BANCA D'ITALIA

EUROSISTEMA

Questioni di Economia e Finanza

(Occasional Papers)

In search of lost capital: an estimation of undeclared portfolio assets

by Valeria Pellegrini and Enrico Tosti

September 2012

Number 131

BANCA D'ITALIA
EUROSISTEMA

Questioni di Economia e Finanza

(Occasional papers)

In search of lost capital: an estimation of undeclared portfolio assets

by Valeria Pellegrini and Enrico Tosti

Number 131 – September 2012

The series Occasional Papers *presents studies and documents on issues pertaining to the institutional tasks of the Bank of Italy and the Eurosystem. The* Occasional Papers *appear alongside the* Working Papers *series which are specifically aimed at providing original contributions to economic research.*

The Occasional Papers *include studies conducted within the Bank of Italy, sometimes in cooperation with the Eurosystem or other institutions. The views expressed in the studies are those of the authors and do not involve the responsibility of the institutions to which they belong.*

The series is available online at www.bancaditalia.it.

IN SEARCH OF LOST CAPITAL: AN ESTIMATION OF UNDECLARED PORTFOLIO ASSETS

by Valeria Pellegrini* and Enrico Tosti*

Abstract

The analyses of the international investment position and balance of payments statistics suggest that foreign assets held abroad are greatly underestimated, in particular in the sector of portfolio investments. The aim of this work is to test this hypothesis and to estimate the magnitude of under-reported assets. The approach is based on the comparison of mirror statistics on portfolio assets and liabilities, mainly using data coming from the Coordinated Portfolio Investment Survey (CPIS) conducted by the IMF, with the addition of information derived from several international databases. For the years from 2001 to 2010 the global discrepancy is estimated to be equal to 7.3% of world GDP on average. Different criteria have been adopted to attribute the share of the estimated under-reporting, particularly significant in the case of mutual funds issued by Luxembourg and the main off-shore centres, to the main euro area countries. Results vary from 6 to 10 per cent of national GDPs. If these amounts were added to national data, statistical consistency in international statistics would improve.

JEL Classification: F32, F21.
Keywords: international investment position, portfolio securities, under-reporting.

Contents

* Bank of Italy, Economic Research and International Relations.

1. Introduction[1]

The international investment position (IIP) shows the stock of assets and liabilities of a country vis-à-vis the rest of the world at a specific date; the difference (net position) represents the net foreign claim or liability of a country. It is a key indicator of the global imbalances among economies, the degree of international financial integration and the vulnerability to external shocks.

The emergence of large amounts of undeclared assets via tax shields and the analysis of global data on balance of payments (BoP) flows and IIP stocks suggest that foreign assets may be systematically under-represented, especially in the portfolio[2] component. The aim of this paper[3] is to assess the existence of a significant under-reporting of foreign portfolio assets and to estimate its magnitude.

The statistical collection systems on BoP and IIP portfolio securities were traditionally based on data provided by resident banks on cross-border payments and, most importantly, on customer deposits of foreign securities; more and more, they are nowadays based on the direct reporting of residents (banks, firms, institutional investors, etc.) about their relationships with foreign creditors or debtors. It is very likely that assets held abroad by residents, particularly households, are under-reported, especially when investors operate through non-resident banks or financial institutions. This is a critical concern for all countries; surveys on households generally do not represent an effective collection system, since results can easily be downward-biased due to both the scarcity of suitable information on wealth distribution (i.e. identification of high-wealth households) and the deliberate attempt to hide (totally or partially) external assets (mainly for tax avoidance and evasion reasons).

In Section 2 the main channels for the illegal export of capital are briefly described. The analysis of global portfolio external statistics (Section 3), which shows a preponderance of liabilities over corresponding assets, tends to confirm our thoughts. Despite the difficulty of collecting reliable data about this phenomenon, it is possible to estimate[4] the portfolio asset under-reporting.

We propose an approach based primarily on mirror[5] portfolio statistics, using a variety of international official databases, integrated with other available sources (Section 4). Our approach is different from those proposed in the literature and based on the estimates of misinvoicing trade or capital flights (very frequently from developing countries) or focused on the analysis of errors and omissions in BoP statistics. Our method compares total portfolio assets declared by investor countries and total portfolio liabilities declared by debtor countries, considering the differences (if existing) between the two aggregates as a proxy for the under-reporting of foreign assets. In other words, we assume that data on external liabilities are more reliable than those on foreign assets.

In Section 5 we estimate the magnitude of the discrepancy between assets declared by investor countries and liabilities reported by issuer countries, broken down by type of instrument (equity or debt securities) and reference year. The result is that the underestimate of global foreign portfolio assets remains steady at between 7 and 7.5 per cent of global GDP in the period from 2001 to 2010 (about $4.5 trillion at the end of 2010).

---

[1] The authors wish to thank Gian Maria Milesi-Ferretti for the provision of the Extended Wealth of Nations II database (EWN II). A special thanks to Riccardo De Bonis, Luigi Cannari, Marco Magnani and Roberto Tedeschi for helpful suggestions. The authors are solely responsible for any errors. The views expressed are personal and are not the responsibility of the Bank of Italy.

[2] Portfolio investments include all investments in securities when they do not reflect the lasting interest of the entity resident in one economy in an entity resident in another economy. They cover transactions in: a) equity securities (below the threshold of 10 per cent of an enterprise's capital) and shares of mutual funds; b) debt securities, broken down into money market instruments and bonds and notes.

[3] It is an updated and heavily revised version of a previous paper published in Italian (Pellegrini and Tosti, 2011).

[4] In general, capital exported for tax evasion purposes is frequently deposited in countries that offer tax advantages or banking secrecy (more than average); moreover, funds are often registered in the name of individuals other than the actual owner, i.e. figureheads, shell companies or trusts located in offshore centres or any other countries that offer the possibility of hiding the identity of the beneficiaries.

[5] Data on the same phenomenon derived from statistics produced by counterpart countries.

In Section 6 we estimate the share to be allocated to major euro area countries (France, Germany, Italy, the Netherlands and Spain); the resulting amounts average around 9 per cent of national GDPs. A less direct but conceptually similar approach is followed by the European Central Bank, which assesses the under-reporting of assets invested in mutual funds in Ireland and Luxembourg by the residents of other euro area countries.

In Section 7 we change the assumption that only assets are biased, and assume instead that only half of the discrepancy is due to under-reporting of assets, while the other half is linked to over-evaluation of external liabilities. In Section 8 we analyse the relationship between net IIP and the cumulated current and capital account balance for major euro area countries in order to assess the consistency between these aggregates and, consequently, the plausibility of the hypothesis of asset under-reporting also from this point of view. Section 9 offers conclusions and is followed by a bibliography and a methodological appendix.

2. Channels of capital export and methods for assessing capital flight

2.1 The illegal export of capital

The methodologies for estimating the illegal export of capital which have been proposed in the literature are generally related to some assumptions about the ways such exports are carried out and about the effects on the BoP and the IIP of the countries affected by this phenomenon. Briefly, the three main ways of exporting capital are as follows.

1) Under-invoicing of exports and over-invoicing of imports of goods, services and intangible assets (misinvoicing trade). Only enterprises are involved in under-invoicing, which consists of reducing revenues in the domestic economy by transferring profits to colluding foreign counterparts, generally located in countries where it is possible to get tax advantages. As for the over-invoicing of imports, the same transfer mechanism is implemented by increasing the costs of the importing company and, consequently, the revenues of the exporting foreign counterpart. This channel may also be exploited by households by means of "fictitious" imports of goods or services. Such methods of capital export do not necessarily generate errors and omissions (E&Os)[6] in the BoP, as these operations may be reflected in both the current account and the financial account of the BoP.

2) Transactions regarding the financial account. This category includes transactions (buy or sell) of financial assets (not related to a settlement of any current or capital account transactions); they are regularly reported at the time of the first cross-border transfer. Funds are then no longer reported for accounting, tax and statistical purposes; this may happen, for example, by means of fictitious loans to companies that go bankrupt subsequently, fictitious foreign settlements toward other foreign countries, and so on. These funds are then invested in other (undeclared) financial instruments, like portfolio securities. The influence of these forms of capital export on the E&Os of the BoP and the IIP depends on the characteristics of the data collection system used to compile[7] such statistics.

3) Cash transfers. The archetypal case of undeclared foreign asset creation is the transfer of cash across the national borders (i.e. smugglers crossing the border physically); in any case, no recordings of foreign assets are declared.[8]

---

[6] The presence of systematic negative errors and omissions in the balance of payments is generally associated with non-registered capital exports; see later.

[7] If the IIP is calculated on the basis of cumulated net flows from cross-border settlements reported by banks, it may take into account the increase in foreign asset stocks, even with a likely misclassification of the underlying phenomenon; if the IIP is compiled on the basis of periodically collected stock data, these assets cannot be easily captured and recorded.

[8] Before the introduction of the euro, at the time of the request for conversion into foreign currency against the delivery of (e.g. Italian) banknotes by foreign banks (usually Swiss ones), a worsening of the external position of the central bank (reduction of foreign currency stocks) was recorded. It was not offset by a corresponding creation of foreign assets; negative E&Os were consequently recorded. The adoption of the euro has largely reduced (or even cancelled) the relationship between capital exports and banknote remittances.

2.2 The literature on capital outflows: a short summary

The literature about undeclared assets abroad has in general focused on capital outflows (capital flight)[9] from emerging or developing countries on the one hand, and on the distortions in the invoicing of imported/exported goods on the other hand.

The literature on capital flight mainly concerns developing countries.[10] Proposals have been made for alternative measures to assess the magnitude of the phenomenon.[11] Some methods are based on the analysis of E&Os which, if systematically and significantly negative, can be interpreted as an indicator of unrecorded capital outflows (hot money methods). Alternative methods consider "*capital flight as being equal to net inflows of capital (increase in public debt plus incoming foreign direct investment) minus net outflows of capital (current account deficit plus the central bank's increase in reserves). Sources of funds (inflows) not matched by visible uses of funds (outflows) are considered capital flight*" (Chang et al, 1997, page 101). This methodology has been developed in several versions, especially by World Bank economists, see for example the Dooley method (Dooley, 1996) and the World Bank residual method (Claessens, 1997).

A different approach is based on the measuring of trade misinvoicing. From the pioneering works of Bhagwati (1964, 1967) to the review made by Nitsch (2009), the under-invoicing of exports and/or over-invoicing of imports has been highlighted as a frequently used channel for illegal exporting capital. The common denominator of this approach is to assess the trade misinvoicing magnitude by analysing the foreign trade data mirror in order to detect discrepancies. However, the application of this method is problematic, given the relevant statistical inconsistencies which make it difficult to identify the real amount of the phenomenon. In particular, at least in the last twenty years, the worldwide empirical evidence shows a regular surplus of exports over imports. Different reasons, such as VAT frauds, can induce a trade misinvoicing in the opposite direction, i.e. over-invoicing of exports and/or under-invoicing of imports. Finally, as noted by Bhagwati (1967): "*Whereas it is easy to establish the conditions under which the faking of trade values […] will occur, it is in practice extremely difficult to set about determining whether such faking is actually occurring. It is further impossible to find out how much faking is going on*". Moreover, the over- and under-invoicing of exports for the purposes of capital export does not necessarily lead to significant asymmetries in world current account balances.[12]

The method proposed in this paper is different: we estimate the under-reporting of foreign assets by using portfolio mirror statistics. In detail, we analyse the discrepancies between portfolio assets and liabilities at the level of issuer country and type of financial instrument. In other words, our approach is independent from the specific mode of capital export; it shifts the focus to the stock of final financial investments, which can also be constituted by assets different from portfolio securities (i.e. bank deposits), although their amounts are likely to be significantly lower.[13]

3. Global statistics on external portfolio assets and liabilities

Before examining data availability and estimating the (possible) under-reporting of portfolio stocks, it is useful to start with BoP flows.

