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The IMF balance sheet approach:  
towards from-whom-to-whom information  
on cross-border portfolio securities<sup>1</sup>

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<sup>1</sup> This paper was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

# The IMF Balance Sheet Approach: towards from-whom-to-whom information on cross-border portfolio securities

Artak Harutyunyan and Carlos Sánchez Muñoz<sup>1</sup>

## Abstract

This paper proposes an international exchange of information on issuers of securities and their institutional sector. This exchange would contribute substantially to breaking down portfolio positions by country and sector of both holders and issuers and thus to uncovering the financial interconnections between sectors and countries at the global level.

The paper first discusses how the Balance Sheet Approach is constructed and how it contributes to major activities carried out at the IMF. It then explains areas for future development towards the longer-term goal of compiling a Global Flow of Funds matrix. Such a matrix would require breaking down all financial positions by counterpart country and sector.

To compile from-whom-to-whom information for portfolio securities, the paper describes an ongoing project of the IMF Statistics Department in coordination with the IMF Committee on Balance of Payments Statistics. The project consists of setting up a centralized database to store information about securities issuers and their institutional sector. By putting this information at the disposal of the IMF Coordinated Portfolio Investment Survey reporters (more than 80 economies), the database would permit breaking down cross-border portfolio securities by country and sector of holders and issuers with a view to compiling from-whom-to-whom portfolio information.

Keywords: Balance Sheet Approach, global flow of funds, financial crisis, IMF surveillance, from-whom-to-whom, portfolio investment, securities, Coordinated Portfolio Investment Survey

JEL classification: F21 International Investment • Long-Term Capital Movements

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## Introduction

**Ever-increasing global financial interlinkages among different sectors and economies require that, besides monitoring transactions, analysts and policy makers pay increasing attention to positions.** In a globalized world with complex financial inter-linkages, drawing a global financial network between different economies and sectors requires sufficiently detailed sectoral financial balance sheets. Sectoral balance sheets (financial assets and liabilities) broken down by counterpart country and sector may facilitate early detection of potential vulnerabilities and risks of spillovers from individual sectors and countries to the rest of the global economy.

**Developing a global flow of funds — expanding the traditional single-economy flow of funds — has been identified by the IMF as a longer-term goal that can fundamentally change the IMF bilateral and multilateral surveillance work.** Given the complexity of building such a global flow of funds for both positions and transactions covering all sectors and instruments, a step-by-step approach is needed. In the last years, two data collection frameworks managed by the IMF — the Coordinated Direct Investment Survey (CDIS) and the Coordinated Portfolio Investment Survey (CPIS) — have helped compilers address bilateral asymmetries.

**This paper describes how an international exchange of information could substantially help CPIS reporters compile from-whom-to-whom information on cross-border portfolio securities.** Section 1 describes the importance of the Balance Sheet Approach (BSA); how to compile it; how the IMF uses it for surveillance; and how it can be further developed. Section 2 focuses on how exchanging information internationally could help break down portfolio investment positions by counterpart country and sector, a step towards the longer-term goal of a Global Flow of Funds matrix.

## 1. The Balance Sheet Approach

### 1.1 What is the Balance Sheet Approach? Why is it important?

**The BSA pulls together the assets and liabilities of each sector within a country, i.e. its aggregate (including cross-border) positions/balance sheet.** Such sectoral balance sheets convey important information on risks and vulnerabilities to policies and shocks, as well as on the interlinkages and exposures between the different sectors of an economy and vis-à-vis the rest of the world.

**Renewed interest on balance sheets arose from the 2007-2008 Global Financial Crisis.**<sup>2</sup> An important trigger of the crisis was the inability of some sectors in certain countries to service their excessive debt, which generated global spillover effects. Increasingly interconnected financial markets require close examination of an economy's sectoral balance sheets for complementing the traditional flow-based analysis.<sup>3</sup> This analysis allows exploring the buildup of balance sheet interlinkages and how they make a sector or an economy vulnerable to shocks.

**Policy makers need to detect balance sheet risks and vulnerabilities early enough to be able to apply timely policy responses.** Balance sheet interlinkages and networks also inform the analysis of

<sup>2</sup> This is reflected in the IMF's 2014 Triennial Surveillance Review, which advocates the development of a global flow of funds "to build on the national balance sheet approach to better analyze cross-border linkages."

<sup>3</sup> Allen et al. (2002)

potential shock propagations from one sector to another, permitting policy makers to take timely preventive measures.

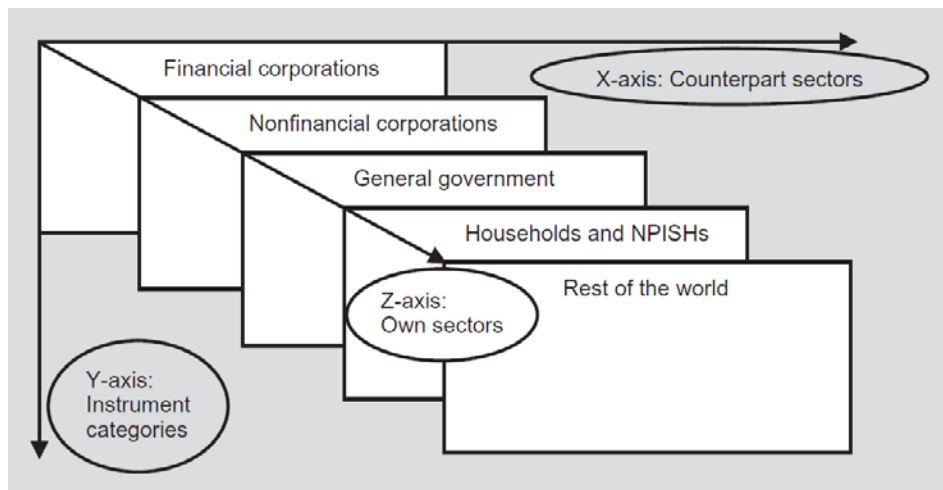
**Analyzing balance sheets allows exploring key macroprudential questions.** Examples of such questions are: how healthy is the aggregate balance sheet of each sector and the external (international investment) position of the economy as a whole; what the potential risks associated to balance sheet vulnerabilities over time are; how such vulnerabilities amplify and propagate the impact of external shocks; and whether there are potential channels of shock propagation among different sectors of the economy.

## 1.2 How to compile and analyze the Balance Sheet Approach

**Financial balance sheets can be compiled at two-dimensional and three-dimensional levels.**<sup>4</sup> The two-dimensional financial balance sheets present, for each sector, financial assets and liabilities without identifying the counterpart sectors.<sup>5</sup> The three-dimensional balance sheets, in addition to the two-dimensional approach contain from-whom-to-whom information, where financial assets and liabilities are broken down by sector and by counterpart sector (Figure 1), thus allowing to draw the financial network between different sectors of the economy and the rest of the world.

**The three-dimensional approach is most suitable for the type of analysis discussed in Subsection 1.1, with interconnectedness being at the core of the analysis.** The data requirements for the three-dimensional presentation are much more demanding though. Figure 2 below shows an integrated system of financial balance sheets of key sectors and identifies possible data sources for each cell.

**Figure 1: Concept of three-dimensional balance sheets**



Source: MFSMCG Figure 8.2.

**Mirror data from counterpart sectors can be used to populate those cells of the matrix for which obtaining source data is difficult.** For example, asset side loan data from the banking sector can be used to populate loan liabilities of the household sector instead of obtaining these data from households, resulting in cost efficiency and better quality of data.

<sup>4</sup> See the IMF's Monetary and Financial Statistics Manual and Compilation Guide (MFSMCG)

<sup>5</sup> As in the balance sheets of the *System of National Accounts 2008 (2008 SNA)*

**The analysis of from-whom-to-whom financial balance sheets focuses on three intra-sector and inter-sectoral macroeconomic vulnerabilities: maturity, currency, and capital structure mismatches.** To analyze such mismatches, three key indicators are compiled and analyzed: net short-term position (short-term assets *less* short-term liabilities); net foreign currency position (foreign currency assets *less* foreign currency liabilities); and net financial position (financial assets *less* liabilities).

**Maturity mismatches arise when assets are longer-term, mainly illiquid, while liabilities are short-term.** Maturity mismatches can arise in both domestic and foreign currency, creating rollover risk, interest rate risk for the debtor, and reinvestment risk for the creditor.

**Currency mismatches arise when assets and liabilities are denominated in different currencies.** This mismatch creates exchange rate risk. For example, if assets are held in domestic currency but liabilities are denominated in foreign currency, substantial losses may result if the domestic currency depreciates sharply.

**Capital structure mismatches result from excessive reliance on debt financing instead of equity.** The absence of an equity buffer can lead to solvency issues when a sector encounters a shock.

**Solvency or credit risk emerges when a sector's financial assets no longer cover its financial liabilities.** Solvency risk is closely linked to maturity mismatch risk, currency mismatch risk, and capital structure mismatch risk.

