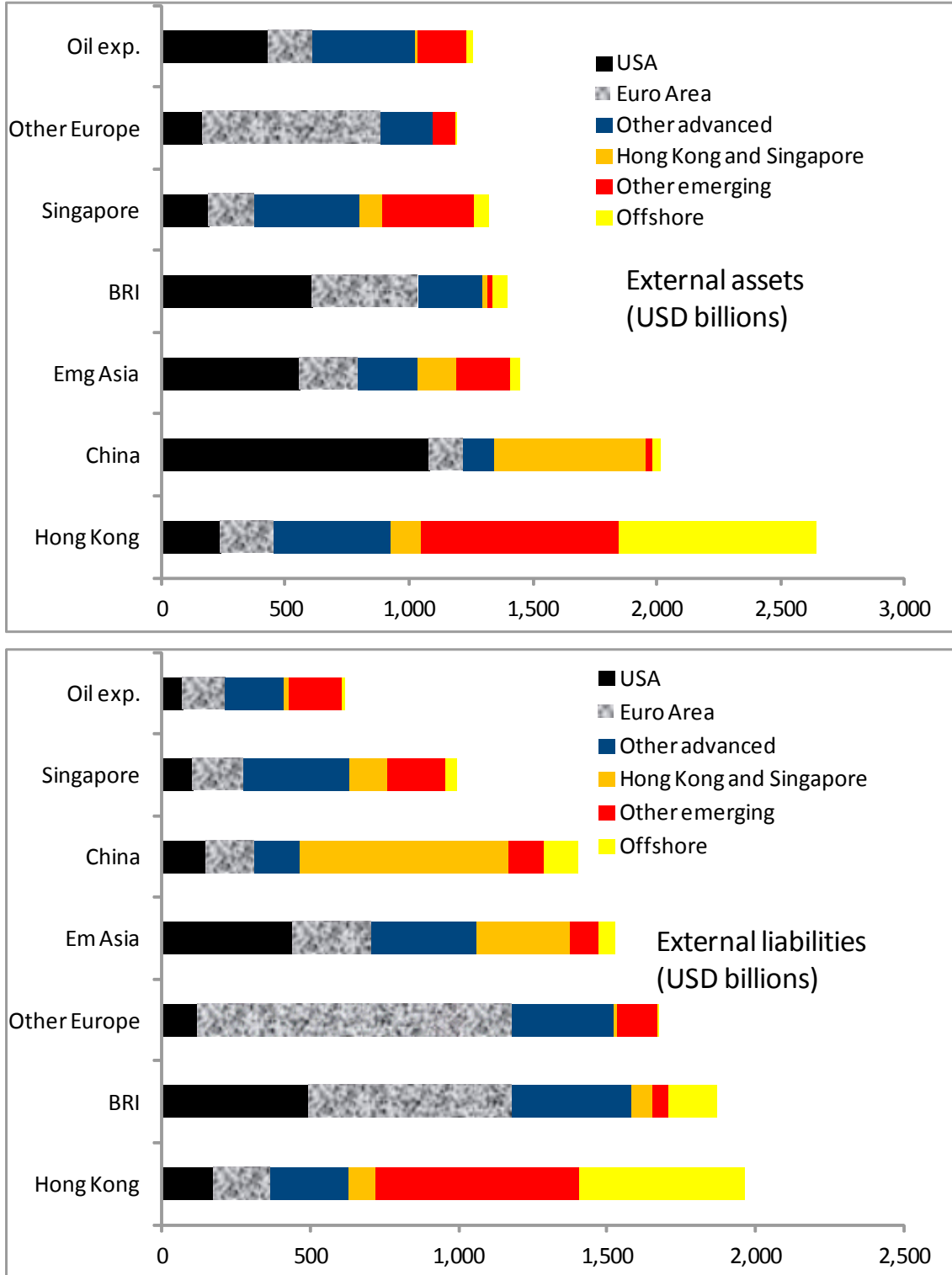


Figure 11. Japan: Net and Gross External Positions (composition, in percent of Japan's GDP)