---

[9] Different definitions have been proposed; one frequently adopted considers capital flight as the sudden irregular outflows from a country as a consequence of an economic crisis or other factors which influence the risk of capital losses on domestic assets.

[10] Before the complete liberalization of capital flows (1990), several papers on capital flight from Italy were published, focusing on the attempt to estimate the illegal exports of banknotes, for example Vicarelli (1970), and on the over-invoicing of imports, for example Gandolfo (1977).

[11] See, for a review, Schneider (2003) and Chang et al. (1997).

[12] In fact, cases involving inter-company or predetermined regular flows imply a consistency in the accounting schemes and, quite probably, in the statistical reporting, too. Conversely, asymmetries may be generated in cases involving households or small companies, as the foreign counterpart may not actually exist or could not be included in statistical data collection (for example, because of the presence of a reporting threshold).

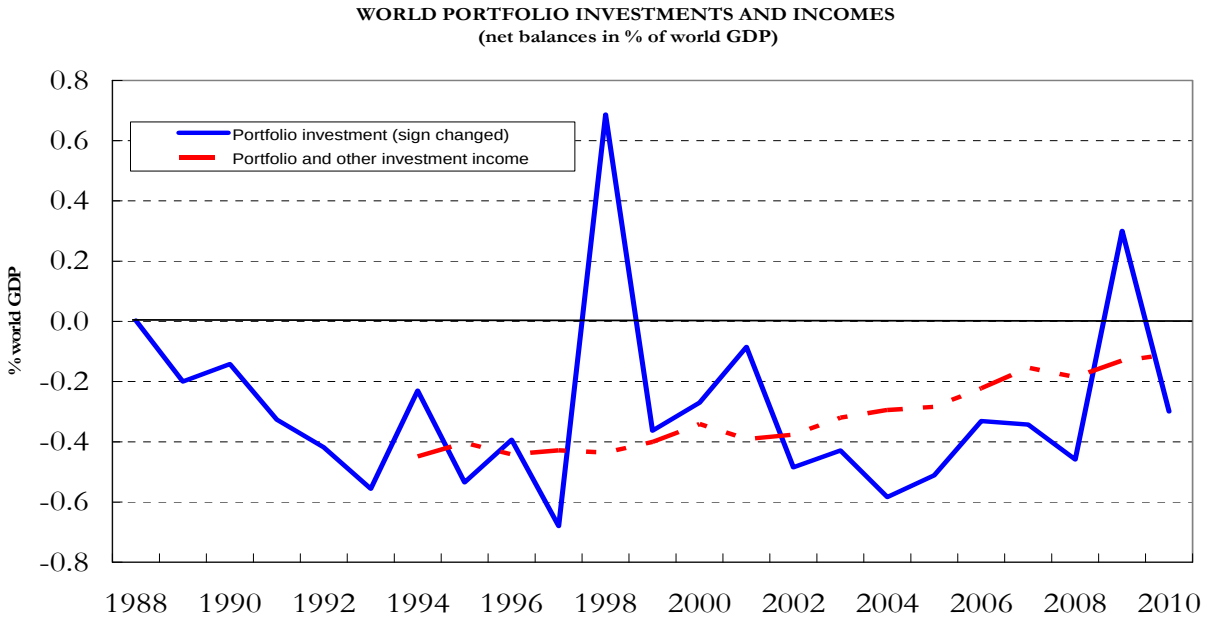
[13] For Italy, this is the outcome of an analysis conducted on the basis of available mirror statistics on foreign direct investment (public data) and bank deposits and loans (confidential data); see Pellegrini and Tosti (2011).

When calculating global statistical discrepancies, the IMF highlights the preponderance of external liabilities over assets; see Figure 1, based on the time series of world portfolio flows from 1988 to 2010. If all global flows were correctly recorded, the portfolio global net balance would be equal to zero, apart from monetary gold; instead, the discrepancy is 0.29 per cent of world GDP (yearly average). In cumulative terms, it sums up to about 6.6 per cent of global GDP (or about $4.184 trillion) at the end of 2010.

Figure 1 also shows the sum of the world balances of income from portfolio investment and other investments. The global net balance is systematically negative, with a yearly average discrepancy of 0.30 per cent of world GDP. This inconsistency implies that interest or dividends paid by debtor countries to residents in foreign countries are usually higher than those declared by investor countries.

Figure 1

Net (reversed sign) portfolio investment discrepancies and portfolio and other investment incomes as a percentage of world GDP (1988-2010)



Source: Based on IMF data.

Such distortions may depend on the overestimation of liabilities and/or on the underestimation of assets. In the first case, the overestimation of the external liabilities can be due to an erroneous attribution to foreign investors of securities issued by residents and held abroad (and not declared) by resident investors, quite probably without using the national banking system. Obviously, the opposite bias is possible: if external liabilities were globally underestimated, the discrepancy calculated on the basis of the method proposed in this paper would be an underestimation of the global discrepancy as well.

The second case, that is, the underestimation of portfolio assets, seems rather plausible as far as systematic under-reporting of assets held abroad is concerned (outside the resident banking sector). This case may be a major cause of the discrepancies observed between global assets and liabilities.

Taking into account these considerations, the rest of this paper is based on the assumption that portfolio liabilities are the reference point and that discrepancies between assets and liabilities are a good proxy of the underestimation of external portfolio assets. The proposed method does not separate the components due to statistical errors (owing to incomplete coverage and/or lack of accurate portfolio statistics) from those linked to the voluntary under-declaration of assets held abroad

(such as the propensity for holding assets abroad). In Section 7 a counter-hypothesis is examined; underestimation of assets and overestimation of liabilities are considered equally probable.

4. The main international data sources and the first step towards building our database

The estimation of undeclared portfolio assets is made from a global perspective, analysing the financial relationships between countries on the basis of portfolio assets and liabilities as reported in official international statistics. This information must be integrated with other statistical sources in order to increase the coverage.

4.1 The Coordinated Portfolio Investment Survey (CPIS)

The primary source is the IMF Coordinated Portfolio Investment Survey (CPIS): the member countries in 2001 (with the exception of China, Saudi Arabia and some other oil-exporting countries, some offshore centres) provide this information on the stock of portfolio assets by issuing (debtor) country on an annual basis.[14] As part of the CPIS, two additional surveys regarding securities held as official reserve assets and securities held by international bodies are conducted.[15]

The CPIS reports the bilateral positions between investor and issuing countries; the geographical breakdown by issuing country allows us to derive data on liabilities (*derived liabilities*) by country. As we shall see, derived liabilities are used both in case of missing data and as the term of comparison with total liabilities, as reported by issuing countries in their IIP data. In formal terms, we define:

A=assets, L=liabilities, P=*derived liabilities*.

Underscripts: i=issuing country; j=investor country, t=year (from 2001 to 2010).

Overscripts: E = equities, D = debt.

By aggregating assets declared by all investor countries j in a single issuing country i, we obtain the *derived liabilities* of country *i* in year *t* for a type of financial instrument (E or D) as:

1) $ {}_t P_i^E = \sum_j {}_t A_{ji}^E \quad \text{e} \quad {}_t P_i^D = \sum_j {}_t A_{ji}^D \quad .$

4.2 International Investment Positions (IIP) data published by the IMF

The second benchmark for the comparison is the IIP data of countries reporting to the IMF,[16] which are published on the basis of the same BPM5 rules. Portfolio stocks are broken down by type of financial instrument but not by partner country (investor for liabilities or issuer for assets). In the absence of reporting errors, *derived liabilities* from the CPIS should be less than or equal to the liabilities declared in IIP statistics, if coverage is incomplete. Asset data have been used in this paper to check total declared assets in the CPIS.

4.3 The External Wealth of Nations (EWN II) database

The External Wealth of Nations II (EWN II) is a database developed by Lane and Milesi-Ferretti.[17] It marks an improvement on the official data published by the IMF (CPIS and IIP), as it extends coverage by integrating other sources and estimates. The stock of assets and liabilities for 145 countries is made available. Data are broken down by major component of IIP, but due to the dependence on IIP data, unlike the CPIS, it provides no information on the geographical breakdown. In this work, EWN II is used to fill information gaps about countries that do not publish their IIP and do not participate in the CPIS.

---

[14] Assets are broken down by (at least) equity securities (including shares and investment funds) and debt securities (money market instruments and bonds and notes; see footnote 2). Assets are valued at market price at the end of the period and data are compiled on the basis of the methodology described in the fifth edition of Balance of Payments Manual (BPM5).

[15] These statistics are published only at an aggregate level as data are confidential.

[16] IFS statistics, http://elibrary-data.imf.org/FindDataReports.aspx?d=33061&e=169393.

[17] For further details, see Lane and Milesi-Ferretti (2001, 2007).

4.4 Merging the three main databases (CPIS, IIP and EWN II)

Our database integrates the existing one so as to increase coverage as much as possible. The starting point is the data on asset stocks (with the breakdown by issuer country) from the CPIS.[18] These data have been matched with the corresponding portfolio liabilities (without the breakdown by investor country),[19] using the IIP, CPIS (in this case as *derived liabilities*; par. 4.1) and EWN II. For each issuing country *i* and year *t* we can calculate the difference between total liabilities (available without the breakdown by investor country) and the sum of the assets that investor countries *j* declare they are holding in securities issued by country *i*:

2) $\forall i,t \quad {}_tU_i^E = {}_tL_i^E - \sum_j {}_tA_{ji}^E$ and the global discrepancy on equity securities is given by: ${}_tU^E = \sum_i {}_tU_i^E$

3) $\forall i,t \quad {}_tU_i^D = {}_tL_i^D - \sum_j {}_tA_{ji}^D$ and the global discrepancy on debt securities is given by: ${}_tU^D = \sum_i {}_tU_i^D$

(i≠j; i,i=1,….,n; t=2001,...,2010).

If available, official IIP data are used to determine liabilities; secondly, EWN II[20] is used. If neither source provides any reliable information, the liabilities of the issuing country are assumed to be equal to the derived liabilities (from the CPIS), namely:

4) ${}_tL_i^E = {}_tP_i^E = \sum_j {}_tA_{ji}^E$ and, by definition, the total discrepancy for that country is zero: ${}_tU_i^E = 0$

5) ${}_tL_i^D = {}_tP_i^D = \sum_j {}_tA_{ji}^D$ and, by definition, the total discrepancy for that country is zero: ${}_tU_i^D = 0$.

It is worthwhile to bear in mind that our approach (until Section 7) is based on the hypothesis of reliability of liabilities; consequently, the discrepancies are entirely attributed to under-reporting of assets. The merging of the three database summary statistics reported in Table 1 shows that liabilities are systematically higher than assets.