**Figure 2. The Balance Sheet Approach and data sources**

Holder of liability (creditor) / Issuer of liability (debtor)	Central bank	General government	Other depository corporations	Other financial corporations	Nonfinancial corporations	Other resident sectors	Nonresidents
<b>Central bank</b>		1. SRF 1SR (Liabilities)	1. SRF 1SR (Liabilities) 2. SRF 2SR (Assets)	1. SRF 1SR (Liabilities)	1. SRF 1SR (Liabilities)	1. SRF 1SR (Liabilities)	1. SRF 1SR (Liabilities) 2. IIP 3. JEDH
<b>General government</b>	1. SRF 1SR (Assets)		1. SRF 2SR (Assets)	1. SRF 4SR (Assets)	n.a. 1/	n.a. 1/	1. IIP 2. QEDS
<b>Other depository corporations</b>	1. SRF 1SR (Assets) 2. SRF 2SR (Liabilities)	1. SRF 2SR (Liabilities)		1. SRF 2SR (Liabilities)	1. SRF 2SR (Liabilities)	1. SRF 2SR (Liabilities)	1. SRF 2SR (Liabilities) 2. IIP 3. QEDS
<b>Other financial corporations</b>	1. SRF 1SR (Assets)	1. SRF 4SR (Liabilities)	1. SRF 2SR (Assets)		1. SRF 4SR (Liabilities)	1. SRF 4SR (Liabilities)	1. SRF 4SR (Liabilities) 2. IIP 3. QEDS
<b>Nonfinancial corporations</b>	1. SRF 1SR (Assets)	GFS	1. SRF 2SR (Assets)	1. SRF 4SR (Assets)		n.a.	1. IIP 2. QEDS 3. JEDH
<b>Other resident sectors</b>	1. SRF 1SR (Assets)	GFS	1. SRF 2SR (Assets)	1. SRF 4SR (Assets)	n.a.		1. IIP 2. CPIS 2/
<b>Nonresidents</b>	1. SRF 1SR (Assets) 2. IIP 3. CPIS	1. IIP 2. CPIS	1. SRF 2SR (Assets) 2. IIP 3. CPIS	1. SRF 4SR (Assets) 2. IIP 3. CPIS	1. IIP 2. CPIS	1. IIP 2. CPIS	

1/ This data gap can in the future be filled with data from the public debt data template (which also covers assets) which is being piloted in some countries.  
2/ CPIS data can be used to derive other resident sector's claims as residual.

Source: IMF training materials.

Notes: SRF=standardized report form for monetary statistics, GFS=government finance statistics, QEDS=Quarterly External Debt Statistics, JEDH=Joint External Debt Hub

**Detection and analysis of the above risks in an integrated from-whom-to-whom balance sheet framework is an essential input for taking macroeconomic policy decisions.** For example, when balance sheet risks are observed, policy makers may implement policies that reduce sectoral vulnerabilities by focusing on changes in key financial variables like exchange and/or interest rates. Furthermore, network-based analysis permits policy makers to evaluate the impact and trade-offs between different policy measures and objectives, and to assess the systemic impact on the financial and the real economy.

**The expansion of the financial balance sheet analysis to cover cross-border bilateral positions by country and sector would strengthen the analysis of interconnectedness across borders.**

The primary goal would be to construct a global flow of funds matrix mapping domestic and external financial positions that can be broken down bilaterally by countries/regions and ideally also

by counterpart sectors. An even longer-term objective would be to extend the analysis to identify flows for regular monitoring of bilateral cross-border financial flows.<sup>6</sup>

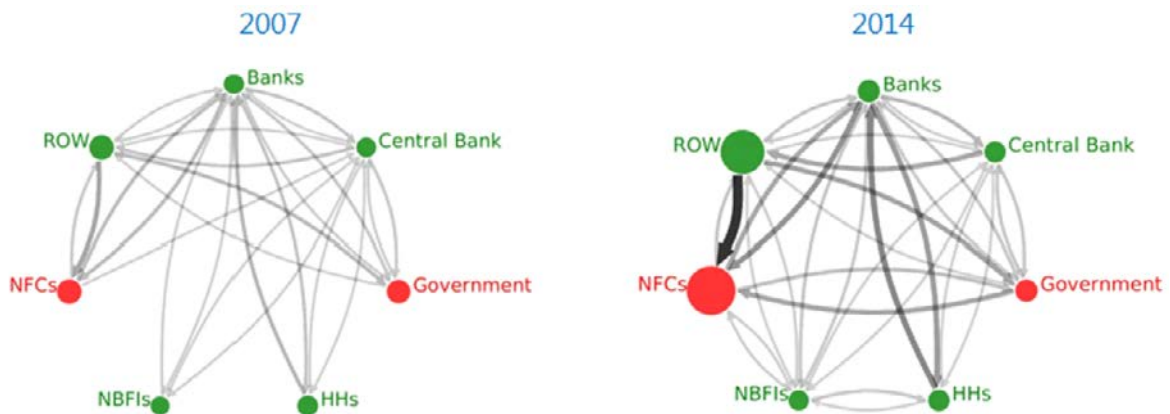
### 1.3 Using the Balance Sheet Approach at the IMF

**The Fund BSA is the analysis of financial balance sheets on a from-whom-to-whom basis.** While Fund staff developed the framework in the early 2000s, only recently has it been mainstreamed into Fund surveillance.

**The 2014 Triennial Surveillance Review (TSR) called for incorporating macro-financial analysis and the BSA into the regular Fund surveillance, with the Statistics Department of the IMF (STA) stepping up its role.**<sup>7</sup> STA supports Fund surveillance by preparing the relevant matrices and supporting analytical work. Following two rounds of Fund-wide pilots on mainstreaming macro-financial surveillance, where BSA was one of the themes, STA has developed a new automated BSA tool using in-house IMF data. The tool guides Fund users in the construction of the BSA matrix for about 120 countries. Certain analytical features are also embedded in the tool; for instance, following an exchange rate depreciation/appreciation shock of a designated magnitude the tool automatically calculates balance sheet positions.

**As an example, the Selected Issues Paper for the 2016 Article IV staff report for Indonesia features the analytical potential of the BSA.** Figure 3 presents the balance sheet interconnectedness network for Indonesia in 2007 and 2014. The evolution of the Indonesian BSA between these two years suggests two areas of vulnerability: first, the increasing reliance of non-financial corporations (NFCs) on cross-border funding; and second, the banking sector increasing exposure to NFCs. Such spillover risks demonstrate the analytical power of the BSA, especially when monitored for multiple periods.

**Figure 3. Indonesia: BSA matrix in network map form**



Source: *Indonesia: Selected Issues Paper, 2016, Figure 1 on page 29, IMF.*

Note: *The thickness of the arrow indicates the size of gross exposure, while the color of the nodes distinguishes net creditors (green) from net debtors (red).*

<sup>6</sup> Errico et al. (2014), for example, present an approach to understanding the shadow banking system in the United States using a similar approach anchored on the analysis of global flow of funds.

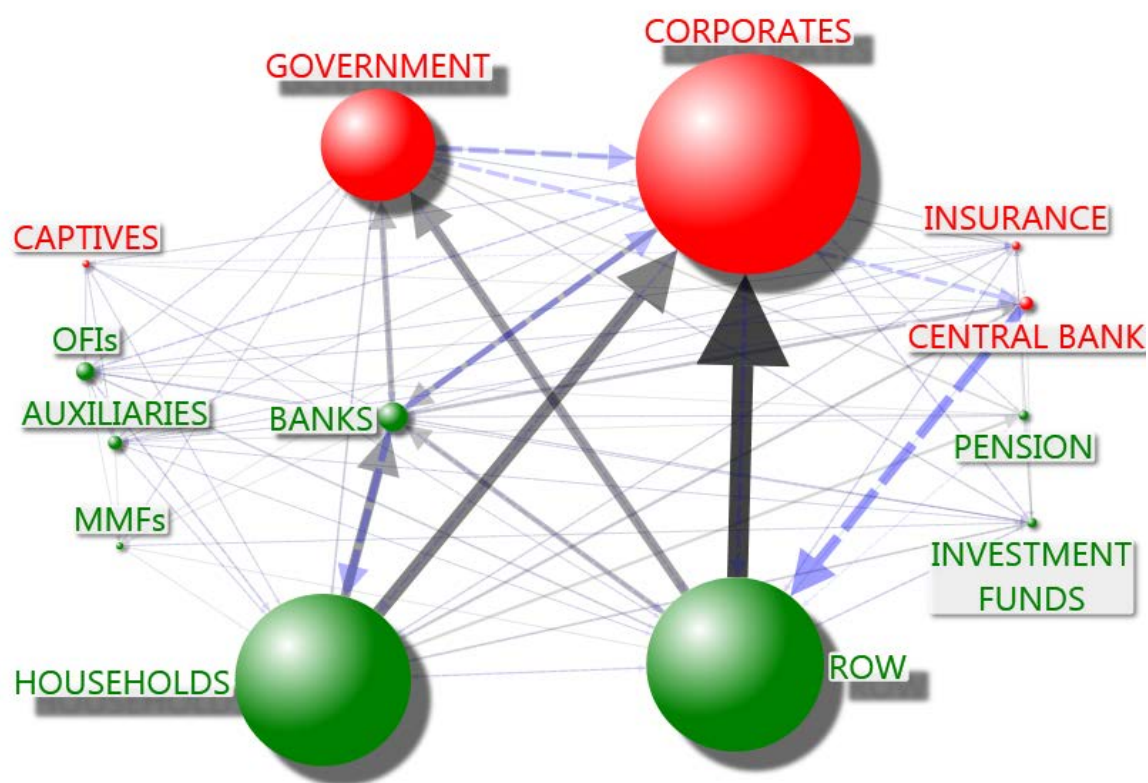
<sup>7</sup> The 2015 paper on *Balance Sheet Analysis in Fund Surveillance* takes detailed stock of the developments until 2015.



Abbreviations: NBFIs – Non-bank Financial Intermediaries; NFCs – Non-financial corporations; HHs – Households; ROW – Rest of the World

**BSA-type analysis is also gaining traction for the Fund’s work on financial sector assessments.** Several recent Financial Sector Assessment Programs (FSAP)<sup>8</sup> and Financial Sector Stability Reviews (FSSR)<sup>9</sup> have used BSA-type analysis in their assessments as a starting point for detecting major macroeconomic vulnerabilities that may directly or indirectly affect the financial system. The recently concluded Romania FSAP, for example, used the BSA to analyze macro-financial interlinkages, sectoral dependencies, and potential balance sheet vulnerabilities for all resident sectors (Figure 4).