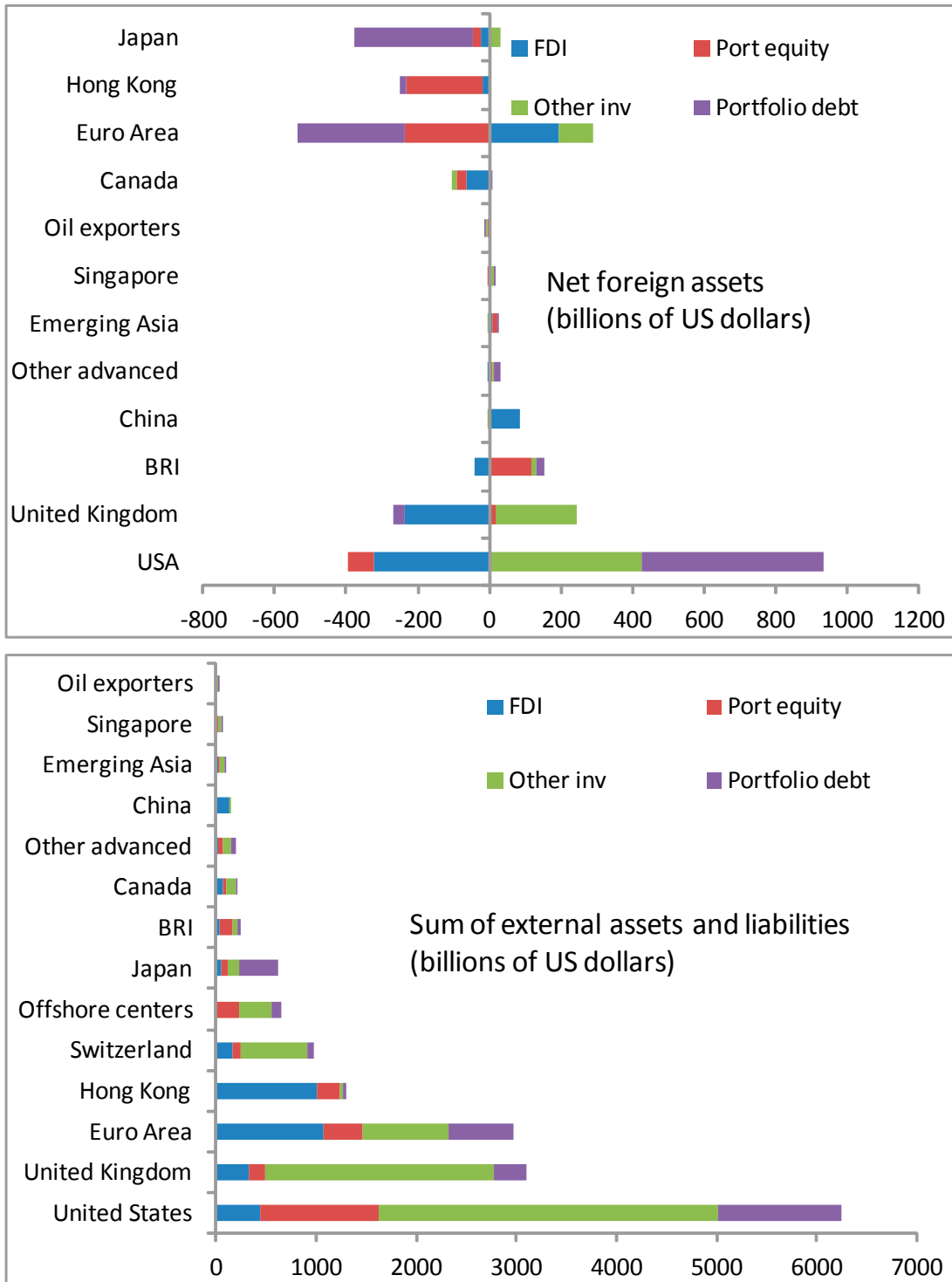
Note: the upper chart displays Japan's bilateral net foreign assets by financial instrument and the bottom chart Japan's bilateral external assets and liabilities by financial instrument, all scaled by Japan's GDP. Source: Authors' database on bilateral external assets and liabilities.

Figure 12. Emerging Markets: External Portfolio (billions of US dollars)