On average the gap is nearly 18 per cent of declared assets, corresponding to about 10 per cent of world GDP; at end-2010 the discrepancy represents about 13 per cent of world GDP.

[18] For some countries, namely Bahrain, India, Kuwait, Latvia, Mexico and Pakistan, some missing data need to be estimated.

[19] Information on the economic sector of the investor has not been taken into account, although it is useful to detect economic sectors that are more prone to under-reporting external assets (households and firms). Such information is not available for some of the major countries.

[20] In the Appendix the methodological note describes the few cases in which the *derived liabilities* (from CPIS) are greater than the officially declared liabilities (from the IIP).

Table 1

Initial stage: comparison between global portfolio assets and liabilities
(in billions of US dollars or percentages)

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
(A) Assets (official reserves included)	Equity securities	5,455	5,025	7,293	9,140	11,046	14,845	17,968	10,408	14,453	16,346
	Debt securities	7,627	9,457	12,386	14,975	15,818	19,408	22,788	22,008	24,576	25,723
	Total	**13,083**	**14,482**	**19,679**	**24,115**	**26,864**	**34,253**	**40,756**	**32,416**	**39,029**	**42,069**
(L) Liabilities	Equity securities	6,846	6,362	9,011	11,193	13,421	17,500	21,375	12,734	17,775	20,228
	Debt securities	8,894	10,868	13,962	16,958	18,012	21,839	25,462	25,071	28,749	29,971
	Total	**15,740**	**17,230**	**22,973**	**28,151**	**31,433**	**39,340**	**46,837**	**37,804**	**46,524**	**50,198**
Global discrepancy $\sum_i {}_t U_i$	Equity securities	-1,391	-1,337	-1,718	-2,053	-2,375	-2,656	-3,407	-2,326	-3,322	-3,882
	Debt securities	-1,267	-1,412	-1,576	-1,983	-2,194	-2,431	-2,674	-3,063	-4,172	-4,248
	Total	**-2,658**	**-2,748**	**-3,294**	**-4,036**	**-4,569**	**-5,087**	**-6,081**	**-5,388**	**-7,495**	**-8,130**
Global discrepancy as a share of global assets	Equity securities	-25.5%	-26.6%	-23.6%	-22.5%	-21.5%	-17.9%	-19.0%	-22.3%	-23.0%	-23.7%
	Debt securities	-16.6%	-14.9%	-12.7%	-13.2%	-13.9%	-12.5%	-11.7%	-13.9%	-17.0%	-16.5%
	Total	**-20.3%**	**-19.0%**	**-16.7%**	**-16.7%**	**-17.0%**	**-14.9%**	**-14.9%**	**-16.6%**	**-19.2%**	**-19.3%**

Sources: IMF (CPIS and IIP) and EWN II.

4.5 Further data used to increase statistical coverage and to estimate portfolio discrepancies

The second step in our process of building the database consists of identifying the critical aspects as regards data coverage and availability. The addition of further data sources has allowed us to fill a substantial share of the gaps, especially on the assets side. In a few cases corrections have been made for both assets and liabilities; in the latter case this is a consequence of adjustments made to eliminate some inconsistencies derived from the comparison of official data. The work of progressively increasing the level of coverage and the consistency of the database has covered the following countries (or groups of countries): the United States, Japan, Ireland, Germany, China, international organizations, the Netherlands, Arab oil-exporting countries and major offshore centres (Cayman Islands, British Virgin islands, Guernsey and Jersey). The Appendix contains a detailed description of both the additions and the corrections made and the additional data sources found.

In the remaining cases (mainly offshore centres, e.g. the Netherlands Antilles), where portfolio liabilities are not available, they have been assumed to be equal to the corresponding CPIS *derived liabilities*. Consequently, no discrepancy referring to the securities issued by these countries can be shown in our data by construction; the estimated global discrepancy can therefore be considered as a lower bound.

5. The final database and the estimation of the global discrepancy

In Table 2 we show the statistical source (in value) of portfolio liabilities and assets, broken down by instrument.

As for liabilities, the main source is the IIP, even if the CPIS *derived liabilities* play a significant role; the EWN II is of little importance. As regards assets, the CPIS is the most important source.

Table 2

Final stage: global portfolio stock assets and liabilities broken down by statistical source
(in billions of US dollars)

LIABILITIES		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Equity securities	CPIS derived	756	494	1,039	1,722	2,925	3,664	2,636	3,008	2,316	4,110
	EWN II	834	42	135	235	275	454	1,174	180	712	922
	IIP	5,135	5,414	7,620	8,900	9,289	12,117	16,147	8,841	13,508	13,860
	Our estimate	501	852	863	1,209	2,054	2,876	3,766	2,606	2,523	2,739
	Total	**7,226**	**6,802**	**9,657**	**12,066**	**14,544**	**19,110**	**23,723**	**14,634**	**19,059**	**21,630**
Debt securities	CPIS derived	1,728	2,017	3,119	4,857	2,269	4,445	3,526	2,667	3,004	2,781
	EWN II	299	328	361	388	374	394	433	418	542	830
	IIP	5,822	7,174	9,300	10,394	14,094	15,657	20,609	21,156	23,030	24,066
	Our estimate	1,148	1,503	1,511	1,706	1,641	1,911	2,184	2,202	2,467	2,613
	Total	**8,997**	**11,022**	**14,291**	**17,345**	**18,378**	**22,407**	**26,752**	**26,444**	**29,044**	**30,290**
ASSETS		**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Equity securities	CPIS derived	5,318	4,894	7,112	8,902	10,822	14,216	17,122	9,820	13,687	15,302
	EWN II	206	186	271	325	391	502	706	463	647	755
	IIP	-	-	-	-	-	-	-	-	-	-
	Our estimate	463	530	776	1,038	1,278	1,890	2,563	1,880	1,950	2,198
	Total	**5,986**	**5,610**	**8,160**	**10,266**	**12,490**	**16,608**	**20,391**	**12,162**	**16,284**	**18,255**
Debt securities	CPIS derived	7,443	9,200	12,207	14,724	15,413	18,846	22,092	21,237	23,815	24,945
	EWN II	88	130	214	265	370	428	537	567	600	669
	IIP	-	-	-	-	-	-	-	-	-	-
	Our estimate	439	548	724	1,102	1,419	2,035	2,762	2,898	3,130	3,583
	Total	**7,971**	**9,878**	**13,146**	**16,091**	**17,202**	**21,308**	**25,391**	**24,702**	**27,544**	**29,196**

Sources: IMF (CPIS and IIP), EWN II, national sources.

In Table 3 we summarize the results. The difference between assets and liabilities is still large – though lower than the one reported in Table 1 – and on average equal to 11.7 per cent of total assets in the period.

The discrepancy in debt securities decreases significantly (at end-2010 it is just one quarter of the initial one) and shows a downward trend, while that regarding equity securities – in which the influence of certain offshore and financial centres is particularly important – remains high (at end-2010 it is 87 per cent of the initial one) and shows an upward trend except in 2008, due to the fall in equity market prices related to the financial crisis.

In 2010 the global discrepancy amounts to $4.469 trillion (equal to 7.1 per cent of world GDP), quite similar to that derived from cumulated global BoP flows ($4.184 trillion; Section 3).[21] The effect on world GDP seems to be quite stable, generally between 7 and 7.5 per cent.

[21] Our results are close to those obtained by Zucman (2012) on the basis of a methodology which also used mirror statistics and was carried out independently of our analysis.

Table 3

Final stage: portfolio stock and global discrepancy between assets and liabilities
(in billions of US dollars or percentages)

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Assets	Equity securities	5,986	5,610	8,160	10,266	12,490	16,608	20,391	12,162	16,284	18,255
	Debt securities	7,971	9,878	13,146	16,091	17,202	21,308	25,391	24,702	27,544	29,196
	Total	**13,957**	**15,489**	**21,306**	**26,357**	**29,692**	**37,916**	**45,782**	**36,864**	**43,828**	**47,451**
Liabilities	Equity securities	7,226	6,802	9,657	12,066	14,544	19,110	23,723	14,634	19,059	21,630
	Debt securities	8,997	11,022	14,291	17,345	18,378	22,407	26,752	26,444	29,044	30,290
	Total	**16,223**	**17,825**	**23,948**	**29,411**	**32,922**	**41,517**	**50,475**	**41,077**	**48,103**	**51,920**
Global discrepancy	Equity securities	1,239	1,192	1,497	1,800	2,053	2,503	3,332	2,471	2,776	3,376
	Debt securities	1,026	1,144	1,146	1,254	1,177	1,099	1,361	1,742	1,500	1,093
	Total	**2,266**	**2,336**	**2,643**	**3,054**	**3,230**	**3,602**	**4,693**	**4,213**	**4,275**	**4,469**
Global discrepancy as share of assets	Equity securities	20.7%	21.2%	18.3%	17.5%	16.4%	15.1%	16.3%	20.3%	17.0%	18.5%
	Debt securities	12.9%	11.6%	8.7%	7.8%	6.8%	5.2%	5.4%	7.1%	5.4%	3.7%
	Total	**16.2%**	**15.1%**	**12.4%**	**11.6%**	**10.9%**	**9.5%**	**10.3%**	**11.4%**	**9.8%**	**9.4%**
Global discrepancy as share of world GDP	Equity securities	3.9%	3.6%	4.0%	4.3%	4.5%	5.1%	6.0%	4.0%	4.8%	5.4%
	Debt securities	3.2%	3.4%	3.1%	3.0%	2.6%	2.2%	2.4%	2.8%	2.6%	1.7%
	Total	**7.1%**	**7.0%**	**7.1%**	**7.3%**	**7.1%**	**7.3%**	**8.4%**	**6.9%**	**7.4%**	**7.1%**

Sources: IMF (CPIS and IIP), EWN II, national sources.

In our approach the identification of discrepancies for each single issuer country is quite reliable: Table 4 reports the first nine differences by issuing country by instrument.

As for equity securities, which includes investment fund shares, the top six issuing countries (Cayman Islands, Luxembourg, the United States, Ireland, Guernsey and Jersey) generate about 75 per cent of the global discrepancy on average in the period from 2001 to 2010. The relevance of these discrepancies is consistent with the role played by almost all of these countries, as they are frequently the location of investment funds and tend to attract capital from foreign investors. While the shares of global discrepancy related to developed countries appear to be erratic in some cases (e.g. the Netherlands), the shares related to financial centres seem to be more stable. The observed trends support the hypothesis of discrepancy due to deliberate under-reporting of assets rather than statistical errors.

As for debt securities, the global discrepancy is less concentrated; the top six issuing countries – the United States, France, Japan, the Netherlands, Italy and Australia – sum up to an average effect of about 60 per cent of the global difference between liabilities and assets: all of them are developed countries and their significance in the global discrepancy is consistent with their role as issuer of debt securities (mainly public sector bonds). A higher volatility characterizes the discrepancies related to debt securities; in any case, for some countries – France, Australia and Austria – the share is fairly stable.