**Figure 4. Romania: Network of balance sheet exposures (2016)**



Source: Romania: FSAP Technical Note on Balance Sheet Analysis, 2018, IMF.

Note: Red nodes represent net borrowers and green nodes net lenders. The diameter of nodes and thickness of arrows show the relative size of imbalances and exposures, respectively.

<sup>8</sup> The FSAP is a comprehensive and in-depth analysis of a country’s financial sector. FSAP assessments are the joint responsibility of the IMF and World Bank in developing economies and emerging markets and of the IMF alone in advanced economies.

<sup>9</sup> FSSRs are a new IMF technical assistance instrument providing a diagnostic upon which financial sector reform programs can be built and implemented. FSSRs provide baseline diagnostic assessments, highlight key weaknesses in financial systems and institutional capacities, and set out prioritized medium-term action plans for well-sequenced financial sector reforms, to be supported by follow-up TA from the IMF and other sources.

Abbreviations: OFIs – Other Financial Intermediaries; MMFs – Money Market Funds; ROW: Rest of the World

## 1.4 Areas for future development

**Mainstreaming BSA-type analysis has become possible because of the increased availability of underlying balance sheet data thanks to the IMF's and member countries' efforts.** Yet, important data gaps remain. STA continues to work on the future improvements of balance sheet statistics through the Data Gaps initiative for G-20 countries<sup>10</sup>. STA is preparing a medium- to long-term strategy to improve the availability of balance sheets for the financial, external, fiscal, and real sectors, with a view to better supporting BSA and its use for surveillance. Capacity development in the field of BSA is also supported by one of the statistical modules of the Financial Sector Stability Fund<sup>11</sup>.

**As mentioned previously, one of the major BSA future developments is breaking down global cross-border positions by counterpart countries and sectors.** The lack of information on portfolio investment assets by issuer sectors is an impediment to continue advancing this work. This is further discussed in the next section.<sup>12</sup>

## 2. A Balance Sheet Approach extension: breaking down portfolio investment positions by geography and sector

### 2.1 Portfolio liabilities and the Coordinated Portfolio Investment Survey

**Compiling accurate statistics on portfolio investment liabilities broken down by country is a well-known statistical challenge.** Domestic issuers of securities may be aware of who first acquires such securities in primary markets, but they most often cannot trace subsequent purchases and sales, nor consequently determine the residence of the final holder. When investors operate via foreign financial intermediaries, it is extremely hard for statistical compilers to find information sources that can determine who ultimately holds domestic securities.<sup>13</sup> This could only be possible by enquiring/surveying final investors. However, reporting requirements typically only address resident reporters, so foreign investors cannot be legally obliged to provide such statistical information.

**In the late nineties, the IMF started to conduct the CPIS<sup>14</sup> with a view to mitigating the increasing size of global portfolio investment asymmetries.** Such sizeable asymmetries had

<sup>10</sup> See latest Progress Report of the Second Phase of the G-20 Data Gaps Initiative (DGI-2) under <https://www.imf.org/external/np/g20/pdf/2017/092117.pdf>. Under recommendation II.8, the DGI-2 encourages advanced economies to disseminate data on a from-whom-to-whom basis.

<sup>11</sup> The Financial Sector Stability Fund is an IMF trust Fund that provides technical assistance and training to low- and lower-middle-income countries in support of financial sector stability, inclusion, and deepening. See <https://www.imf.org/external/np/ins/english/pdf/FSSF.pdf>

<sup>12</sup> Other aspects for BSA future development include reconciliation of asymmetries between different underlying datasets; sectoral financial accounts with from-whom-to-whom counterpart detail; maturity breakdowns for all financial instruments; further breaking down the nonbank financial sector; and compiling matrices of financial flows corresponding to balance sheet positions.

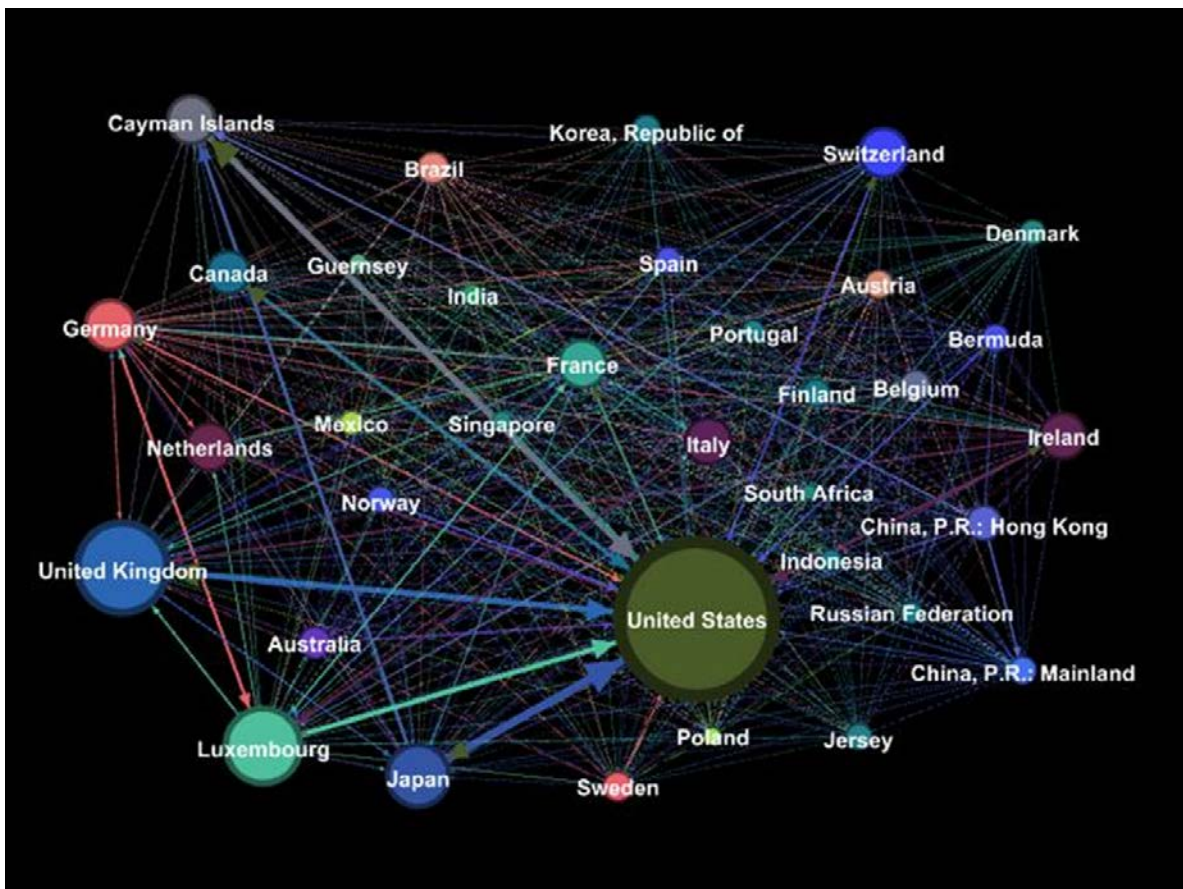
<sup>13</sup> This is particularly true because most investors transact and keep securities in custody with financial intermediaries, often through a long chain of custodians and sub-custodians. The frequently long chains of custodians/sub-custodians/final investors usually entail cross-border relationships involving several countries.

<sup>14</sup> <http://data.imf.org/cpis>

resulted from the increased liberalization of cross-border transactions and the above-described measurement issues. The CPIS is a global survey of portfolio investment stocks collecting semi-annual (end-June and end-December) information on cross border holdings of debt and equity securities.

**The CPIS provides each economy with mirror statistics on its portfolio investment liabilities, coming from what every other economy reports to be holding of the securities issued by residents in that country.** Compiling detailed information about cross-border portfolio investment assets (domestic holdings of foreign securities) is substantially more straightforward than compiling similar information about liabilities (domestic securities held abroad). Therefore, with the mirror information provided by the CPIS, each economy can compile the geographic distribution of its nonresident creditors. In this way, the information provided by the CPIS permits that cross-border position statistics portray complex financial interlinkages between different economies as in figure 5:

**Figure 5: CPIS networking analysis**



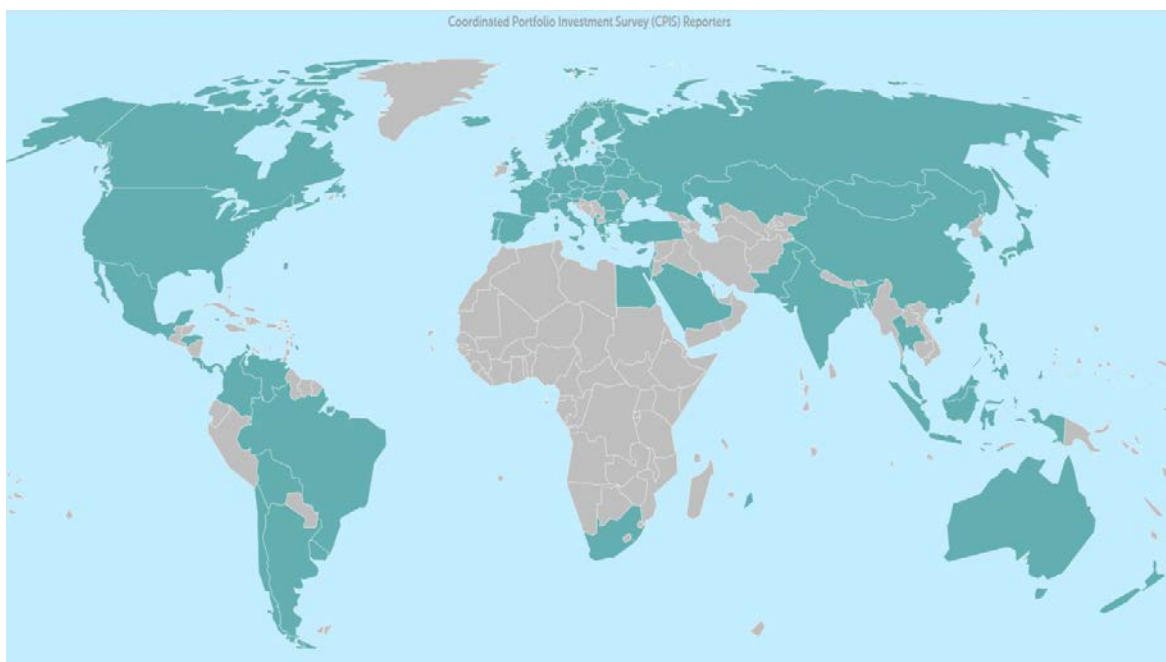
Source: End-June 2017 CPIS data

Size of circles is proportional to total cross-border issues/holdings and size and direction of arrows, to the scale and direction of the financing

**More than 80 economies participate in the CPIS, including all major industrialized economies as well as most offshore financial centers and emerging markets** (see figure 6).<sup>15</sup>

**Figure 6: CPIS participating economies**

<sup>15</sup> The list of CPIS reporters can be consulted here: <http://data.imf.org/?sk=B981B4E3-4E58-467E-9B90-9DE0C3367363&sid=1481580274211>



## 2.2 Still missing: which foreign sectors are domestic investors financing?

**From-whom-to-whom portfolio information requires that cross-border securities holdings be broken down by domestic (holding) sector and by counterpart (issuing) country and sector.**

Ignoring the institutional sector of the foreign securities held by domestic investors (i.e. which non-resident sectors are resident sectors financing) may jeopardize financial stability. Whether domestic banks are holding foreign securities issued by foreign banks; by mutual or hedge funds; by financial vehicle corporations; by (public or private) non-financial corporations; etc. may involve substantially different risks. The lack of information on portfolio investment assets by issuer sectors impedes efforts to build up a global map of interlinkages between lenders and borrowers.

**Even if information about securities holdings is available security by security, it is significantly more challenging to sectorize non-resident issuers than domestic holders.** Statisticians need to sectorize domestic institutional units to compile macroeconomic statistics, so they need to have access to (or keep a record of) the institutional sector where each resident entity belongs. However, having access to similar information for non-resident units is much harder.<sup>16</sup>

## 2.3 Exchanging information internationally to close the gap

**A centralized exchange of information across countries could improve the CPIS' sectorization of non-resident issuers.** The Inter-Agency Group on Economic and Financial Statistics and the Financial Stability Board Secretariat recommended the IMF Committee on Balance of Payments Statistics<sup>17</sup> (hereinafter BOPCOM) to consider the feasibility of such an exchange. This was reflected

<sup>16</sup> Central Banks in the European Union (EU) benefit from the information available in the so-called Centralized Securities Database (CSDB), which contains reference data for individual securities sourced from the central banks themselves and from commercial data providers. This way of exchanging information at the regional level has already proved to be successful for sectorizing non-resident issuers of the (respective) other European Union countries. However, even in the CSDB sectorizing issuers of jurisdictions beyond the European Union remains a challenge.

<sup>17</sup> <https://www.imf.org/external/bopage/bopindex.htm>

in recommendation II.12 of the G-20 Data Gaps Initiative<sup>18</sup> and is also in line with recommendation II.20, which promotes sharing granular data to cover more comprehensively highly interconnected markets and to reduce bilateral asymmetries.

**At its 2016 annual meeting, BOPCOM considered the possibility to address this gap by setting up a centralized database hosted by the IMF that would permit an international exchange of information.** The IMF would receive from each CPIS reporter information on individual securities (ISIN codes<sup>19</sup>) and/or the IDs of the most important foreign issuers of securities held by their domestic investors. Securities/issuers IDs would be grouped according to their country of residence; duplicates be eliminated; and the resulting list of securities/issuers be sent to each country participating in the exchange for their subsequent sectorization. In this way, each economy would only sectorize its domestic issuers. The resulting information would be stored in a database hosted at the IMF and be made available to all CPIS reporters for later use to identify the issuer sector of the foreign securities held by domestic investors.

**Countries usually collect portfolio investment data either on an aggregate or on a security-by-security basis.** The latter countries usually collect a reduced volume of information from investors (which may be as limited as just the number and/or the nominal value of the securities they held plus the ISINs or other securities identifiers<sup>20</sup>), which is later combined with the reference information (e.g. mark-to-market value, currency, maturity, coupon, rating) contained in a securities database. By combining these two elements, statisticians have full flexibility to compile the aggregate statistics they need and even to review time series retroactively by adding new breakdowns without the need to request additional information from respondents. Conversely, countries that compile portfolio investment statistics on an aggregate basis need to provide instructions to reporters on how to aggregate their raw microdata according to the breakdowns they want to produce. In this case, producing new breakdowns and reviewing historical series would force compilers to come back to their reporters and request additional information.

**Countries with access to information connecting individual securities (via e.g. their ISIN) with issuers (via their LEI<sup>21</sup> or another standard identifier) and their institutional sector could exchange information at the level of individual securities.** This may not require security-by-security data collection, since the information may be available through another local database (e.g. stock exchange, public debt or other securities databases) connecting individual securities with issuers and their institutional sector.

**Countries collecting only aggregate information and without access to any such database may still participate in the project by providing more limited information.** They would be required to provide a list of the domestic issuers with the largest cross-border liabilities (again identified through their LEI or another standard identifier by the other CPIS reporters) and their corresponding institutional sector.

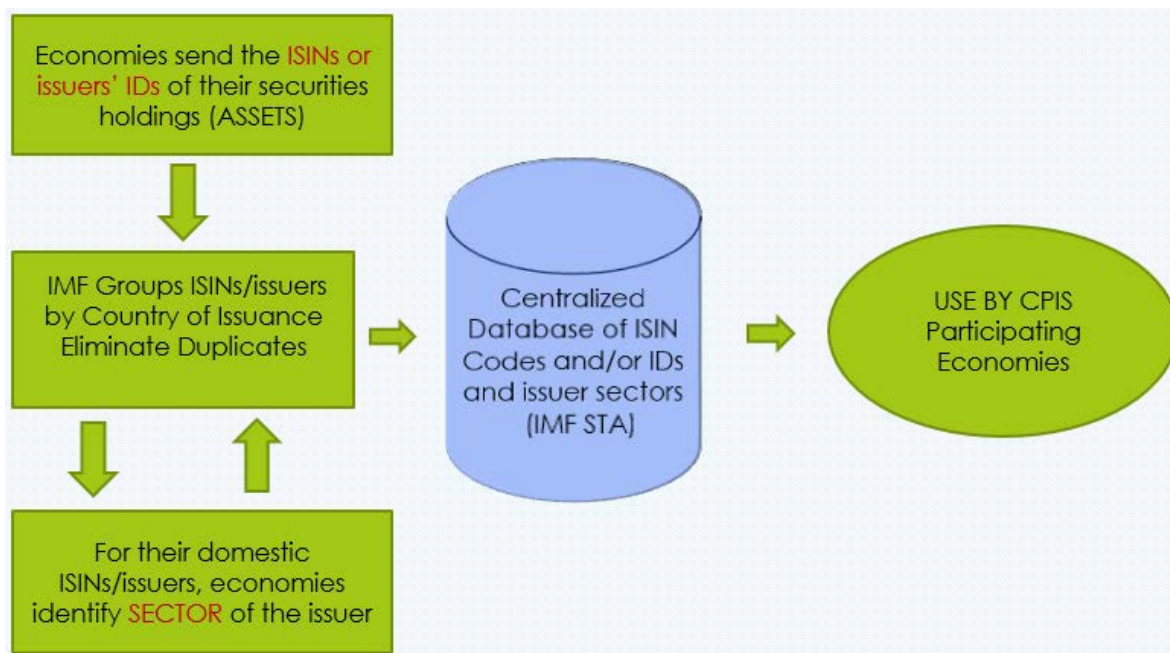
<sup>18</sup> This recommendation monitors among others the number of G-20 economies that report the CPIS table with information by sector of issuer.

<sup>19</sup> The International Securities Identification Number (ISIN) is a 12-character alphanumeric code that uniquely identifies a security according to ISO standard 3166.

<sup>20</sup> CUSIP (Committee on Uniform Security Identification Procedures) number, SEDOL (Stock Exchange Daily Official List) number, etc.

<sup>21</sup> The Legal Entity Identifier (LEI) is a 20-digit alpha-numeric code that uniquely identifies a legal entity participating in financial transactions.

**Figure 7: IMF-centralized exchange of data to improve sectorization of issuers in the CPIS**



**No additional information (e.g., currency, type of security, original maturity, etc.) would be part of the proposed exchange.** That's because any additional information could exacerbate potential copyright and confidentiality issues.

## Conclusions

**In a globalized world with increasingly complex cross-border linkages, sufficiently detailed sectoral balance sheet positions become fundamental in anticipating potential risks and spillovers.** Whereas some progress has been made in analyzing sectoral interlinkages within individual domestic economies, much more needs to be done to extend the analysis to the global level. This can only be possible when a full matrix of cross-border positions between countries and sectors be constructed.