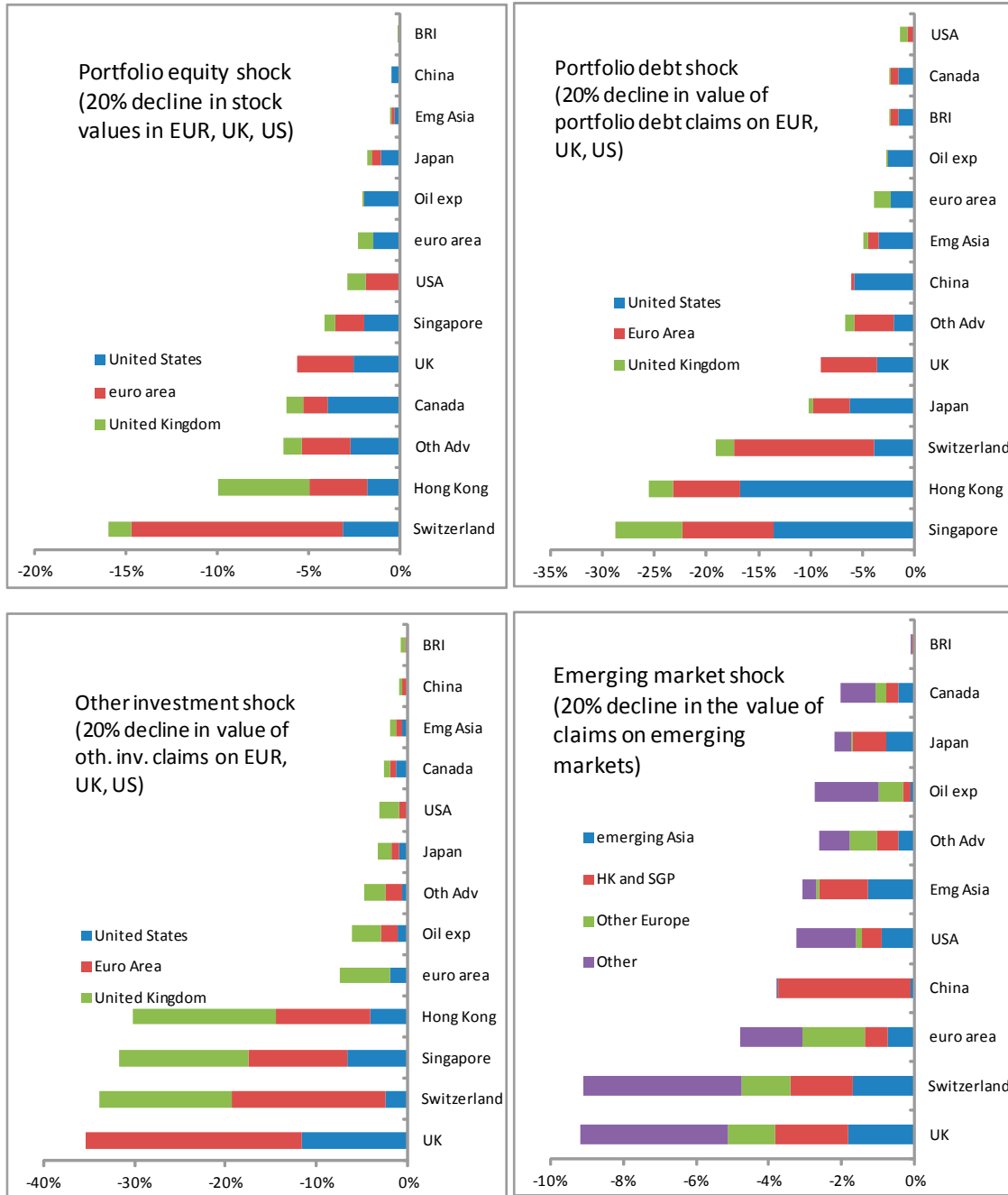
Note: the upper chart shows the geographical composition of emerging markets' external assets and the bottom chart the geographical composition of their external liabilities, both in billions of US dollars. Source: Authors' database on bilateral external assets and liabilities.

Figure 13. Offshore centers: net and gross external position (billions of US dollars)



Note: the upper chart displays offshore centers' bilateral net foreign assets by financial instrument and the bottom chart offshore centers' bilateral external assets and liabilities by financial instrument (in billions USD). Source: Authors' database on bilateral external assets and liabilities.

Figure 14. Impact of asset price shocks in partner countries (in percent of domestic GDP)



Note: the charts present the impact on each region’s external assets (scaled by domestic GDP) of a 20 percent decline in the value of claims in the euro area, United Kingdom, and United States (top 2 panels, bottom left panel) and of a 20 percent decline in the value of claims on all emerging markets (bottom right panel). For the bottom right panel, claims on emerging Asia includes claims on China and on other emerging and developing countries in East Asia. Claims on “other” emerging markets include Claims on Brazil, Russia, and India; Latin American countries; oil exporters; and other African and Middle-Eastern countries. The bottom panel excludes the impact of the emerging market shock on Hong Kong S.A.R. (91% of GDP) and Singapore (57 percent of GDP).

## APPENDIX I. COUNTRIES AND REGIONAL GROUPS

Our dataset covers 8 individual economies (the United States, Japan, the United Kingdom, Switzerland, Canada, China, Hong Kong S.A.R., and Singapore) and 7 regional groups (euro area, other advanced countries, oil exporters, offshore centers, emerging Asia, “BRI”, and other Europe). The composition of the regional groups for which we construct bilateral positions is as follows:

Euro area: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovenia, Spain.

Other advanced countries: Australia, Denmark, New Zealand, Norway, and Sweden.

Oil exporters: Algeria, Gabon, Libya, Nigeria, Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

Offshore centers: Aruba, Andorra, Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Gibraltar, Guernsey, Isle of Man, Jersey, Lebanon, Macao, Mauritius, Netherland Antilles, Panama, Samoa, Vanuatu, West Indies, Liechtenstein, Vatican, San Marino, Monaco.

Emerging Asia: Indonesia, Korea, Malaysia, Philippines, Taiwan province of China, and Thailand

BRI: Brazil, Russia, and India.

Other European countries: Albania, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Iceland, Latvia, Lithuania, Macedonia, Malta, Moldova, Poland, Romania, Serbia, Slovak Republic, Turkey, and Ukraine.

In addition, we calculate bilateral external assets and liabilities vis-à-vis another set of partner countries, for which we don't assemble a full “external balance sheet.” These groups are:

Other Latin American countries (including Argentina, Mexico, and other Latin American countries);

Other African and Middle-Eastern countries (including countries such as Egypt and South Africa);

Other Asian countries (including countries such as Bangladesh and Vietnam).

## APPENDIX II. DATA SOURCES AND ADJUSTMENTS

All data in currencies different from US dollars have been converted in USD by using the IMF official exchange rates as of Dec 31, 2007 and expressed in millions.