The last column of Table 4 shows the effect of discrepancy on a country's own liabilities (declared or estimated). Especially for equity securities, as is to be expected, the impact is much smaller for developed countries (the United States, Switzerland, the Netherlands and Ireland) than for offshore centres (Cayman Islands, Jersey, Guernsey and the British Virgin Islands) and financial centres (such as Luxembourg), which is generally around 50 per cent; it seems that the higher the indicator, the higher the propensity of a country to act as a tax haven. As for debt securities, the effect is always less than 15 per cent.

Table 4

Major portfolio discrepancies by issuing country
(in billions of US dollars)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average share in global discrepancy	Average share in country's liabilities
EQUITY SECURITIES												
Cayman Islands	170.1	201.5	309.6	444.2	551.4	791.5	1.044.7	868.3	655.4	729.2	25.9%	47.9%
Luxembourg	254.0	289.2	364.4	416.1	500.8	645.1	757.4	660.4	823.3	905.8	25.3%	30.5%
United States	325.1	228.6	263.0	278.2	217.6	148.3	201.6	93.6	320.7	495.5	11.6%	10.8%
Ireland	38.2	49.1	64.0	71.5	82.1	31.0	100.5	171.2	179.3	215.8	4.5%	12.5%
Guernsey	33.0	35.7	49.8	69.5	82.3	118.2	164.9	129.4	125.6	148.0	4.3%	58.8%
Jersey	62.7	72.5	71.9	64.4	72.9	119.2	154.7	102.4	55.5	53.8	3.7%	55.9%
Netherlands	0.0	11.9	0.0	0.0	110.1	150.2	163.7	85.8	91.6	76.0	3.1%	15.4%
British Virgin Isl.	41.3	33.1	45.7	47.9	55.5	78.0	102.6	51.9	56.7	66.4	2.6%	46.5%
Switzerland	86.1	77.6	75.6	79.0	66.8	62.9	45.5	41.3	17.6	12.6	2.5%	10.7%
Other countries	228.9	192.8	252.7	329.5	313.8	358.2	596.4	266.9	449.9	672.4	16.5%	-
Total	**1,239.4**	**1,191.9**	**1,496.7**	**1,800.4**	**2,053.4**	**2,502.7**	**3,332.0**	**2,471.2**	**2,775.6**	**3,375.6**	**100.0%**	**15.0%**
DEBT SECURITIES												
United States	198.1	235.5	337.2	443.8	486.4	388.5	369.9	483.1	159.2	34.5	24.8%	5.7%
France	152.7	164.7	141.0	180.4	216.6	138.6	196.5	274.8	252.6	133.1	14.6%	11.8%
Japan	47.9	37.7	38.5	0.0	32.0	75.5	128.9	142.2	85.8	116.8	6.1%	14.6%
Netherlands	2.1	18.8	123.2	119.9	46.8	115.8	85.5	89.5	9.8	21.8	5.0%	5.4%
Australia	48.9	61.8	55.2	48.8	54.5	66.6	72.2	74.1	68.9	72.2	4.9%	14.7%
Italy	19.4	18.7	0.8	11.0	15.6	71.6	128.1	130.1	94.5	119.3	4.8%	5.4%
United Kingdom	50.2	65.7	6.0	0.0	56.1	25.5	50.9	14.5	184.5	145.0	4.7%	3.7%
Austria	33.7	43.3	43.2	47.8	39.6	40.5	53.2	58.6	53.1	29.5	3.5%	13.2%
Spain	0.0	10.5	0.0	10.4	3.8	39.4	56.9	78.6	96.3	90.3	3.0%	5.2%
Other countries	473.3	487.1	400.7	391.3	225.3	136.9	218.8	396.1	494.7	330.9	28.6%	-
Total	**1,026.3**	**1,144.0**	**1,145.8**	**1,253.5**	**1,176.7**	**1,098.8**	**1,360.9**	**1,741.6**	**1,499.5**	**1,093.3**	**100.0%**	**6.1%**

Sources: IMF (CPIS and IIP), EWN II, national sources.

6. Under-reporting attribution and stock position adjustments

Once individual (issuer) country non-reported liabilities are calculated, the final step is to assign a share of each country discrepancy to investing countries. How to calculate the share is the essence of this estimation. We start with the seldom seen cases in which similar adjustments have been proposed in the statistical practice.

6.1 Methodological adjustments in the euro area international investment position (IIP) and balance of payments (BoP)

Recently, the European Central Bank (ECB) addressed the underestimation of asset flows and stocks in the compilation of euro area BoP and IIP statistics.

The aggregation of BoP national data by the ECB to obtain euro area BoP led to high level of errors and omissions; following an in-depth analysis carried out with the help of experts and IIP and BoP compilers of member countries, a cause was identified in the underestimation of assets held in Luxembourgish and Irish investment funds by euro area residents. The methodology applied was identical to ours: "a comparison between the portfolio investment liabilities of each euro area country and the respective assets held by residents abroad, using data from the IMF Coordinated Portfolio

Investment Survey, revealed that euro area residents' holdings of equity securities issued in Luxembourg and Ireland (by investment funds) were underestimated. This seemed to be related to the under-reporting of euro area households' holdings of investment fund shares" (ECB, 2009b, page 104).

In order to reduce asymmetries and errors and omissions, the ECB has adopted a methodology which, besides adjustments regarding other BoP items, consists in reducing equity portfolio liabilities vis-à-vis countries outside the euro area; over the period starting from mid-2004 and ending in the second half of 2009, the correction in terms of cumulated flows amounted to roughly €217 billion (ECB, 2009a), corresponding to 2.4 per cent of euro area GDP (2009). The correction on cumulated flow data was reflected in a corresponding adjustment in IIP stocks. Due to the "residual" method,[22] the reduction of liabilities to non-residents implies an increase in assets of euro area residents in Luxembourgish and Irish funds.

6.2 Criteria of under-reporting attribution

Each country-unallocated liabilities are attributed in proportion to the share by the investing country in the allocated liabilities, as declared in the CPIS data. Such a share is calculated for each combination of issuer country, type of financial instrument (equity and debt) and reference year. In general, we define the under-reporting to be attributed to an investor country *j* in the year *t* as follows:

$$ {}^{j}_{t}U = \left(\sum_{i} {}_{t}K^{E}_{ji} \cdot {}_{t}U^{E}_{i} + \sum_{i} {}_{t}K^{D}_{ji} \cdot {}_{t}U^{D}_{i}\right) \quad (0 \le K \le 1;\ i \neq j;\ i,j=1,\ldots,n;\ t=2001,...,2010). $$

On the basis of the mirror data (CPIS) criterion, the shares ${}_{t}K^{E}_{ji}$ and ${}_{t}K^{D}_{ji}$ are calculated as follows:

$$ \text{C1)}\ \forall i,t \quad {}_{t}K^{E}_{ji} = \frac{{}_{t}A^{E}_{ji}}{\sum_{j} {}_{t}A^{E}_{ji}} \quad \text{and} \quad {}_{t}K^{D}_{ji} = \frac{{}_{t}A^{D}_{ji}}{\sum_{j} {}_{t}A^{D}_{ji}} \quad \text{for } j \in \{CPIS\}. $$

This approach uses all the detailed information provided by the CPIS: in other words, the basic hypothesis is that under-reporting should be proportional to the amounts reported officially by investor countries. This criterion takes into account the level of foreign portfolio assets (and thus it properly weights the financial openness of the investor country), as well as the preference of each investor country for a specific combination of issuer country/financial instrument.

Accordingly, it attributes a higher propensity to under-report portfolio assets to the major investors in securities issued by countries for which high discrepancies between declared and derived liabilities are observed (Luxembourg, the Cayman Islands, etc.). As a consequence, no under-reporting is attributed to the countries (e.g. China and Arab oil exporters) which do not participate in the CPIS.

As a robustness test, we compare this estimate with the one that is obtained simply by dividing the world discrepancy with the country share of world GDP, an economic variable available for almost all countries. Formally, we have:

$$ \text{C2)}\ \forall i,t \quad {}_{t}K^{E}_{ji} = {}_{t}K^{D}_{ji} = \frac{{}_{t}GDP_{j}}{\sum_{r} {}_{t}GDP_{r}} \quad (r,i=1,\ldots,n;\ t=2001,...,2010). $$

This criterion concentrates the allocation of undeclared assets according to the size of "real" economic activities rather than the relevance of financial investments. Moreover, it does not take into

[22] Euro area liabilities are calculated by the ECB as the difference between the sum of liabilities vis-à-vis the rest of the world (inside and outside the area) declared by each euro area country and the sum of assets held by them in other euro area countries.

account differences across countries in terms of saving propensity, level of financial openness and preference in terms of issuing country/instrument.

Table 5 shows the results of the attribution, on the basis of the proposed criteria, of the global under-reporting to five major European countries: Italy, Germany, France, the Netherlands and Spain. As a whole, these countries would be attributed about 24 per cent of the global under-reporting, when adopting the CPIS criterion (C1), or about 17 per cent when using the GDP criterion (C2). This difference is due to the prominent role in terms of financial assets played by these countries with respect to their shares of world GDP, particularly in the case of the Netherlands.

In order to measure the impact of a possible adjustment in the IIP portfolio assets of this group of countries, we need to consider its influence on the declared external asset stocks. As a whole, there would be on average an increase of about 17 per cent in equity securities and 5 per cent in debt securities: Germany would register the greatest adjustment (about 31 per cent for equities and 9 per cent for debt). The adjustment in the IIP portfolio assets in terms of national GDP would be on average about 11 percentage points when applying the CPIS criterion (C1) and about 8 percentage points when adopting the GDP criterion (C2): the Netherlands would register the greatest impact (14 per cent on average).

Table 5

Under-reporting attributed to five major European countries (in billions of euros or percentages)