**Constructing a full matrix of cross-border positions between countries and sectors is particularly complex when it comes to sectorizing non-resident counterparts.** While statisticians usually have information to sectorize domestic institutional units, having access to similar information for non-resident units is much harder, thus why exchanging information across countries looks worth exploring. Given the high level of standardization of portfolio securities, progress in this area can proceed faster as it can benefit from a high degree of automation.

**The IMF in coordination with BOPCOM is currently studying the possibility to set up a centralized database to store information about non-resident issuers of securities and their institutional sector.** The information in the database would be used by the CPIS reporters to sectorize non-resident issuers and be able to compile and disseminate from-whom-to-whom information for portfolio securities.

**All countries (even those which only compile aggregate information) would substantially benefit from participating in the project.** Participating in the exercise and sharing their data with

the other CPIS countries would bring substantial benefits to all participants, since they could use the mirror CPIS data provided by counterpart economies to compile their portfolio investment liabilities by issuer sector with a much higher degree of accuracy.

**Before proceeding with the exchange, several issues need to be addressed.** First, participants may need to deal with potential copyright restrictions, mostly referring to data coming from commercial data providers. Second, only a high degree of standardization would permit to reap the benefits of a largely automated process. Finally, it must be assessed whether the foreseeable benefits of the database outweigh its set up and running costs.

## Annex 1: Pilot project between the European Central Bank and the US Fed

**As a proof of concept, in 2017 the US Federal Reserve System (FED) and the European Central Bank (ECB) undertook a pilot exercise aimed to assess whether such an exchange of information could bear useful results.** In the pilot (limited to securities with an ISIN code) the ECB provided the FED with more than 120,000 US securities from its Centralized Securities Database<sup>22</sup>, while the Fed transmitted the ECB 45,000 securities issued by EU residents. Both institutions sectorized their respective issuers and sent back the resulting matching of security-issuer-sector to the other party.

**The exercise confirmed that home-country reviewers could far more precisely assign a sector to domestic issuers (sometimes even just based on the issuer name) than what had been previously stored in each respective database.** Prior to the exercise, both institutions had already assigned institutional sectors to foreign issuers in their databases. The pilot was supposed to validate the accuracy of such information, and revealed a number of errors. Typical cases were securities correctly classified as Government-issued, but to which the level of government assigned (i.e. state or local) was sometimes incorrect. Another example was that of financing arms of nonfinancial firms, which often was also erroneously considered as nonfinancial.

**The pilot also showed the importance of standardization.** The FED gives freedom to respondents to report using any security identifiers (ISIN, CUSIP, SEDOL, even internal codes). The pilot showed that it was much more difficult for them to be able to match EU securities (and for the ECB to do the same with US securities). Therefore, it was concluded that a high level of standardization was key for the more exhaustive tranche of the exchange (the one exchanging information by individual securities instead of by individual issuers).

### Characteristics of the exchange based on the pilot conclusions

**All in all, the results of the pilot suggested that the more exhaustive tranche of the exchange (based on security-issuer-sector) should be as automated as possible.** This is because the volumes of information to be exchanged would be much higher than for the other tranche (only encompassing individual issuers and sectors). Therefore, the information to be exchanged should be highly standardized, i.e. using the ISIN code as the securities' identifier and the LEI as issuers' identifiers. Besides, the exhaustive tranche should only focus on securities for which cross-border holdings exceed a certain threshold (e.g., USD 1 mil.)

**The alternative tranche would cover only limited information about individual issuers and their corresponding sector.** This would allow additional countries to participate in the exchange by not covering any information at the level of individual securities. Only a limited number of the national issuers accounting for the largest cross-border positions liabilities above a certain threshold (still to be defined) would be covered.

**Depending on the information available at national level, each CPIs reporter would decide whether they wanted to participate in the exchange via the more exhaustive (security/issuer/sector) or the more limited (only issuer/sector) tranche of the exercise.** Participants in either tranche of the exchange should use a single methodology for the sector classification of issuers, namely the SNA 2008 and BPM6 methodology. Any bridging from national

<sup>22</sup> At the time of the exercise, the CSDB kept reference information on 2 million live securities, of which 180,000 corresponded to US issuers.



sectorization or identification codification to internationally accepted standards should take place prior to the provision of the data to the centralized database.

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Ninth IFC Conference on "Are post-crisis statistical initiatives completed?"

Basel, 30-31 August 2018

## The IMF balance sheet approach: towards from-whom-to-whom information on cross-border portfolio securities<sup>1</sup>

Artak Harutyunyan and Carlos Sánchez Muñoz,  
International Monetary Fund

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<sup>1</sup> This presentation was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.



# The IMF Balance Sheet Approach: towards from-whom-to-whom Information on Cross- border Portfolio Securities

Carlos Sánchez-Muñoz

Irving Fisher Committee Conference; August, 2018

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# Outline

- The IMF Balance Sheet Approach
- Breaking down portfolio investment positions by geography and sector
- Exchanging information internationally to close the gap
- Conclusions



# Outline

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# The IMF Balance Sheet Approach

- **Assets and liabilities of each sector** (positions)
- Estimate inter-sectoral financial positions **by instrument, maturity, and currency**
- Objective: detect sector vulnerabilities / policies to reduce them

Three intra-sector mismatches:

- Maturity mismatches → LT illiquid assets vs. ST liabilities
- Currency mismatches → exchange rate risks
- Capital structure mismatches → not enough equity

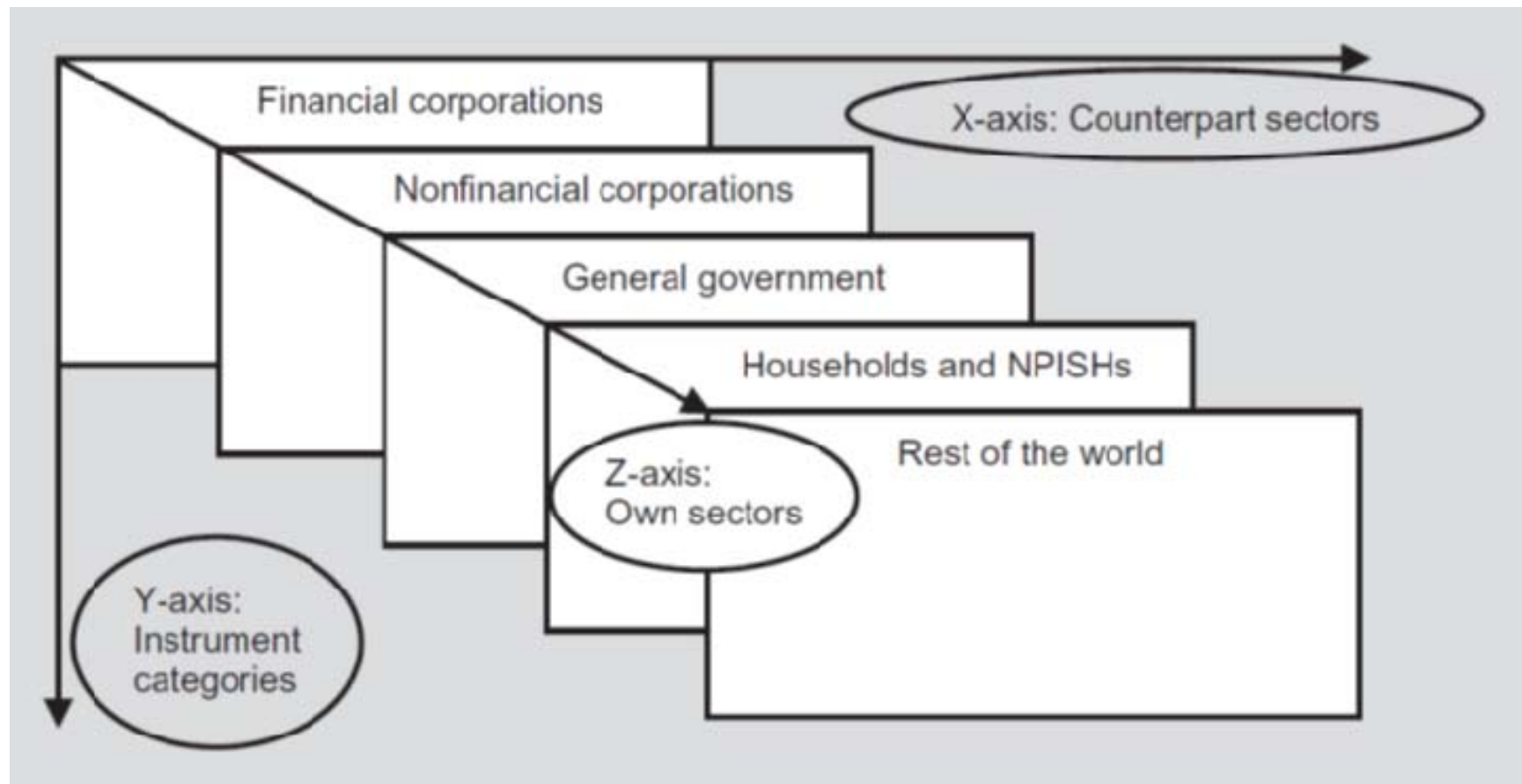
Can turn into → **Solvency or credit risk** (financial assets < liabilities)