### Brazil, Russia, and India (BRI)

**FDI:** we use reported FDI assets for Brazil and figures derived from partner countries for both FDI assets of India and Russia and for FDI liabilities of Brazil, India, and Russia.

**Portfolio equity and debt:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investment, equity securities and total debt securities (tables 1, 1.1 and 1.2). For portfolio liabilities we use derived portfolio investment liabilities by country of non-resident holder for total portfolio investment, equity securities and total debt securities (tables 5, 5.1, 5.2). Aggregate figures for the BRI group for portfolio assets and liabilities are calculated as the sum of the individual CPIS reported data (for assets) and derived data (liabilities) from Brazil, Russia and India. For India, even if reported liabilities were available, we use derived liabilities for consistency with the other two countries in the same group and because reported liabilities for India are lower than the derived ones.

**Other investment:** we use both reported figures for loans and deposits of Brazilian and Indian banks, as well as data derived from partner countries (from BIS and other sources) for claims and liabilities of Russian banks and of Brazilian, Indian, and Russian nonbanks.

**Foreign exchange reserves:** For Russia, we use the currency composition of reserves reported by the Central Bank of Russia. For Brazil, we estimate holdings in the United States as the difference between US portfolio debt liabilities vis-à-vis Brazil at end-2007 and Brazil's portfolio debt holdings in the United States. The remainder is estimated to be held in euros. For India, we estimate the currency composition of reserves based on COFER data. We assume that reserves are held in the country corresponding to the currency of issuance.

### CANADA

**FDI:** we use outward and inward stocks by country of foreign direct investment statistics published by the Office of the Chief Economist of the Canadian Minister of Foreign Affairs and International Trade (<http://www.international.gc.ca/economist-economiste/statistics/statistiques/investments-investissements.aspx?lang=eng>)

**Portfolio equity and debt:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investments, equity securities and total debt securities (tables 1, 1.1 and 1.2). For portfolio liabilities we use derived portfolio investment liabilities by country of non-resident holder for total portfolio investment, equity securities and total debt securities (tables 5, 5.1, 5.2).

**Other Investment:** for banks, we use loans and deposits of Canadian banks as reported to the BIS; for nonbanks, we use partner-country data on liabilities and claims of BIS-reporting banks vis-à-vis Canadian nonbanks in the form of loans and deposits.

**Foreign exchange reserves:** we use Canada Department of Finance data for the dollar share of reserves (<http://www.fin.gc.ca/pub/oir-ro-eng.asp>) and the report “The international role of the euro” published by the European Central Bank in July 2009 for the euro share of reserves, and assume that reserves are held in the country corresponding to the currency of issuance.

## CHINA

**FDI:** we rely both on reported figures (from UNCTAD) and figures derived from partner-country data.

**Portfolio equity and debt:** China does not report the geographical allocation of its portfolio investment holdings. We therefore use data derived from partner countries’ bilateral portfolio liabilities (see discussion under “Foreign exchange reserves” below) but are unable to distinguish portfolio assets from reserves. China’s portfolio equity and debt liabilities are based on data derived from partner country data reported in the CPIS.

**Other Investment:** we use figures derived from partner countries’ estimates for both assets and liabilities.

**Foreign exchange reserves:** We estimate holdings of portfolio debt instruments in the United States from the U.S. Treasury survey of U.S. portfolio liabilities. We estimate holdings in the euro area as the cumulative value of Chinese purchases of German portfolio debt instruments (from Bundesbank data), and holdings in Japan as Japan’s reported portfolio debt liabilities vis-à-vis China from CPIS.

## EMERGING ASIA

**FDI:** we rely on reported figures for FDI assets for Korea (OECD), Malaysia and Thailand (UNCTAD) and for FDI liabilities of Korea (OECD), Malaysia, Philippines, and Thailand (UNCTAD) and on derived figures from partner-country data.

**Portfolio equity and debt:** for assets, we use the IMF Coordinated Portfolio Investment Survey (Indonesia, Korea, Malaysia, Philippines, Thailand) and figures derived from partner-country data for Taiwan province of China. For liabilities we use derived CPIS figures on portfolio investment liabilities by country of non-resident holder for total portfolio investment, equity securities and total debt securities (tables 5, 5.1, 5.2).

**Other Investment:** we use primarily BIS data—both reported figures (for Korea, Malaysia, and Taiwan province of China for bank loans and deposits), and derived figures from partner-country data (for bank assets and liabilities of Indonesia, Philippines, and Thailand and for nonbank assets and liabilities of all countries).

**Foreign exchange reserves:** For Korea we estimate the currency composition of reserves using COFER data (where Korea and a few other countries were recently re-classified as advanced economies and we take advantage of the change in reserve composition data to estimate their joint holdings). For Indonesia, the Philippines, and Thailand we estimate currency shares based on COFER data for emerging markets. For Malaysia, we estimate reserve holdings in the United States as the difference between U.S. portfolio debt liabilities vis-à-vis Malaysia and Malaysia's reported portfolio debt assets in the United States. For Taiwan province of China, we estimate holdings in the United States as total U.S. portfolio debt liabilities vis-à-vis Taiwan reported by the U.S. Treasury survey of portfolio liabilities. Note that for Taiwan province of China we are unable to distinguish between portfolio debt assets and foreign exchange reserves held in the form of securities. We assume that reserves are held in the country corresponding to the currency of issuance.