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ITALY											
1st criterion: mirror data (CPIS)	Equity securities	99.6	97.4	102.7	102.5	137.0	148.5	144.5	102.3	112.2	141.0
	Debt securities	59.1	45.8	36.8	32.2	33.5	25.4	26.0	35.1	31.0	14.3
	Total	**158.7**	**143.2**	**139.5**	**134.7**	**170.5**	**173.9**	**170.5**	**137.4**	**143.2**	**155.4**
	% of global official assets	*12.7%*	*12.6%*	*11.1%*	*10.0%*	*10.2%*	*10.0%*	*10.1%*	*10.0%*	*9.2%*	*9.0%*
2nd criterion: share of world GDP	Equity securities	51.7	44.0	50.5	57.3	72.3	76.7	92.6	72.9	77.9	91.8
	Debt securities	42.8	42.4	38.7	40.0	43.5	37.0	41.0	54.5	42.1	29.8
	Total	**94.5**	**86.4**	**89.2**	**97.4**	**115.7**	**113.7**	**133.6**	**127.4**	**120.0**	**121.5**
	% of global official assets	*7.5%*	*7.6%*	*7.1%*	*7.3%*	*7.0%*	*6.6%*	*7.9%*	*9.3%*	*7.7%*	*7.0%*
GERMANY											
1st criterion: mirror data (CPIS)	Equity securities	162.6	131.4	141.9	135.0	193.5	156.6	174.7	173.3	181.4	203.6
	Debt securities	73.6	79.1	62.7	66.9	67.1	71.6	81.7	104.0	89.3	78.3
	Total	**236.3**	**210.6**	**204.6**	**202.0**	**260.7**	**228.2**	**256.4**	**277.4**	**270.8**	**281.9**
	% of global official assets	*21.3%*	*20.5%*	*18.7%*	*16.4%*	*16.9%*	*13.3%*	*14.4%*	*18.0%*	*15.6%*	*14.7%*
2nd criterion: share of world GDP	Equity securities	87.0	72.4	81.2	90.4	112.4	119.5	145.4	115.0	121.7	146.7
	Debt securities	72.0	69.8	62.3	63.2	67.7	57.6	64.5	85.9	65.8	47.6
	Total	**159.0**	**142.2**	**143.4**	**153.6**	**180.1**	**177.1**	**209.9**	**201.0**	**187.5**	**194.3**
	% of global official assets	*14.4%*	*13.8%*	*13.1%*	*12.5%*	*11.7%*	*10.3%*	*11.8%*	*13.0%*	*10.8%*	*10.2%*
FRANCE											
1st criterion: mirror data (CPIS)	Equity securities	54.0	48.0	58.0	68.4	98.4	123.1	160.0	122.2	101.0	125.8
	Debt securities	45.2	49.1	48.8	56.3	52.1	65.7	86.4	118.6	92.0	88.3
	Total	**99.2**	**97.1**	**106.8**	**124.7**	**150.5**	**188.8**	**246.5**	**240.8**	**193.0**	**214.1**
	% of global official assets	*6.2%*	*5.5%*	*4.9%*	*4.9%*	*4.7%*	*5.0%*	*6.1%*	*6.6%*	*4.8%*	*5.1%*
2nd criterion: share of world GDP	Equity securities	62.0	52.4	60.1	68.1	86.8	92.9	113.0	89.8	96.9	114.4
	Debt securities	51.3	50.6	46.1	47.6	52.2	44.8	50.1	67.1	52.3	37.1
	Total	**113.2**	**103.0**	**106.1**	**115.7**	**139.0**	**137.8**	**163.1**	**156.9**	**149.2**	**151.5**
	% of global official assets	*7.0%*	*5.8%*	*4.9%*	*4.5%*	*4.4%*	*3.7%*	*4.1%*	*4.3%*	*3.7%*	*3.6%*
THE NETHERLANDS											
1st criterion: mirror data (CPIS)	Equity securities	65.3	50.0	59.4	54.1	57.5	53.8	66.4	67.1	81.7	109.9
	Debt securities	34.2	32.1	25.6	30.8	40.2	30.3	40.9	54.1	45.1	30.4
	Total	**99.5**	**82.1**	**85.0**	**84.9**	**97.7**	**84.1**	**107.3**	**121.2**	**126.7**	**140.4**
	% of global official assets	*9.0%*	*7.6%*	*6.2%*	*5.2%*	*5.0%*	*4.2%*	*5.0%*	*6.9%*	*6.1%*	*6.3%*
2nd criterion: share of world GDP	Equity securities	18.6	15.8	18.1	20.2	26.0	27.9	34.3	27.7	29.3	34.9
	Debt securities	15.4	15.3	13.8	14.1	15.6	13.5	15.2	20.7	15.8	11.3
	Total	**33.9**	**31.1**	**31.9**	**34.3**	**41.6**	**41.4**	**49.5**	**48.3**	**45.1**	**46.2**
	% of global official assets	*3.1%*	*2.9%*	*2.3%*	*2.1%*	*2.1%*	*2.1%*	*2.3%*	*2.7%*	*2.2%*	*2.1%*
SPAIN											
1st criterion: mirror data (CPIS)	Equity securities	11.9	10.7	12.8	18.1	26.3	28.6	29.6	22.0	23.1	28.3
	Debt securities	12.9	15.9	17.6	20.1	25.7	18.7	20.1	24.9	22.1	12.7
	Total	**24.8**	**26.6**	**30.3**	**38.2**	**52.1**	**47.4**	**49.6**	**46.9**	**45.2**	**41.1**
	% of global official assets	*6.3%*	*5.2%*	*4.5%*	*5.0%*	*5.3%*	*4.7%*	*4.9%*	*5.4%*	*5.2%*	*5.6%*
2nd criterion: share of world GDP	Equity securities	28.2	24.8	29.6	34.6	45.9	50.8	63.1	50.6	54.0	63.0
	Debt securities	23.3	23.9	22.7	24.2	27.6	24.5	28.0	37.8	29.2	20.4
	Total	**51.5**	**48.6**	**52.3**	**58.8**	**73.6**	**75.3**	**91.1**	**88.4**	**83.2**	**83.4**
	% of global official assets	*13.1%*	*9.4%*	*7.8%*	*7.7%*	*7.5%*	*7.4%*	*9.0%*	*10.2%*	*9.5%*	*11.3%*

Sources: IMF (CPIS and IIP), EWN II, national sources.

7. A counter-hypothesis: removing the hypothesis of reliability of portfolio liabilities

It is likely that asset under-reporting is more common than liability overestimation. However, in this section we examine the consequences of assuming this intermediate hypothesis for the above five European countries. We make the assumption that the two types of error are equally probable, thus attributing one-half of the discrepancy to the overestimation of the total liabilities – and consequently reducing the declared portfolio liabilities – and treating the remaining half as the under-reporting of assets of the investor countries, accordingly increasing the declared portfolio assets of the investor.

Formally, the estimated under-reporting for the investor country is in this case equal to one half of the amount previously calculated, for example, with the criterion based on the use of the CPIS data (C1):

$$6a) \quad {}_t K^{E}_{ji} = \frac{{}_t A^{E}_{ji}}{2 \times \sum_j {}_t A^{E}_{ji}} \quad \text{and} \quad {}_t K^{D}_{ji} = \frac{{}_t A^{D}_{ji}}{2 \times \sum_j {}_t A^{D}_{ji}}$$

The remaining half of the discrepancy should be treated as a reduction of the liabilities for the debtor country. The reduction of the declared liability can be expressed for equity and debt portfolio liabilities, respectively, as follows:

$$6b) \quad \frac{L^{E}_{i} - \sum_j {}_t A^{E}_{ji}}{2} \quad \text{and} \quad \frac{L^{D}_{i} - \sum_j {}_t A^{D}_{ji}}{2}$$

Table 6 shows the estimation of the two components by major European countries, broken down by type of financial instrument and reference year. This hypothesis has a different impact on portfolio net positions of the five countries, due to their different behaviour as issuer and investor. The reduction of liabilities is quite significant for some countries and it can hardly be explained by a possible under-reporting of securities issued by residents and held abroad by other residents, which would erroneously inflate the liabilities attributed to foreign investors. The over-reporting of liabilities can be expected to be mainly due to pure statistical errors.

For France, the overall improvement of the portfolio net IIP would be 81 percent of the one resulting from the hypothesis of under-reporting of assets (CPIS criterion). For Italy, the percentage is lower (64 per cent); for Germany, it would be 54 per cent, as for this country reported liabilities tend to be more like the derived ones. However, for Spain the counter-hypothesis implies a greater impact on portfolio net IIP in the case of CPIS criterion (150 per cent); the opposite is true for the Netherlands (86 per cent). In conclusion, although the adoption of this counter-hypothesis generally diminishes the magnitude of the adjustment of the net portfolio IIP for the selected countries, such a correction is still significant.

Table 6

Counter-hypothesis: half of the discrepancy attributed to the under-reporting of assets (CPIS criterion) and half attributed to the over-reporting of liabilities

(in billions of euros)

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ITALY											
Equity	More assets	49.8	48.7	51.3	51.2	68.5	74.2	72.2	51.1	56.1	70.5
	Less liabilities	5.4	5.7	5.7	6.8	0.9	- 0.2	0.5	0.7	0.4	0.1
	Total	**55.2**	**54.4**	**57.0**	**58.0**	**69.4**	**74.1**	**72.8**	**51.8**	**56.5**	**70.6**
Debt	More assets	29.5	22.9	18.4	16.1	16.8	12.7	13.0	17.6	15.5	7.2
	Less liabilities	5.5	4.5	0.2	2.0	3.3	13.6	21.7	23.4	16.4	22.3
	Total	**35.0**	**27.3**	**18.6**	**18.1**	**20.1**	**26.3**	**34.8**	**40.9**	**31.9**	**29.5**
Total adjustment		**90.2**	**81.7**	**75.6**	**76.1**	**89.5**	**100.4**	**107.5**	**92.7**	**88.3**	**100.1**
GERMANY											
Equity	More assets	81.3	65.7	70.9	67.5	96.8	78.3	87.3	86.7	90.7	101.8
	Less liabilities	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
	Total	**81.3**	**70.6**	**70.9**	**67.5**	**96.8**	**78.3**	**87.3**	**86.7**	**90.7**	**103.8**
Debt	More assets	36.8	39.6	31.4	33.5	33.6	35.8	40.9	52.0	44.7	39.2
	Less liabilities	0.0	0.0	0.0	0.0	0.0	0.0	2.2	17.8	11.7	9.5
	Total	**36.8**	**39.6**	**31.4**	**33.5**	**33.6**	**35.8**	**43.0**	**69.8**	**56.3**	**48.6**
Total adjustment		**118.1**	**110.2**	**102.3**	**101.0**	**130.3**	**114.1**	**130.4**	**156.5**	**147.1**	**152.4**
FRANCE											
Equity	More assets	27.0	24.0	29.0	34.2	49.2	61.5	80.0	61.1	50.5	62.9
	Less liabilities	3.4	8.6	8.2	1.9	0.0	7.6	20.8	10.8	5.8	0.0
	Total	**30.4**	**32.6**	**37.3**	**36.2**	**49.2**	**69.2**	**100.8**	**72.0**	**56.3**	**62.9**
Debt	More assets	22.6	24.5	24.4	28.1	26.0	32.8	43.2	59.3	46.0	44.1
	Less liabilities	86.6	78.5	55.8	66.2	91.8	52.6	66.7	98.7	87.7	49.8
	Total	**109.2**	**103.1**	**80.2**	**94.4**	**117.8**	**85.5**	**110.0**	**158.0**	**133.7**	**94.0**
Total adjustment		**139.6**	**135.7**	**117.5**	**130.5**	**167.1**	**154.7**	**210.8**	**230.0**	**190.0**	**156.9**
THE NETHERLANDS											
Equity	More assets	32.7	25.0	29.7	27.1	28.8	26.9	33.2	33.6	40.8	55.0
	Less liabilities	0.0	2.8	0.0	0.0	23.3	28.5	27.8	15.4	15.9	14.2
	Total	**32.7**	**27.8**	**29.7**	**27.1**	**52.1**	**55.4**	**61.0**	**49.0**	**56.7**	**69.2**
Debt	More assets	29.5	22.9	18.4	16.1	16.8	12.7	13.0	17.6	15.5	7.2
	Less liabilities	11.0	8.9	0.3	4.0	6.6	27.2	43.5	46.7	32.8	44.6
	Total	**40.5**	**31.8**	**18.7**	**20.2**	**23.4**	**39.8**	**56.5**	**64.3**	**48.3**	**51.8**
Total adjustment		**73.2**	**59.6**	**48.4**	**47.2**	**75.4**	**95.3**	**117.5**	**113.3**	**105.0**	**121.0**
SPAIN											
Equity	More assets	6.0	5.3	6.4	9.0	13.2	14.3	14.8	11.0	11.5	14.2
	Less liabilities	2.0	5.9	8.2	7.3	3.1	10.4	18.0	6.2	9.3	7.5
	Total	**7.9**	**11.3**	**14.6**	**16.4**	**16.3**	**24.7**	**32.8**	**17.2**	**20.9**	**21.6**
Debt	More assets	6.4	7.9	8.8	10.1	12.9	9.4	10.0	12.5	11.1	6.4
	Less liabilities	0.0	5.0	0.0	3.8	1.6	15.0	19.3	28.2	33.4	33.8
	Total	**6.4**	**12.9**	**8.8**	**13.9**	**14.5**	**24.3**	**29.4**	**40.7**	**44.5**	**40.1**
Total adjustment		**14.4**	**24.2**	**23.4**	**30.3**	**30.8**	**49.0**	**62.2**	**57.9**	**65.3**	**61.8**

Sources: IMF (CPIS and IIP), EWN II, national sources.