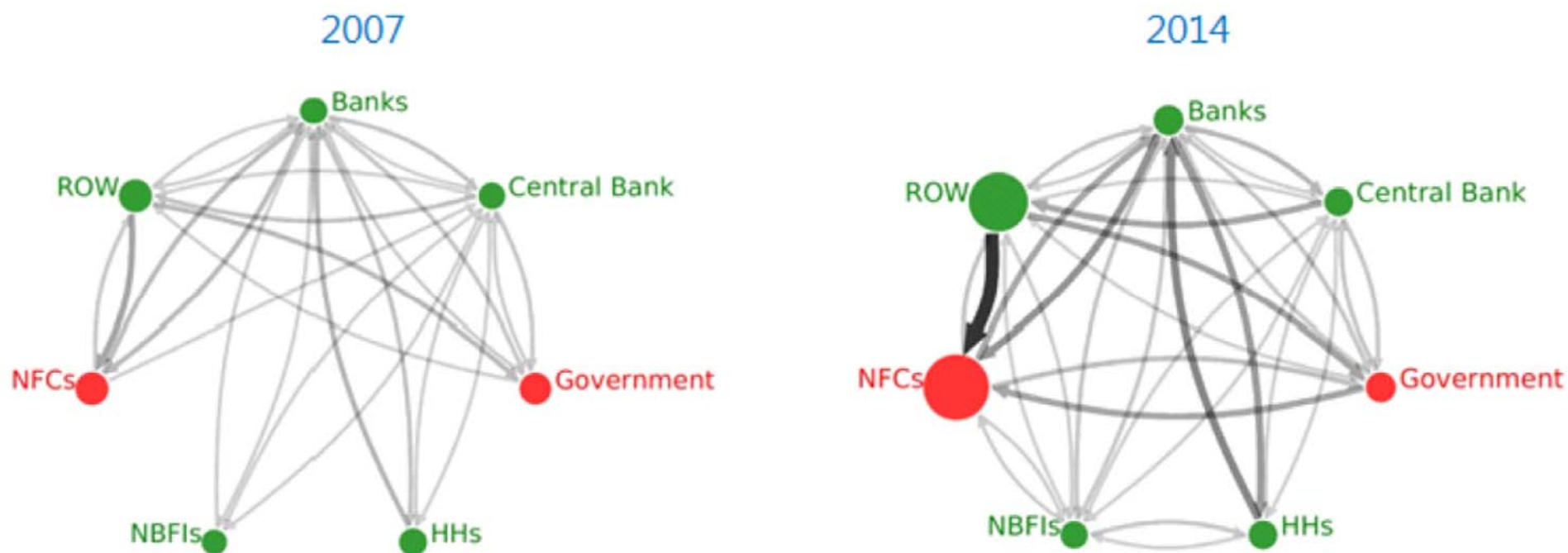
# How to compile and analyze the Balance Sheet Approach

- The three-dimensional BSA provide counterpart information





# Example: BSA network map for Indonesia



Source: *Indonesia: Selected Issues Paper, 2016, Figure 1 on page 29, IMF.*

Note: *The thickness of the arrow indicates the size of gross exposure, while the color of the nodes distinguishes net creditors (green) from net debtors (red).*

Abbreviations: NBFIs – Non-bank Financial Intermediaries; NFCs – Non-financial corporations; HHs – Households; ROW – Rest of the World



## Areas for future development

- **Maturity** breakdowns for all financial instruments
- Further breaking down **nonbank** financial sector
- Reconciliation of **asymmetries**
- Compiling matrices of **inter-sectoral financial flows**

And

Breaking down global cross-border positions with **from-whom-to-whom counterpart (country and sector) detail**

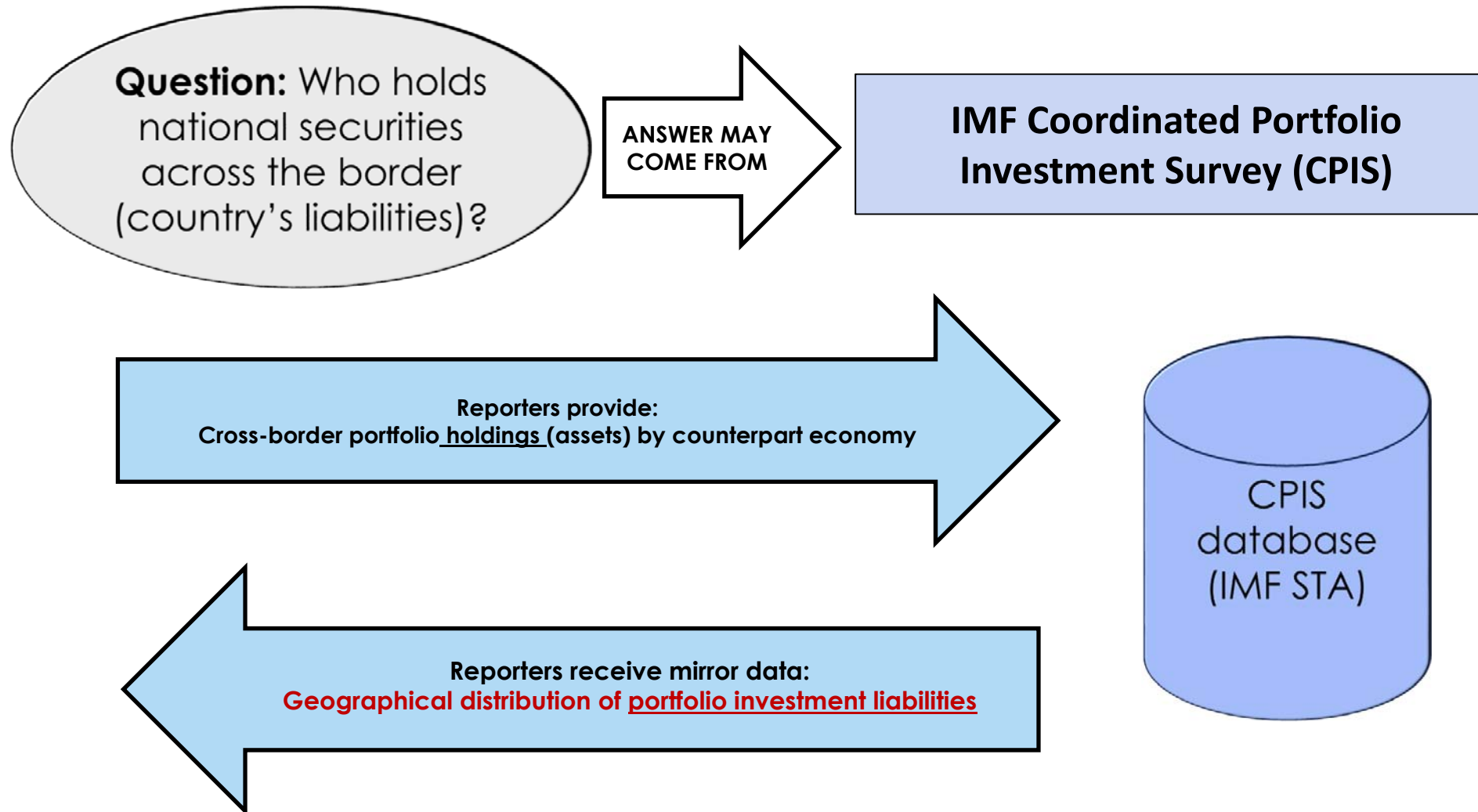


# Outline

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## Break down by geography cross-border positions





## CPIS : Participating economies

- Reporters cover:
  - All major industrialized economies
  - Most offshore financial centers
  - Most emerging markets
  - Lacking some oil-producing economies
- Results for December 2017 to be posted in September 2018



# What is missing to permit identification of who (holder) finances whom (issuer)?

- We know which domestic sectors hold securities, but...
- ... don't know which non-resident sectors they are financing:

## Very different risks depending on **borrowing/issuing sector!**

- Government (state, local)?
- Banks?
- OFIs (e.g., hedge funds, FVCs, etc.)?
- NFCs?

- But how to sectorize non-resident issuers?
- Compilers sectorize resident entities to compile macro economic statistics, so **the economy where the issuer is resident** could provide this service to its counterparts