## EURO AREA

**FDI:** we rely on the geographical breakdown of the international investment positions for FDI provided in Statistical Data Warehouse of the European Central Bank for the Euro area 13 (fixed composition). In particular we use annual outstanding amounts at end of period of "*Financial Accounts: Direct Investment Abroad*" (for assets) and "*Financial Accounts: Direct Investment in the Reporting Economy*" (for liabilities). ([http://sdw.ecb.europa.eu/browseSelection.do?DATASET=0&DATASET=1&FREQ=A&REF\\_AREA=506&DATA\\_TYPE\\_BOP=8&node=2120819](http://sdw.ecb.europa.eu/browseSelection.do?DATASET=0&DATASET=1&FREQ=A&REF_AREA=506&DATA_TYPE_BOP=8&node=2120819)). Since the geographical breakdown for Euro Area FDI refers to a broader category of "offshore centers" which includes Hong Kong S.A.R. and Singapore, we use ECB-reported positions vis-à-vis Hong Kong S.A.R. and Singapore's reported figures for inward and outward FDI vis-à-vis the euro area in order to net this amount out of the "offshore" aggregate figure reported for the Euro Area under in the ECB's SDW. The data are integrated with partner-country data for countries or regions which are not identified separately by the ECB breakdown.

**Portfolio equity and debt:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investments, equity securities and total debt securities (tables 1, 1.1 and 1.2). For portfolio liabilities we use derived portfolio investment liabilities by country of non-resident holder for total portfolio investments, equity securities and total debt securities (tables 5, 5.1, 5.2). Portfolio assets and liabilities are calculated as the sum of the individual CPIS reported data (for assets) and derived data (for liabilities) from the euro area 12 countries (i.e. excluding Slovenia from the 2007 euro area composition) netting out the intra euro area positions. Slovenia is not included as this country is not among the CPIS reporters.

**Other Investment:** we rely on the geographical breakdown of the international investment positions for other investment provided in Statistical Data Warehouse of the European Central Bank for the Euro area 13 (fixed composition). Specifically, we use annual outstanding amounts at end of period of "*Financial Accounts: Other Investment, assets*" (for assets) and "*Financial Accounts: Other Investment, liabilities*" (for liabilities). (<http://sdw.ecb.europa.eu/browseSelection.do?DATASET=0&DATASET=1&FREQ=A&no>



[de=2120826](#)). As for FDI, we integrate these data with partner-country data for countries and regions not identified separately by the ECB breakdown.

**Foreign exchange reserves:** We use data provided by the European Central Bank on the currency composition of euro area reserves. We assume that reserves are held in the country corresponding to the currency of issuance.

### HONG KONG S.A.R. of China

**FDI:** we rely on the geographical breakdown of FDI statistics published by the Census and Statistics Department of the Government of Hong Kong ([http://www.censtatd.gov.hk/hong\\_kong\\_statistics/statistics\\_by\\_subject/index.jsp?subjectID=3&charsetID=1&displayMode=T](http://www.censtatd.gov.hk/hong_kong_statistics/statistics_by_subject/index.jsp?subjectID=3&charsetID=1&displayMode=T)). In particular we use positions of outward direct investment at end of year 2007 reported in Table 050 “*Outward Direct Investment (DI) of Hong Kong by Major Recipient Country/Territory at Market Value*” for assets; and positions of inward direct investment at end of year 2007 reported in Table 048 “*Inward Direct Investment (DI) of Hong Kong by Major Investor Country/Territory at Market Value*” for liabilities.

**Portfolio equity and debt:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investment, equity securities and total debt securities (tables 1, 1.1 and 1.2). For portfolio liabilities we use derived portfolio investment liabilities by country of non-resident holder for total portfolio investments, equity securities and total debt securities (tables 5, 5.1, 5.2).

**Other Investment:** for banks, other investment assets are calculated as the difference between total bank assets reported by the BIS and estimated portfolio assets held by banks. The latter are estimated assuming that the geographical distribution of banks’ portfolio assets is the same as the one for total portfolio assets (reported by CPIS). For nonbanks, we use partner-country data on BIS-reported foreign banks’ liabilities vis-à-vis Hong Kong’s nonbanks in the form of deposits. For bank liabilities, we use the same methodology. For nonbank liabilities, we also use partner-country data on BIS-reported foreign banks’ assets vis-à-vis Hong Kong’s nonbanks in the form of loans.

**Foreign exchange reserves:** We use data provided by the Hong Kong Monetary Authority on the currency composition of reserves, and assume that reserves are held in the country corresponding to the currency of issuance.