8. Comparison between IIP and the cumulated current account

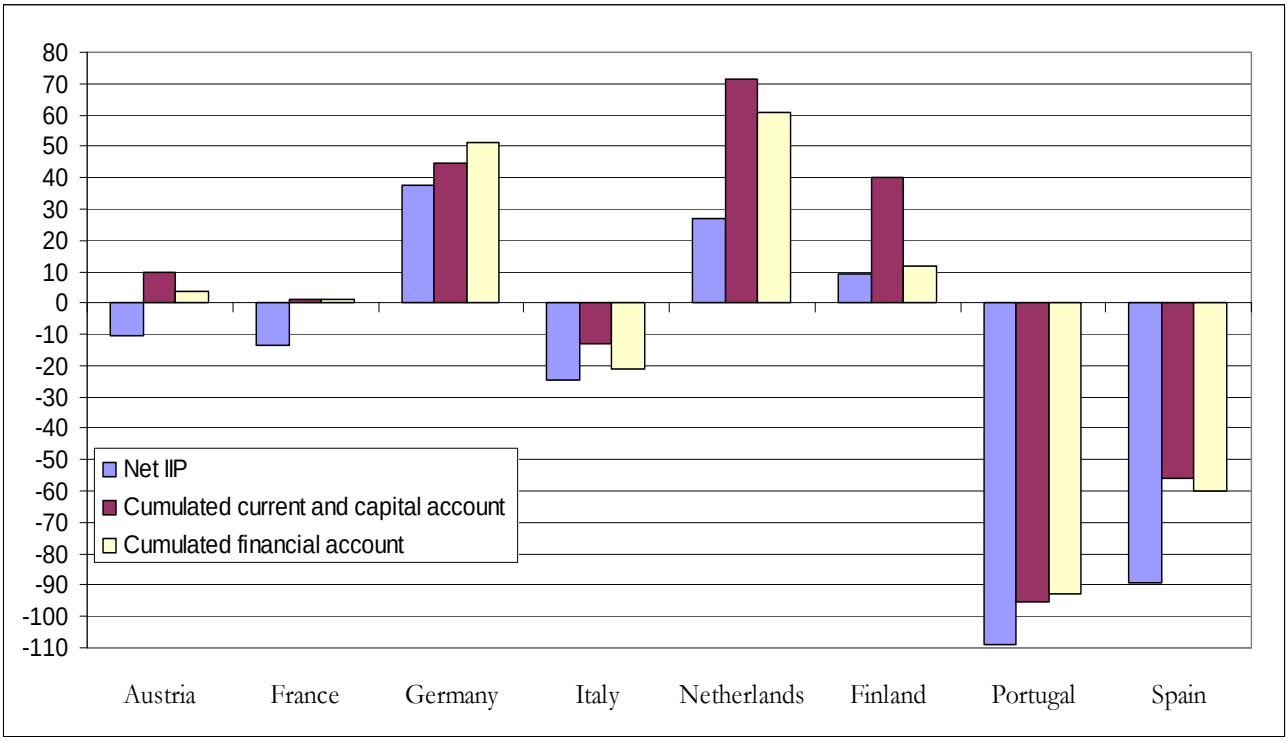
Given the allocation of the global portfolio under-reporting, we analyse the consistency of the results − in terms of adjustments to the IIP due to undeclared portfolio assets − with the national BP and IIP statistics. In other words, we compare the data on the net position of a country with both its cumulated current and capital account[23] balance and its cumulated financial account balance (with reversed sign). We know that, in the theoretical case where errors and omissions in the balance of payments are equal to zero, the relation between balance of payment items can be expressed as follows:

current and capital account balance = financial account balance (with reversed sign).

Consequently, apart from valuation adjustments, the cumulated current and capital account should therefore be closely tracking the net IIP. For most of the major euro area countries, we may assume that in the long run valuation adjustments to assets and liabilities grow on average at a similar pace and consequently they would roughly offset each other, so that in Figure 2 we just cumulate the annual flows.

Figure 2

Net IIP (end-2010) and cumulated (since 1975) balances of current and capital account and financial account (reversed sign) as a percentage of national GDP



Sources: EWN II, Eurostat.

Figure 2 shows data in percentage of national GDP:[24] inconsistencies between BoP and IIP are quite widespread. The figure reports the net IIP at the end of 2010 and the cumulated balance since 1975 of both current plus capital account and the financial account; the difference between the two cumulated balances is the amount of cumulated errors and omissions.

[23] Data on the capital account balance are not available for all countries as from 1975, but this should have a negligible impact.

[24] Data have been derived from External Wealth of Nations EWN II (Lane and Milesi-Ferretti), December 2011 release.

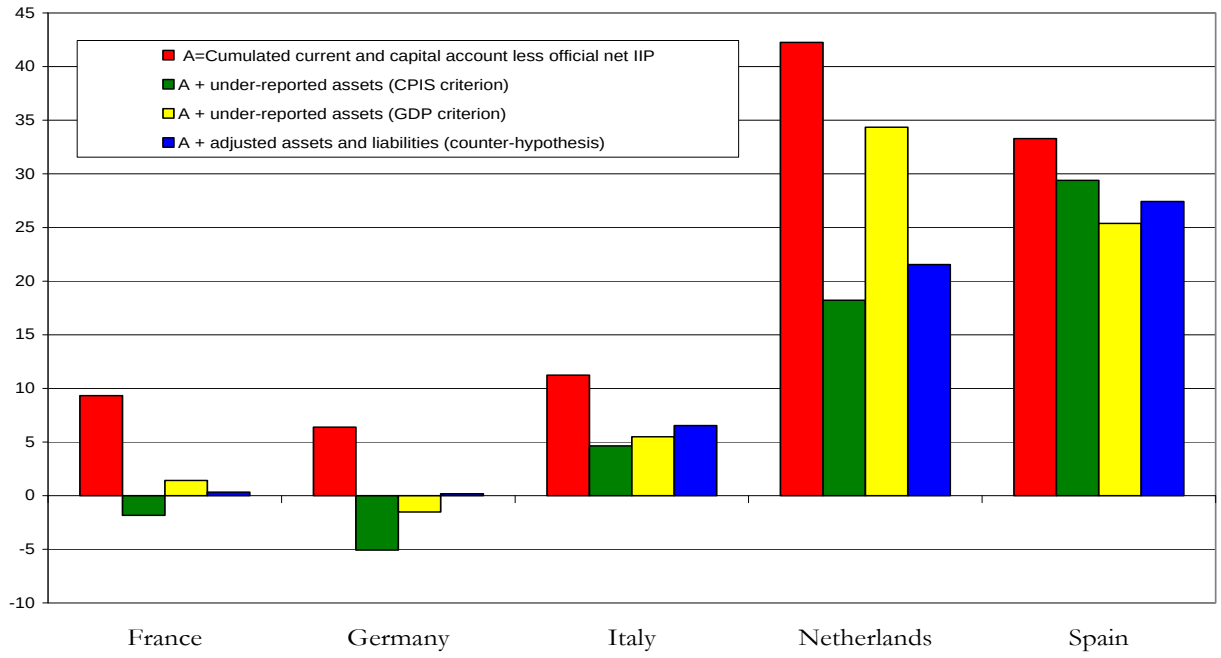
All countries have an official net IIP worse (or slightly worse) than what would be warranted on the basis of the sequence of current and capital account balances. In some cases it is unlikely that valuation adjustments may explain these differences. This discrepancy leads again to the dilemma about the overestimation of liabilities versus underestimation of assets. In the case of Italy, the results of the quality and consistency analysis and the outcomes of the control on mirror data made on BoP and IIP aggregates do not seem to reveal the presence of very relevant biases in the current account time series or in IIP components other than portfolio stocks. Furthermore, a significant amount of negative cumulated error and omissions (which may be related to undeclared assets abroad) can be observed for the Italian BoP time series. Accordingly, we may conclude that the upward revision on portfolio net IIP would improve the consistency between BoP and IIP aggregates for Italy.

In order to assess if these upward revisions might be meaningful also for the other euro area countries, a more in-depth analysis of national IIP and BP statistics is required. We can observe that, similar to Italy, a group of countries (Austria, Finland, the Netherlands and Spain) show negative cumulated errors and omissions, which is consistent with the hypothesis of external undeclared portfolio assets. Germany and Portugal show positive cumulated errors and omissions, but their net IIPs are in any case worse than their cumulated current and capital accounts. The difference unexplained by errors and omissions may depend on valuation adjustments or on unreconciled BoP and IIP time series, for example when BoP and IIP statistics derive from different data sources and/or are not backward revised.[25]

Figure 3 shows the results of a test to check whether the three proposed adjustments (under-reported assets estimated on, respectively, CPIS and GDP criteria, plus the counter-hypothesis) on portfolio stocks are able to reduce – for the major countries of the euro area – the difference between the cumulated current and capital accounts and the official net IIP.

Figure 3

Effects of adjustments of portfolio stocks on the difference between cumulated balances of current and capital account (from 1975) and net IIP (end-2010)
(percentage of national GDP)



Sources: EWN II, Eurostat.

[25] For the authors it is clearly more difficult to obtain and correctly interpret this kind of information related to foreign countries.

For these countries the estimated adjustments improve the overall consistency between BoP and IIP statistics. In fact, the more the differences between cumulated current and capital account and adjusted net IIP are close to zero, the more appropriate the proposed adjustments to portfolio stock data seem to be. For France and Germany, the alternative criterion of the counter-hypothesis seems to provide the best results; for Italy and the Netherlands, the method based on unreported assets estimated by the CPIS maximizes the reduction of discrepancies. For Spain, the adjustment based on unreported assets estimated by GDP criterion seems to be the best approach.

In the case of Italy, we have taken into account the capital repatriation due to a tax shield in place between the end of 2009 and the beginning of 2010, which disclosed a significant amount of undeclared foreign assets, nearly €105 billion,[26] of which about €60 billion were estimated to be portfolio securities (corresponding to nearly 4 per cent of GDP). The adjustments have been consistently reduced in order to take into account the fact that a portion of the capital held abroad has already been included in the official Italian BoP and IIP statistics after the disclosure.