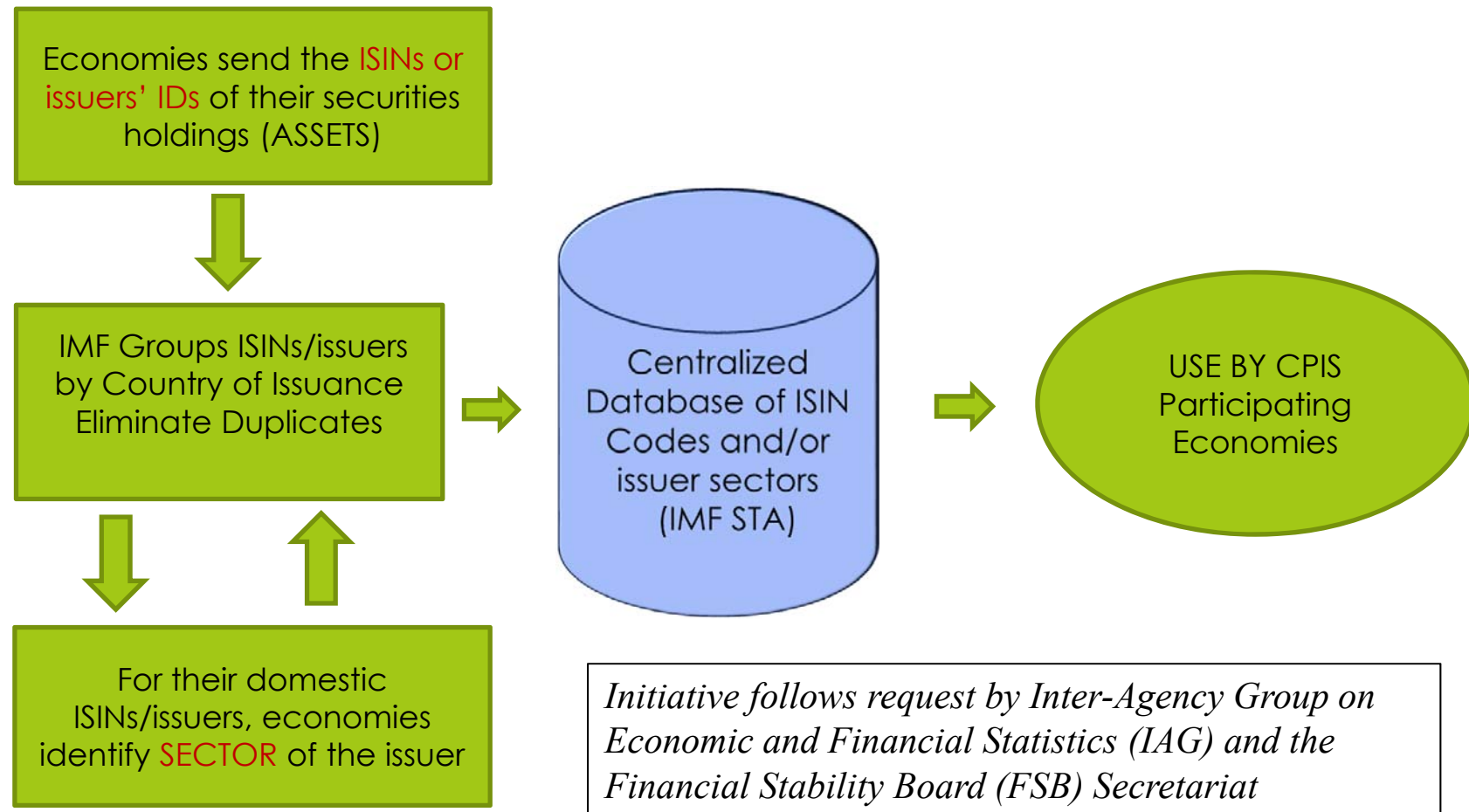
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# Project: centralized exchange of data to improve sectorization of issuers in the CPIS



[ISIN: International Securities Identification Number]



## IMF BOP Committee (Oct. 2017)

- Based on the pilot results, **BOPCOM** fully supported the initiative
- Underlined the importance of sectorization for **IMF surveillance and to address asymmetries**
- Need to address contractual issues with commercial data providers
- Automated process requires standardization:
  - ISIN to identify securities
  - Legal Entity Identifier (LEI) to identify issuers



## IMF BOP Committee (Oct. 2017)

- However:
  - Implementation of the LEI can take time
  - Around 1/3 of securities don't have an ISIN
  - Even fewer in certain parts of the world (e.g., Asia)
- Therefore, combined approach:
  - **Individual securities** (with ISIN) for countries collecting security-by-security data
  - **Only issuer IDs** (domestic issuers with largest cross-border liabilities) for countries collecting aggregate data



# What comes next?

- **Survey** run with CPIS economies in 2018:
  - ❖ Volume of securities
  - ❖ Update frequency
  - ❖ Identifiers used (ISIN, CUSIP, SEDOL, etc.) + (LEI)
  - ❖ Confidentiality, copyright, contractual limitations to share information
  
- With survey results, IMF **feasibility study** of:
  - A centralized database hosted/managed by the IMF
  - Technical requirements
  - Associated costs
  
- Proposal to be presented to the IMF Committee on Balance of Payments Statistics **October 2018**



# Outline

- The IMF Balance Sheet Approach
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# Conclusions

- **Detailed sectoral balance sheets** fundamental to anticipate risks and spillovers
- **Sectorizing non-resident counterparts** necessary to achieve a full matrix of cross-border positions
- **Exchanging information** across countries could make it possible
- High level of **standardization of portfolio securities** enables automation → progress could be faster



## Conclusions (cont'd)

- IMF STA + BOPCOM studying the possibility to set up a **centralized database** of securities issuers and sectors
- Information to be used by CPIS reporters
- Sharing data with other CPIS countries would provide participants with mirror CPIS data **by issuer sector** to compile their portfolio investment liabilities
- Several issues to be addressed:
  - Potential **copyright restrictions** (commercial data providers)
  - High degree of **standardization** required
  - **Benefits must outweigh** set up and running **costs**



**Thank you very much for your  
attention**

**Questions/comments welcome**





# Background Slides



# Questions BSA can address

## What Kind of Questions Can Balance Sheet Analysis Address?



- How healthy are the aggregate balance sheets of the household, nonfinancial corporate, bank, nonbank financial, and government sectors?
- Are there pockets of vulnerability within these sectors that are concealed by aggregate indicators?
- Is balance sheet repair constraining the transmission of macroeconomic policies to real activity?
- What balance sheet vulnerabilities could amplify and propagate the macro-financial impacts of systemic risks?
- How would these macro-financial feedback loops operate, and could they constrain the effectiveness of mitigating policies?



# The Balance Sheet Approach: Analysis of Key Mismatches

**Maturity mismatches:** typically arise when assets are long-term, mainly illiquid, while liabilities are short-term. Maturity mismatches can arise in both domestic and foreign currency. Maturity mismatches create:

- rollover risk: the risk that it will not be possible to refinance maturing debts and that debtors will have to meet their obligations with liquid assets.
- interest rate risk for the debtor: the risk that the level and/or structure of interest rates on the outstanding debt will change.
- reinvestment risk: the risk that a creditor will not be able to reinvest a maturing claim at the previous higher interest rate.

**Currency mismatches:** This risk arises when assets and liabilities are denominated in different currencies. It creates:

- Exchange rate risk: If assets are held in domestic currency but liabilities are denominated in foreign currency, substantial losses may result if the domestic currency depreciates sharply in an exchange rate shock.

**Capital structure mismatches:** This risk results from excessive reliance on debt financing instead of equity. The absence of an equity buffer can lead to a financial crisis when a sector encounters a shock.

- Debt rather than equity risks

**Solvency or credit risk:** This risk emerges when a sector's financial assets no longer cover its financial liabilities. Solvency risk is closely linked to maturity mismatch risk, currency mismatch risk, and capital structure mismatch risk.