### JAPAN

**FDI:** we rely on the geographical breakdown provided in the “*Regional direct investment position assets and liabilities (end of 2007)*” provided by the Bank of Japan (<http://www.boj.or.jp/en/theme/research/stat/bop/bop/index.htm#dip>)

**Portfolio equity and debt:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investments, equity securities and total debt securities (tables 1, 1.1

and 1.2). For portfolio liabilities we use a combination of reported liabilities by country of non-resident holder for total portfolio investment, equity securities and total debt securities (tables 4, 4.1, 4.2) (<http://www.imf.org/external/np/sta/pi/part.asp?iso=JPN>) and of liabilities derived from partner-country data.

**Other Investment:** for banks, we use the “*Results of Locational International Banking Statistics (end-December 2007)*” prepared by the Financial Markets Department of the Bank of Japan ([http://www.boj.or.jp/en/type/stat/boj\\_stat/ibs/qibs0712.htm](http://www.boj.or.jp/en/type/stat/boj_stat/ibs/qibs0712.htm)). Because these data include portfolio investment assets of banks as well as banks’ trustee business we adjust the data by subtracting from Japan’s bilateral banking statistics the amount of portfolio investment assets held by banks (reported in the CPIS sectoral breakdown, table 3) as well as the portfolio investment assets held by Other Financial Institutions/Other, thus assuming that the latter refers to trust accounts. For bank liabilities, the discrepancy between IIP reported figures and BIS locational banking statistics is relatively small. We therefore use directly the Japanese bilateral data without subtracting the quota of portfolio investment liabilities attributed to banks. For nonbanks, we use partner-country data on BIS-reported foreign banks’ assets liabilities vis-à-vis Japanese nonbanks in the form of loans and deposits.

**Foreign exchange reserves:** We estimate the currency composition of Japan’s foreign exchange reserves from COFER data and information about the currency composition of reserves of other advanced economies. We assume that reserves are held in the country corresponding to the currency of issuance.

## OFFSHORE CENTERS

**FDI:** we use derived figures for both FDI assets and liabilities based on the positions reported by partner countries and regions.

**Portfolio equity and debt:** we use both reported and derived figures based on the IMF’s CPIS and on the US Treasury report on US portfolio liabilities.

**Other Investment:** we rely on BIS locational banking statistics. For banks, we use reported assets and liabilities when available, and assets and liabilities derived from partner-country data otherwise. For nonbanks, we use partner-country data on liabilities and claims of BIS-reporting banks vis-à-vis offshore centers’ nonbanks in the form of loans and deposits.

**Foreign exchange reserves:** Offshore centers have very small foreign exchange reserves, and we therefore do not attempt to estimate their bilateral allocation.

## OIL EXPORTERS

**FDI:** due to the lack of reported data on FDI from oil-exporting countries, for both FDI assets and liabilities we rely on figures derived from partner country data.

**Portfolio equity and debt:** for portfolio assets we use both reported figures (from CPIS) and derived figures (from partner-country data, including reported U.S. and Japan reported

portfolio liabilities). For portfolio liabilities, we use CPIS figures derived from partner-country data.

**Other Investment:** we use figures derived from partner-country data (primarily from the BIS), together with reported banking statistics figures for Bahrain.

**Foreign exchange reserves:** For oil exporters we cannot estimate separately the composition of portfolio assets and international reserves, and we therefore report all such estimated holdings as portfolio assets. The main source of information for portfolio asset holdings are the portfolio liabilities reported by the U.S. and Japan vis-à-vis oil exporters.

### OTHER ADVANCED COUNTRIES

**FDI:** the aggregate figures for the group are calculated as the sum of foreign direct investment data reported by Australia, Denmark, and New Zealand (national sources detailed below) and Norway and Sweden (Eurostat). In particular, Australian FDI are based on Table 5 “*Australian Investment Abroad: Level of Investment by Country and Country Groups by type of investment and year*” (for assets) and Table 2 “*Foreign Investment in Australia: Level of Investment by Country and Country Groups by type of investment and year*” (for liabilities) produced by the Australian Bureau of Statistics.

(<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5352.02008?OpenDocument>); New Zealand’s FDI data is based on table 3 “*Stock of direct investment by country*” contained in the report “*Balance of Payments and International Investment Position: Year ended 31 March 2009*” published by Statistics New Zealand

([http://www.stats.govt.nz/browse\\_for\\_stats/economic\\_indicators/balance\\_of\\_payments/BalanceOfPaymentsYearEnded\\_HOTPYe31Mar09.aspx](http://www.stats.govt.nz/browse_for_stats/economic_indicators/balance_of_payments/BalanceOfPaymentsYearEnded_HOTPYe31Mar09.aspx)); Denmark’s FDI are based on Table 3 “*Direct Investments broken down by country*” contained in the report “*Annual statistics on the stock of direct investments, end-2008*” published by the Danmarks Nationalbank.

([http://www.nationalbanken.dk/DNUK/Statistics.nsf/side/Download\\_statistics\\_-\\_Publications!OpenDocument](http://www.nationalbanken.dk/DNUK/Statistics.nsf/side/Download_statistics_-_Publications!OpenDocument)).