In conclusion, the hypothesis of undeclared foreign assets seems to be consistent with the prevailing patterns of the observed discrepancies between IIP and BoP aggregates, at least for the main euro area countries. For the United Kingdom and the United States[27], however, the cumulated current and capital accounts would indicate a net position significantly worse than the official one. Generally, the approach based on the use of mirror statistics (CPIS) may appear more promising than the GDP criterion, while the hypothesis of partial over-estimation of external liabilities cannot be excluded.

9. Conclusions

The analysis of balance of payments and international investment position portfolio statistics shows a systematic preponderance of liabilities over corresponding assets. It is likely that a significant part of this discrepancy is related to undeclared assets held abroad by non-resident financial institutions. In fact, as the resident banking system is generally obliged to report data for statistical and fiscal purposes, foreign assets held by domestic intermediaries are captured by data collection systems.

In particular, the results observed during the last decade concerning the tax shields used to repatriate to Italy undeclared capital held abroad tends to reinforce the hypothesis that under-reporting of portfolio asset securities could be significant; the possible scale of this under-reporting has recently led some major European countries to conclude agreements with the Swiss authorities on the taxing of capital held by their residents in Swiss financial institutions.

In this paper we estimated a plausible order of magnitude for this phenomenon. The innovative element is the attempt to quantify the under-reporting of portfolio assets by analysing the discrepancy between portfolio stocks of liabilities and assets on the basis of mirror statistics, primarily using data derived from the Coordinated Portfolio Investment Survey (CPIS) conducted by the IMF and from international investment position (IIP) statistics, and secondly using other available sources in order to obtain an as-good-as-possible statistical coverage. The analysis takes into account all methods of capital export.

[26] http://www.bancaditalia.it/statistiche/SDDS/stat_rapp_est/bilancia_pag/bilpag_04_10/en_bilancia_pagamenti_apr_10.pdf

[27] In the case of the United States, several papers try to explain this phenomenon (frequently called the "exorbitant privilege"); for example, Eichengreen (2011), Habib (2010) and Lane and Milesi-Ferretti (2009). According to Habib (2010), "one third of this excess return is accounted for by a positive yield differential from investment income and two thirds by capital gains. At least as regards yields from the investment income, other major issuers of international currencies, such as Japan and Switzerland, enjoy positive differential returns almost similar to those of the United States. The euro area however does not enjoy a yield privilege similar to other issuers of international currencies" (page 31). Lane and Milesi-Ferretti (2009) focus their attention on residual adjustments (i.e. unrecorded financial flows, mis-measured stock positions, or mis-measured capital gains): "a good proportion of the residual adjustment could well reflect unrecorded financial flows, especially in the portfolio category" (page 197).

In the period from 2001 to 2010 the positive gap between global liabilities and assets is on average equal to 7.3 per cent of world GDP; this amount is consistent with the discrepancy in the global cumulated balance of payments portfolio flows, which show a systematic preponderance of external liabilities over assets. The under-reporting of shares in investment funds located in Luxembourg and in some offshore countries (above all the Cayman Islands) is particularly important, as might be expected. As for debt instruments, the discrepancy is significantly lower, less concentrated and related to securities issued by advanced countries.

Starting from the estimated global under-reporting of investors, broken down by issuer country, reference year and type of financial instrument (equity and debt securities), on the basis of different allocation criteria we calculate the shares to be attributed to major euro area countries as investors. At the end of 2010 the average values of undeclared assets attributed to Germany and France are between 9 and 10 per cent of their national GDP; for Spain we estimate nearly 6 per cent of national GDP, while for the Netherlands about 16 per cent, as a consequence of its lower weight in terms of GDP and greater occurrence in terms of external financial assets. For Italy the estimate would be on average between 9 and 10 per cent (similar to France and Germany), but it should be adjusted downwards in order to take into account the capital repatriation linked to the tax shield in force between the last months of 2009 and the first months of 2010.

We have also examined the alternative hypothesis in which observed discrepancies are partly due to asset under-reporting and partly due to an overestimation of liabilities. The overall effect of net IIP is on average lower but still significant, albeit with different effects from country to country. In general, for the main euro area countries the analysis of the consistency between IIP statistics and cumulated current account balances confirms that net IIP tends to be worse than it should be; such a conclusion corroborates the hypothesis of foreign asset under-reporting. Furthermore, the estimated adjustments we have proposed are generally able to reduce the discrepancy between the net IIP and the cumulated current and capital accounts and, consequently, to improve the overall statistical consistency.

Looking ahead, important improvements regarding the accuracy of the estimation of asset under-reporting and its distribution by issuer country and by financial instrument will be possible; the extension of the main database used in this work - the CPIS - from the point of view of both the number of participating countries and the available breakdowns (e.g. sector of the investor), will substantially improve the reliability of the estimates.

Bibliography

Baker, R. W. (2005), *Capitalism's Achilles Heel*, John Wiley and Sons, New Jersey (US).

Bank of Italy (2008), *Household wealth in Italy*, proceedings of the Conference, Perugia, 16-17 October 2007, www.bancaditalia.it/studiricerche/convegni/atti/ric_fam_it/Household_wealth_Italy.pdf.

Bertaut, C., Griever, W. e R. Tryon (2006), *Understanding U.S. Cross-Border Securities Data*, http://www.federalreserve.gov/pubs/bulletin/2006/crossbordersecurities/default.htm, Federal Reserve Bulletin.

Bhagwati, J.N. (1964), *On the Under-Invoicing of Imports*, Bulletin of the Oxford University, Institute of Economics and Statistics, 26, pp. 389-97.

Bhagwati, J.N. (1967), *Fiscal policies, the Faking of Foreign Trade Declarations and the Balance of Payments*, Bulletin of the Oxford University, Institute of Economics and Statistics, 29, pp. 61-77.

Cayman Islands Monetary Authority (2009), *Investment Statistical Digest*, years 2007, 2008 and 2009, available at: http://www.cimoney.com.ky.

Chang, P.H.K., Claessens, S. e Cumby, R.E. (2001), *Conceptual and Methodological Issues in the Measurement of Capital Flight*, International Journal of Finance and Economics, Vol. 2, pp. 101-119.

Claessens, S. (1997), *Estimates of capital flight and its behavior*, Revista de Analisis Economico, Vol. 12, No. 1, pp. 3-34.

Davies, J.B., Sandström, S., Shorrocks, A.F. e E.N. Wolff (2010), *The level and distribution of global household wealth*, Economic Journal, Doi: 10.111/j.1468-0297.2010.02391.

Gandolfo, G. (1977), *Esportazioni clandestine di capitali e sovrafatturazione delle importazioni*, in Rassegna economica, No. 6, November-December.

Guernsey Financial Services Commission, *Investment Statistics*, various issues available at: http://www.gfsc.gg/The-Commission/Documents and Forms/.

ECB (2002), *Final report of Task Force on Portfolio Investment Collection Systems.*

ECB (2008), *The impact of sovereign wealth funds on global financial markets*, Occasional Papers, No. 91, July.

ECB (2009a), *Methodological changes in the compilation of the euro area balance of payments and international investment position (as of November 2009),* 2 November. http://www.ecb.europa.eu/stats/pdf/bop/meth_changes_nov09.pdf?48a338af044ea51ecf3e32f9a5a23067

ECB (2009b), *Monthly Bulletin*, December.

ECB (2010), *Monthly Bulletin*, May.

Eichengreen, B.J. (2011), *Exorbitant privilege: the rise and fall of the dollar and the future of the International Monetary System*, New York, Oxford University Press

European Commission (1998), *Communications of the Commission on undeclared work*, Brussels, COM(98) – 219.

Felettigh, A. and Monti, P. (2008), *How to interpret the CPIS data on the distribution of foreign portfolio assets in the presence of sizeable cross-border positions in mutual funds. Evidence from Italy and the main euro-area countries*, Bank of Italy, Occasional Papers No. 16, August.

Habib, M. M. (2009) *Excess Returns on Net Foreign Assets: The Exorbitant Privilege from a Global Perspective*, http://www.bancaditalia.it/studiricerche/seminari/2010/excess-returns/habib.pdf

IMF (2002), *Coordinated Portfolio Investment Survey Guide*, 2nd Edition.

IMF (2008), *Balance of Payments and International Investment Position Manual*, http://www.imf.org/external/pubs/ft/bop/2007/bopman6.htm.

Jersey Financial Services Commission, *Summary of statistical data provided to the International Monetary Fund's information framework,* various issues available at: http://www.jerseyfsc.org/the_commission/general_information/statistics/international_monetary_fund.asp.

Kubelec, C. e Sá, F. (2010), *The geographical composition of national external balances sheets: 1980-2005*, Bank of England, Working Paper No. 384, March.

Lane, P. R. and Milesi-Ferretti, G.M. (2001), *The External Wealth of Nations: Measures of Foreign Assets and Liabilities for Industrial and Developing Countries*, Journal of International Economics, Vol. 55, pp. 263–94, November.

Lane, P.R. and Milesi-Ferretti, G.M. (2007), *The External Wealth of Nations Mark II*, Journal of International Economics, 73, No. 2 (November), pp. 223-50.

Lane, P.R. and Milesi-Ferretti, G.M. (2008), *International investment patterns*, The Review of Economics and Statistics, 90(3), pp. 538–549.

Lane, P.R. and Milesi-Ferretti, G.M. (2009), *Where Did All the Borrowing Go? A Forensic Analysis of the U.S. External Position*", Journal of the Japanese and the International Economies, 23, 177-199.

Lane, P.R. and Milesi-Ferretti, G.M. (2010), *Cross-Border Investment in Small International Financial Centers*, IMF Working Papers, WP/10/38.

Milesi-Ferretti, G.M. (2009), *The financial crisis and its international transmission: some tentative lessons*, mimeo, September.

McGuire, P. and Tarashev, N. (2008), *Global monitoring with the BIS International Banking Statistics*, BIS Working Paper, No. 244.

McGuire, P. and Wooldridge, P. (2005), *The BIS Consolidated Banking Statistics: structure, uses and recent enhancements*, BIS Quarterly Review, September.

Nitsch, V. (2009) *Trade Mispricing and Illicit Flows*, presented at the World Bank Conference: "The Dynamics of Illicit Flows from Developing Countries", 14-15 September.

Pellegrini, V. and Tosti, E. (2011), *Alla ricerca dei capitali perduti: una stima delle attività all'estero non dichiarate dagli italiani*, Bank of Italy, Occasional Papers, No. 97, July.

Schneider, B. (2003), *Measuring Capital Flight: Estimates and Interpretations*, Overseas Development Institute, Working Paper No. 194, London (UK).

Vicarelli, F. (1970), *L'esportazione di banconote nell'esperienza italiana dell'ultimo decennio: una analisi quantitativa*, in Studi Economici, No. 3-4, May-August.

Wooldridge, P.D. (2006), *The changing composition of official reserves*, BIS Quarterly Review, September.

Zucman, G. (2012), *The missing wealth of nations: are Europe and the U.S. net debtors or net creditors?*, Paris School of Economics, http://www.parisschoolofeconomics.eu/docs/zucman-gabriel/mwn23march.pdf

Appendix

Integration of official data on external portfolio stocks

Only in a few cases were the derived liabilities from the CPIS higher than those reported by the other sources (IIP and EWN II). Even though in some cases the discrepancy was far from being negligible, the overall impact on global amounts and on final results was quite moderate; this is the case for the Netherlands, Germany and Luxembourg for debt instruments and for the United Kingdom and Canada for equities.