**Portfolio equity and debt:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investments, equity securities and total debt securities (tables 1, 1.1 and 1.2). For portfolio liabilities we use derived portfolio investment liabilities by country of non-resident holder for total portfolio investments, equity securities and total debt securities (tables 5, 5.1, 5.2). Aggregate figures for portfolio assets and liabilities are calculated as the sum of the individual CPIS reported data (for assets) and derived data (liabilities) from Australia, New Zealand, Denmark, Sweden and Norway.

**Other Investment:** for banks, we use reported and derived figures based on bilateral BIS data, and for nonbanks we use partner-country data on liabilities and claims of BIS-reporting banks vis-à-vis other advanced economies’ nonbanks in the form of loans and deposits.

Reported other investment data provided by Australia only

(<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5352.02008?OpenDocument>).

**Foreign exchange reserves:** For Australia, information on the currency composition of reserves is taken from the “*Annual Report 2007*” published by the Res. Bank of Australia (<http://www.rba.gov.au/PublicationsAndResearch/RBAAnnualReports/2007/Html/ofm.html>) and for New Zealand from the “*Reserve Bank Bulletin 2007*” published by the Reserve Bank of New Zealand (<http://www.rbnz.govt.nz/research/bulletin/index.html>). For the euro share of Norway and Sweden we use the report “The international role of the euro” published by the European Central Bank in July 2009. We assume that reserves are held in the country corresponding to the currency of issuance.

## OTHER EUROPE

**FDI assets and liabilities:** we use data reported by Eurostat, as well as figures derived from partner-country data.

**Portfolio (equity and debt):** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investment, equity securities and total debt securities (tables 1, 1.1 and 1.2). For portfolio liabilities we use figures derived from partner-country data.

**Other investment:** we use figures derived from partner-country data reported to the BIS (loans and deposits claims and liabilities vis-à-vis “Other Europe” banks and nonbanks).

**Foreign exchange reserves:** We use central bank data on the currency composition of reserves (or central bank balance sheets) for Bulgaria, Croatia, Czech Republic, Latvia, Lithuania, Poland, Romania, Serbia, Slovak Republic, and Turkey. We assume that reserves are held in the country corresponding to the currency of issuance.

## SINGAPORE

**FDI:** for assets we rely on the geographical breakdown of direct investments contained in Table 3 “*Total Direct Investment Abroad by country/region, 1997-2007*” of the report “*Singapore’s Investment Abroad, 2007*” published by Statistics Singapore in July 2009 (<http://www.singstat.gov.sg/pubn/business.html#sia>); while for liabilities we rely on Table 2 “*Foreign Direct Investment in Singapore by country/region, 1998-2007*” of the report “*Foreign Equity Investments in Singapore, 2007*” published by Statistics Singapore in July 2009.

**Portfolio equity and debt:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investments, equity securities and total debt securities (tables 1, 1.1 and 1.2). For portfolio liabilities we use derived portfolio investment liabilities by country of non-resident holder for total portfolio investment, equity securities and total debt securities (tables 5, 5.1, 5.2).

**Other Investment:** for banks, we rely on the geographical breakdown for total bank assets and liabilities (BIS locational banking statistics), correcting for estimates of portfolio investment assets and liabilities held by banks. For nonbanks, we use partner-country data on

liabilities and claims of BIS-reporting banks vis-à-vis Singapore nonbanks in the form of loans and deposits.

**Foreign exchange reserves:** We estimate the currency composition of reserves using COFER data (where Singapore and a few other countries were recently re-classified as advanced economies and we take advantage of the change in reserve composition data to estimate their joint holdings). We assume that reserves are held in the country corresponding to the currency of issuance.

## SWITZERLAND

**FDI:** we rely on table 1.1 “*Swiss direct investment abroad by country*” (for assets) and table 2.1 “*Foreign direct investment in Switzerland, by country*” in the report “*Direct Investment 2007*” published by the Swiss National Bank on December 2008 ([http://www.snb.ch/en/i/about/stat/statpub/fdi/stats/fdi/fdi\\_ChDirAus\\_LgKapBe](http://www.snb.ch/en/i/about/stat/statpub/fdi/stats/fdi/fdi_ChDirAus_LgKapBe)).

**Portfolio equity and debt:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investments, equity securities and total debt securities (tables 1, 1.1 and 1.2). For portfolio liabilities we use derived portfolio investment liabilities by country of non-resident holder for total portfolio investments, equity securities and total debt securities (tables 5, 5.1, 5.2).

**Other Investment:** For bank positions, we use the geographical breakdown provided by the BIS locational banking statistics (loans and deposits of Swiss banks), adjusting these positions downward for Swiss banks’ trustee business on behalf of nonresidents (included in the BIS data but excluded from the IIP). For nonbank positions, we use partner country data on foreign bank positions vis-à-vis Swiss nonbanks in the form of loans and deposits.

**Foreign exchange reserves:** we use the report “The international role of the euro” published by the European Central Bank in July 2009 for the euro share of reserves, with the balance assumed to be held primarily in U.S. dollars and a small part in yen, in proportion to COFER estimates. We assume that reserves are held in the country corresponding to the currency of issuance.