For Luxembourg and the Netherlands the exclusion from portfolio liabilities of the securities issued by special purpose entities (SPEs) has been identified as the main cause of the observed over-reporting. SPEs are frequently created in specific countries by multinational enterprises in order to achieve benefits in terms of legal and tax advantages and of privacy. Securities issued by SPEs are generally declared by investors as an asset vis-à-vis the countries hosting the SPEs. An adjustment has been made to the declared liabilities whenever data on the amount of SPEs issuance are available. For the Netherlands, official data including the positions referring to SPEs are available.[28]

In the other cases, the information available is not enough to assess whether the discrepancy is due to an over-reporting of assets vis-à-vis these countries or to statistical distortions implying a systematic underestimation of portfolio liabilities. Accordingly, the CPIS derived liabilities have been generally taken into account as the most realistic proxy. The choice of using derived liabilities in the case of over-reporting made the global amount of liabilities increase, but the impact of these adjustments on the total amount was quite low (less than 0.5 per cent of total liabilities); moreover, it has not inflated the amount of the discrepancy between assets and liabilities, as in these cases it is by definition equal to zero (formulas 4 and 5 in the text).

This appendix describes the integrations and the adjustments made and illustrates the contents of the supplementary data source which we have taken into account in order to improve the level of coverage and consistency of the database (par. 4.5).

United States – liabilities broken down by investor country

The US Department of the Treasury collects information on transactions and positions referring to foreign portfolio securities through the Treasury International Capital (TIC) reporting system.[29] Data are collected from banks and brokers. Once a year, a detailed investigation is conducted on the stocks of portfolio securities, broken down by issuer and investor country, also collecting data from importers, exporters and financial institutions other than banks. Data on liabilities broken down by investor country are regularly disseminated.

However, some difficulties in correctly identifying the country of residence of the final investor exist. As a matter of fact, these statistics tend to overestimate the assets of the countries in which securities are traded and held (custodial bias)[30] and to underestimate the assets of final investors. The information on the geographic detail of the liabilities of the United States has been used in any case to quantify the assets in US securities held by some major countries which do not report CPIS data, namely China, Taiwan and the Arab oil-exporting countries. For these countries the custodial bias is not expected to affect the figures significantly.

---

[28] De Nederlandsche Bank, http://www.statistics.dnb.nl/index.cgi?lang=uk&todo=Balans.

[29] US Department of the Treasury , http://www.ustreas.gov/tic/fpis.shtml.

[30] In case of long and complex chains of deposits and intermediaries, the residence of the final investor cannot be easily identified; in particular, according to the US Department of the Treasury, this "custodial bias" can lead to an overestimation of the liabilities to the Cayman Islands, Switzerland, the United Kingdom and Luxembourg, and to an underestimation of liabilities to all other countries (Bertaut *et al*, 2006).

Japan – liabilities broken down by investor country

Until a year or so ago, the central bank of Japan published on its website[31] portfolio liabilities broken down by investor country at the end of each year. This information on transactions and positions regarding foreign investments in domestic securities was collected through sample surveys. Data on liabilities broken down by investor country have been used in the same way as the TIC data for the United States in order to quantify the portfolio assets vis-à-vis Japan held by some of the major countries not reporting in the CPIS.

Ireland – liabilities in equity securities (shares and funds)

As regards Irish equities and investment fund shares, there is a considerable discrepancy between the official and derived liabilities, presumably related to the presence of SPEs, especially in the financial sector[32] (on average about 42 per cent the total liabilities are attributable to the banking sector). A significant proportion of debtor positions are declared by Ireland but they are not reported by investor countries. On the basis of specific and confidential information, it has been possible to make a reduction in this discrepancy, attributing some of it to certain countries.

United States and Germany – adjustment on portfolio assets

It has been necessary to make a correction on CPIS asset data reported by the United States and Germany, since for some years there have been significant differences from the portfolio assets reported in their IIPs. The geographical percentage distribution deriving from the CPIS has been applied to the value of total portfolio assets as reported in these countries' IIPs.

China – assets (official reserves)

The foreign assets held by China - a country not reporting to the CPIS - are largely constituted by official reserves; the total amount is known thanks to official Chinese statistics (State Administration of Foreign Exchange) and EWN II. As assets held vis-à-vis United States and Japan have been already calculated (see above), the point is to estimate those vis-à-vis the remaining countries. On the basis of a study conducted by the Bank of International Settlements (Wooldridge, 2006)[33], we assumed that 80 per cent of reserve assets was invested in debt securities. The breakdown by issuer country has been estimated on the basis of the geographical distribution of the global reserve assets in debt securities reported by all countries in the CPIS (Survey of Securities held as Foreign Exchange Reserves, SEFER).

International organizations – liabilities (debt securities)

International organizations (for example, the European Investment Bank) issue debt instruments but statistics on their international investment position are not published. Assets held in debt securities issued by international organizations are instead included in stocks declared by investor countries, causing a discrepancy between global assets and liabilities. In order to reduce these inconsistencies, international organizations' portfolio liabilities have been estimated on the basis of data on the outstanding amount of international bonds periodically published by the Bank for International Settlements. It should be noted that the valuation of these stocks is based on nominal values, whereas the assets reported by the investor countries in the CPIS are based on market ones. The different valuation criteria may generate discrepancies.

---

[31] Bank of Japan, http://www.boj.or.jp/en/type/stat/boj_stat/bop/rdip/.

[32] The International Financial Services Centre (IFSC) is located in Dublin, hosting more than half of the world's top 50 financial groups.

[33] It is higher than the average estimated (70 per cent; Wooldridge, 2006, p. 32) for the developed countries, as there are reasons to believe that the Chinese monetary authorities have a lower propensity for other types of financial instrument than other central banks.

The Netherlands – adjustments on portfolio liabilities

As already mentioned, for the Netherlands portfolio debt liabilities have been increased by adding the amount of liabilities issued by SPEs, which are excluded from the official IIP (liabilities are lower than total assets vis-à-vis the Netherlands reported in the CPIS). Data on SPEs' portfolio liabilities are published by the Dutch central bank, as already mentioned. After the correction, portfolio liabilities ended up higher than declared assets.

Offshore centres – assets and liabilities

The Cayman Islands and British Virgin Islands are the two most relevant offshore centres as regards portfolio investments, particularly investment funds.[34] These two countries do not report complete portfolio statistics: the Virgin Islands do not publish IIP and do not participate in the CPIS, while the Cayman Islands only report the assets held by banks to the CPIS. Consequently, for these countries estimations and adjustments on both assets and liabilities have been made.

For the Cayman Islands, estimates are based on data published by the Cayman Islands Monetary Authority[35] (CIMA), which is the authority in charge of monitoring resident investment funds. The net asset values declared by Cayman funds have been considered as a proxy for equity liabilities to foreign investors. As for debt, the derived liabilities calculated on the basis of CPIS data have been considered as a proxy because of the lack of specific and reliable information. Furthermore, in order to estimate portfolio assets (except those held vis-à-vis the US and Japan, see above) statistics from CIMA have been used as well.

As for the British Virgin Islands, Lane and Milesi-Ferretti (2010) tried to quantify total external assets and liabilities. For two other major offshore centers, Guernsey and Jersey, the integration to the database only relates to the external liabilities in equity investment funds issued. Both countries do not publish IIP but they do report portfolio assets in the CPIS. The integration is based on data on collective investment funds published respectively by the Guernsey Financial Services Commission[36] and the Jersey Financial Services Commission.[37] Also in this case we used the net asset value of the investment funds issued in these countries to approximate the amount of their external equity liabilities.

Whenever we have used data on fund net asset value, we have assumed that: a) all equity funds are held by foreign investors; b) the fund invests all its assets in foreign securities. We expect that these assumptions do not have an important impact on the estimation of global discrepancy, as the effects on assets and liabilities should balance each other. However, such assumptions may influence the country and financial instrument breakdown of global discrepancy.

As regards the breakdown by debtor country and by financial instrument of the assets held by the Cayman Islands and British Virgin Islands, we have estimated it by adopting the hypothesis that it reflects the distribution related to the subset of offshore and small financial centres[38] declaring to the CPIS.

Arab oil exporters – assets (Sovereign Wealth Funds)

The estimates of portfolio assets held by Arab oil exporters (again with the exception of those vis-à-vis the US and Japan) have been mainly based on published data on the net asset values of sovereign wealth funds collected by the SWF Institute[39] and from specific studies (ECB, 2008). In the absence of reliable information on the distribution by country and by financial instrument, we assume

---

[34] According to estimates made by Lane and Milesi-Ferretti (2010), these two countries account for between 50 and 60 per cent of total assets and liabilities of the 32 small international financial centers (SIFCO) countries (information relating to year 2007).

[35] http://www.cimoney.com.ky/Stats_Reg_Ent/. (Investment Statistical Digest for 2007, 2008 and 2009).

[36] http://www.gfsc.gg/Investment/Pages/Statistics.aspx.

[37] http://www.jerseyfsc.org/the_commission/general_information/statistics/international_monetary_fund.asp.

[38] The group comprises Bermuda, Guernsey, Jersey, Luxembourg, the Isle of Man and - only for banking sector - Barbados, the Bahamas, British Virgin Islands, Cayman Islands and Netherlands Antilles.

[39] http://www.swfinstitute.org/fund-rankings.

that they are proportionally distributed according to the global discrepancy. In other words, such assets have been proportionally subtracted from the global discrepancy for each combination of year, issuer country and type of instrument (see formula A.1 below).

Other countries not included in the CPIS and IIP statistics – assets and liabilities

As regards the other countries (e.g. Taiwan) not reporting data to IMF (CPIS and IIP) and not included elsewhere, we derived data – subject to availability – on assets (portfolio securities plus the 70 per cent of official reserves) and liabilities (portfolio securities) from EWN II. In the absence of reliable information on the distribution by country and by financial instrument, we assume that they are proportionally distributed according to the global discrepancy (see formula A.1 below).

As regards the breakdown by country and type of instrument of estimated assets held both by Arab (A) oil exporters (in securities issued by countries other than the US and Japan) and by countries not included in the CPIS and IIP statistics (O), we define, respectively, equity and debt securities as follows:

$$A_{AO}^{E} \quad \text{and} \quad A_{AO}^{D}$$

and considering global individual country discrepancies before the integration of the above assets:

$$_{t}U^{E*} \quad _{t}U^{D*} \quad _{t}U_{i}^{E*} \quad _{t}U_{i}^{D*}$$

the final amount of the discrepancy in equity securities by a reference year and issuer country can be expressed as follows (with a similar notation for debt securities):

A.1) $$\forall\, i,t \qquad {}_{t}U_{i}^{E} = {}_{t}U^{E*} - \left(A_{AO}^{E} \times \frac{{}_{t}U_{i}^{E*}}{{}_{t}U^{E*}} \right) = {}_{t}L_{i}^{E} - \sum_{j} {}_{t}A_{ji}^{E} - \left(A_{AO}^{E} \times \frac{{}_{t}U_{i}^{E*}}{{}_{t}U^{E*}} \right) \quad .$$