## UNITED KINGDOM

**FDI:** we rely on the geographical breakdown provided in the “Foreign Direct Investment Business Monitor MA4” produced by the ONS. In particular, for FDI assets we use the information contained in table 3.1 “*Net FDI international investment position abroad analysed by area and main country, end 1998 to end 2007*” and for FDI liabilities table 6.1 “*Net FDI International positions in the United Kingdom analysed by area and main country, 1998 to 2007*”. Both tables are included in the file “Foreign Direct Investment 2007 – Data” available on the ONS website. (<http://www.statistics.gov.uk/statbase/Product.asp?vlnk=9614>).

**Portfolio equity and debt:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investments, equity securities and total debt securities (tables 1, 1.1 and 1.2). For portfolio liabilities we use derived portfolio investment liabilities by country of non-resident holder for total portfolio investments, equity securities and total debt securities (tables 5, 5.1, 5.2). (<http://www.imf.org/external/np/sta/pi/part.asp?iso=GBR>)

**Other Investment:**

- For bank assets, we rely on the geographical breakdown provided by the Bank of England in the “*External business of banks operating in the UK, by country*” (table C3.1, available at (<http://www.bankofengland.co.uk/statistics/ms/current/index.htm>)). The UK bilateral banking assets reported by the BoE include also portfolio investment of banks, which are excluded from the IIP definition of “Other Investment banks”. In order to reconcile the data with the aggregate positions reported by the UK in the IIP, we net out from the UK bilateral banking assets the amount of portfolio investment assets held by banks as reported by CPIS.
- For non-bank assets, we use the difference between total bilateral assets and the sum of FDI, portfolio, and other investment bank assets.
- For bank liabilities, we rely on Table C3.2 from the same source as bank assets, and net out estimated portfolio investment liabilities by banks. We estimate these liabilities by assuming that countries investing in U.K. portfolio instruments hold the same proportion of portfolio claims on banks.
- For non-bank liabilities, we use the difference between total liabilities and FDI liabilities, portfolio investment liabilities and other Investment liabilities (banks).

**Foreign Exchange Reserves:** we estimate the dollar share of reserves using COFER data and the euro share of reserves using the report “The international role of the euro” published by the European Central Bank in July 2009 (with the balance assumed to be held in yen). We assume that reserves are held in the country corresponding to the currency of issuance.

**Total assets and liabilities:** we rely on the information reported in Chapter 10 of the “*Pink Book 2009 edition*” published by the Office for National Statistics (ONS). In particular we use table 10.2 “*Geographical breakdown of International Investment Position: UK assets*” and table 10.3 “*Geographical breakdown of International Investment Position: UK liabilities*”. (<http://www.statistics.gov.uk/statbase/tsdtables1.asp?vlnk=pb>)

## UNITED STATES

**FDI:** we rely on the geographical breakdown provided in the International Economic Accounts produced by the Bureau of Economic Analysis of the U.S. department of commerce. In particular, for FDI assets we use annual data (end of year positions) contained in the table “*U.S. Direct Investment Abroad: Selected Items by Detailed Country, 2004 2007*” (<http://www.bea.gov/international/di1usdbal.htm>) while for liabilities we use annual data contained in the table “*Foreign Direct Investment in the United States: Selected Items by*



*Detailed Country, 2004-2008*” (<http://www.bea.gov/international/di1fdibal.htm>). The data for FDI provided by the Bureau of Economic Analysis are reported at historical cost. In order to reconcile these figures with those reported under the International Investment Position (at current cost), we approximate the current cost by multiplying the positions at historical cost by the ratio of current cost to historical cost for total FDI.

**Portfolio equity and debt assets:** we use the IMF Coordinated Portfolio Investment Survey. For portfolio assets we use the reported portfolio investment assets by country of non-resident issuer for total portfolio investments, equity securities and total debt securities (tables 1, 1.1 and 1.2) (<http://www.imf.org/external/np/sta/pi/part.asp?iso=USA>)

**Portfolio equity and debt liabilities:** we use data published in the *Report on Foreign Portfolio Holdings of U.S. Securities* as of June 30, 2007 provided by the U.S. Treasury. (<http://treas.gov/tic/fpis.shtml>). Data on portfolio debt liabilities vis-à-vis a restricted group of countries have been updated based on the monthly estimates of US cross-border securities positions provided by Bertaut and Tryon (2007) (<http://www.federalreserve.gov/pubs/ifdp/2007/910/default.htm>)

**Other Investment:** for banks, we use data reported to the BIS and published by the U.S. Treasury under the International Capital Reporting System. In particular for Other investment assets we use positions at end of period of “*Total Claims on Foreigners by Type and Country*” (<http://treas.gov/tic/ticclaim.shtml>); for Other Investment liabilities we use positions at end of period of “*Total Liabilities to Foreigners by Type and Country*” (<http://treas.gov/tic/ticliab.shtml>), excluding in both cases short-term securities. For nonbanks, we use partner-country BIS data on BIS-reporting banks’ liabilities and claims vis-à-vis US nonbanks.

**Foreign Exchange Reserves:** we use U.S. Treasury data on the currency composition of foreign exchange reserves, and assume that reserves are held in the country corresponding to the currency of issuance.