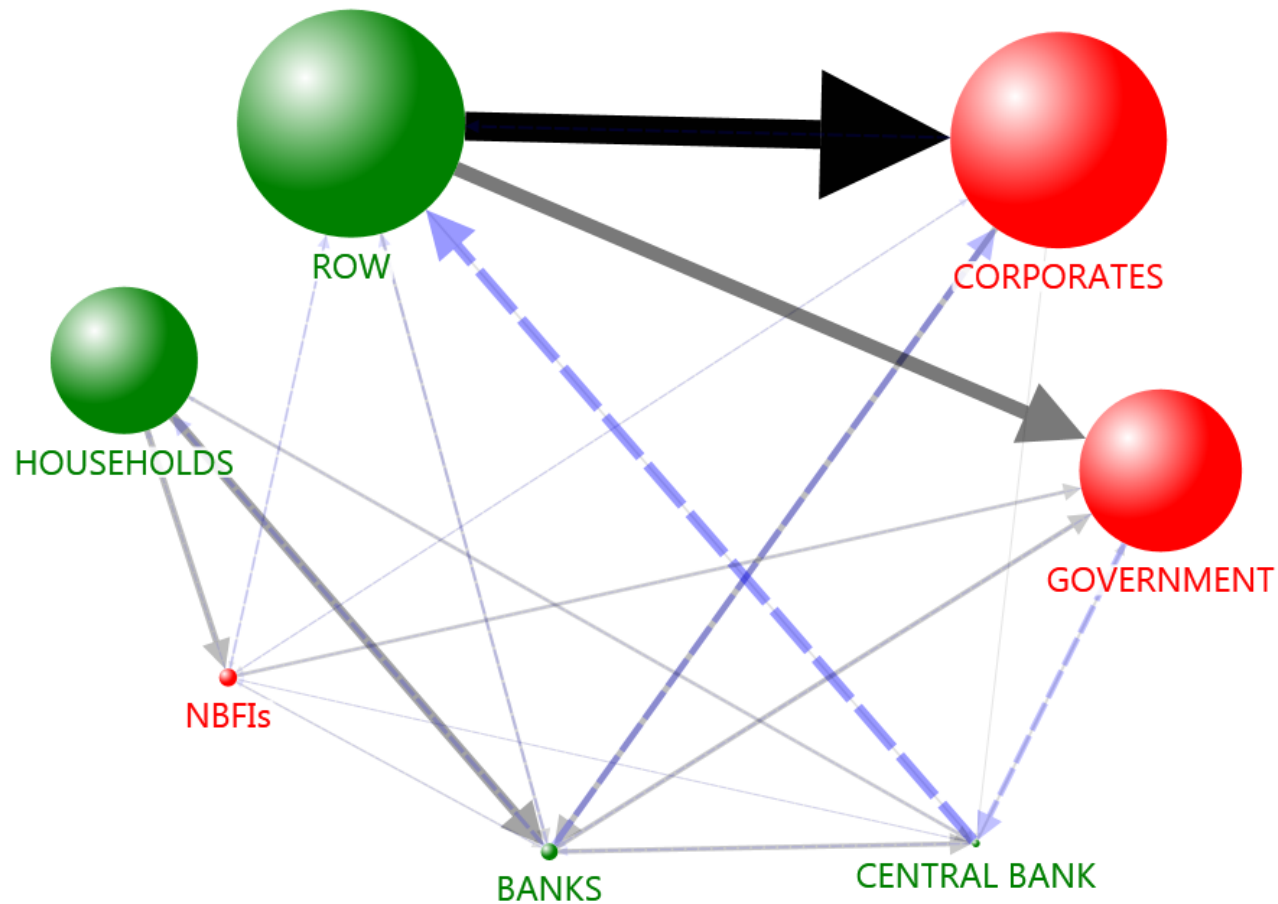
# Source Data for the BSA Matrix

Holder of liability (creditor) / Issuer of liability (debtor)	Holder of liability (creditor)						
	Central bank	General government	Other depository corporations	Other financial corporations	Nonfinancial corporations	Other resident sectors	Nonresidents
Central bank		1. SRF 1SR (Liabilities)	1. SRF 1SR (Liabilities) 2. SRF 2SR (Assets)	1. SRF 1SR (Liabilities)	1. SRF 1SR (Liabilities)	1. SRF 1SR (Liabilities)	1. SRF 1SR (Liabilities) 2. IIP 3. JEDH
General government	1. SRF 1SR (Assets)		1. SRF 2SR (Assets)	1. SRF 4SR (Assets)	n.a. 1/	n.a. 1/	1. IIP 2. QEDS
Other depository corporations	1. SRF 1SR (Assets) 2. SRF 2SR (Liabilities)	1. SRF 2SR (Liabilities)		1. SRF 2SR (Liabilities)	1. SRF 2SR (Liabilities)	1. SRF 2SR (Liabilities)	1. SRF 2SR (Liabilities) 2. IIP 3. QEDS
Other financial corporations	1. SRF 1SR (Assets)	1. SRF 4SR (Liabilities)	1. SRF 2SR (Assets)		1. SRF 4SR (Liabilities)	1. SRF 4SR (Liabilities)	1. SRF 4SR (Liabilities) 2. IIP 3. QEDS
Nonfinancial corporations	1. SRF 1SR (Assets)	GFS	1. SRF 2SR (Assets)	1. SRF 4SR (Assets)		n.a.	1. IIP 2. QEDS 3. JEDH
Other resident sectors	1. SRF 1SR (Assets)	GFS	1. SRF 2SR (Assets)	1. SRF 4SR (Assets)	n.a.		1. IIP 2. CPIS 2/
Nonresidents	1. SRF 1SR (Assets) 2. IIP 3. CPIS	1. IIP 2. CPIS	1. SRF 2SR (Assets) 2. IIP 3. CPIS	1. SRF 4SR (Assets) 2. IIP 3. CPIS	1. IIP 2. CPIS	1. IIP 2. CPIS	

1/ This data gap can in the future be filled with data from the public debt data template (which also covers assets) which is being piloted in some countries.  
2/ CPIS data can be used to derive other resident sector's claims as residual.



# BSA: An example of Network Representation





# Capital Flight and Depreciation Simulation Results

*Country Example: Net cross-sectoral exposures*

	Government	Central Bank	Banks	NBFIs	NFCs	HHs	ROW
(In percent of GDP, after 25 percent depreciation shock)							
Government		-0.05%	0.11%	0.00%	0.00%	0.00%	4.46%
Central Bank	0.05%		0.44%	0.00%	0.00%	0.00%	-3.95%
Banks	-0.11%	-0.44%		-0.03%	-0.63%	0.58%	0.62%
NBFIs	0.00%	0.00%	0.03%		-0.16%	0.00%	0.23%
NFCs	0.00%	0.00%	0.63%	0.16%			14.39%
HHs	0.00%	0.00%	-0.58%	0.00%			0.00%
ROW	-4.46%	3.95%	-0.62%	-0.23%	-14.39%	0.00%	
(In percent of GDP, after combined shocks)							
Government		-0.05%	0.11%	0.00%	0.00%	0.00%	4.46%
Central Bank	0.05%		0.44%	0.00%	0.00%	0.00%	-3.95%
Banks	-0.11%	-0.44%		-0.03%	-6.90%	0.58%	0.62%
NBFIs	0.00%	0.00%	0.03%		-0.16%	0.00%	0.23%
NFCs	0.00%	0.00%	6.90%	0.16%			8.12%
HHs	0.00%	0.00%	-0.58%	0.00%			0.00%
ROW	-4.46%	3.95%	-0.62%	-0.23%	-8.12%	0.00%	

Banking system overall not very exposed to FX shocks

14.39%

The depreciation increases corporate external liabilities

-6.90%

Liquidity withdrawal involves financial system

Source: Indonesia 2015 Article IV Consultation Selected Issues Paper.



# Policy Implications

- Information in sectoral balance sheets should be timely:
  - allows policymakers to identify and correct weaknesses
- Focuses attention on policies that can reduce sectoral vulnerabilities:
  - in particular, the vulnerability to changes in key financial variables
- Allows policymakers to evaluate trade-offs between different policy objectives:
  - systemic threat to the financial and economic system
- Helps the official sector to assess the case for financial intervention:
  - to better understand the scale of official support



# Pilot project: ECB and Federal Reserve

## *[September 2017]*

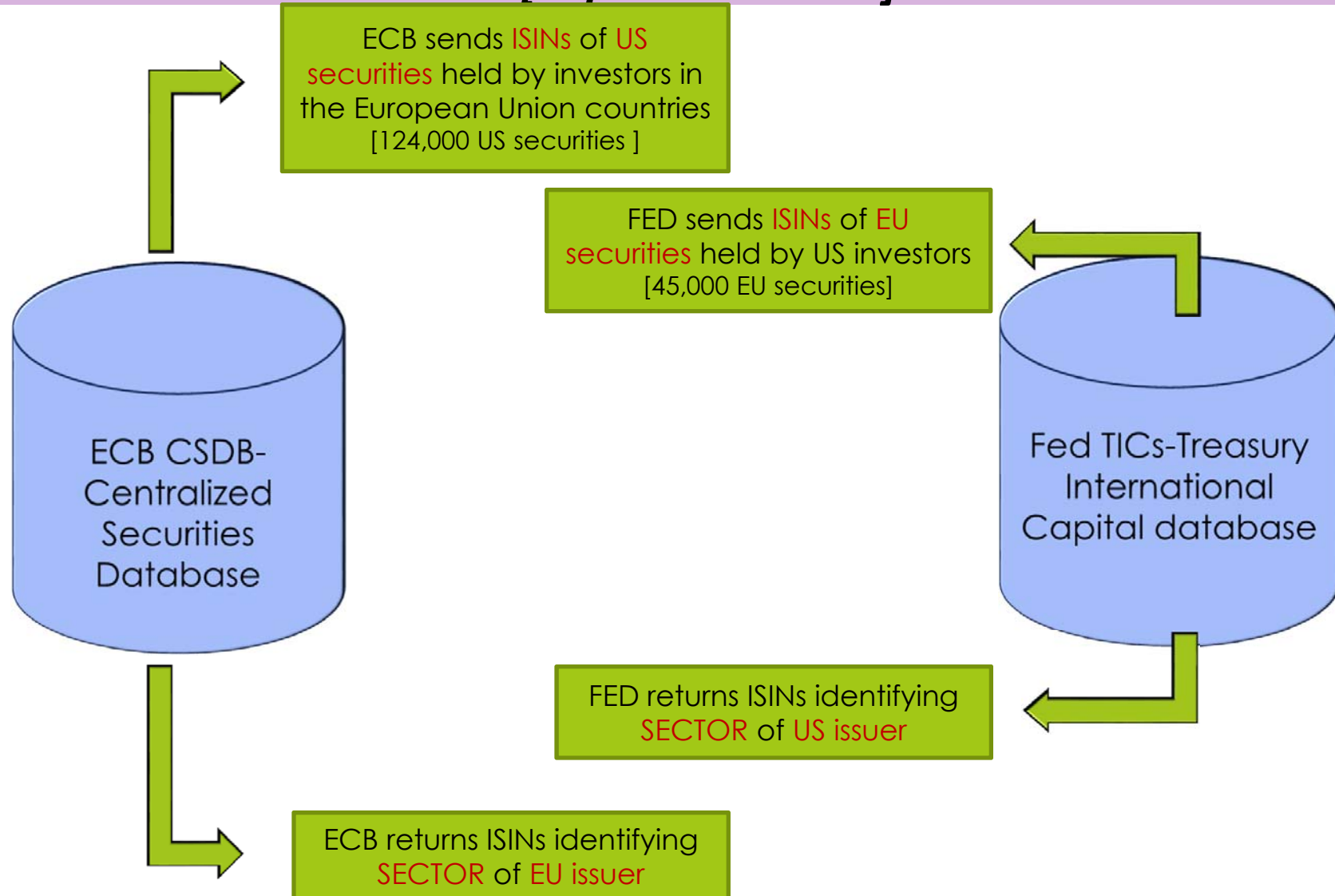
- Limited to a bilateral exchange (limitation of ECB contracts with commercial data providers) completed in September 2017
  - **European Central Bank** → Centralized Securities Database – daily updates (from which: US securities held by 27 EU countries)
  - **US Federal Reserve** → Treasury International Capital (TIC) system – annual updates (from which: EU securities held by US investors)
- ECB sent 124,000 US securities (alive market capitalisation > EUR 10 million)
- FED sent 45,000 EU securities (held by US residents)





# Pilot project: ECB and Federal Reserve

*[September 2017]*





# Federal Reserves data collection system

- U.S. cross-border securities dataset part of the Treasury International Capital (TIC) system
- Individual-security data collected annually: end-June (U.S. liabilities) and end-December (U.S. claims)
- Largest 125–150 reporters → about 98% of market
- “Benchmark” surveys conducted once every five years covering all known reporters.

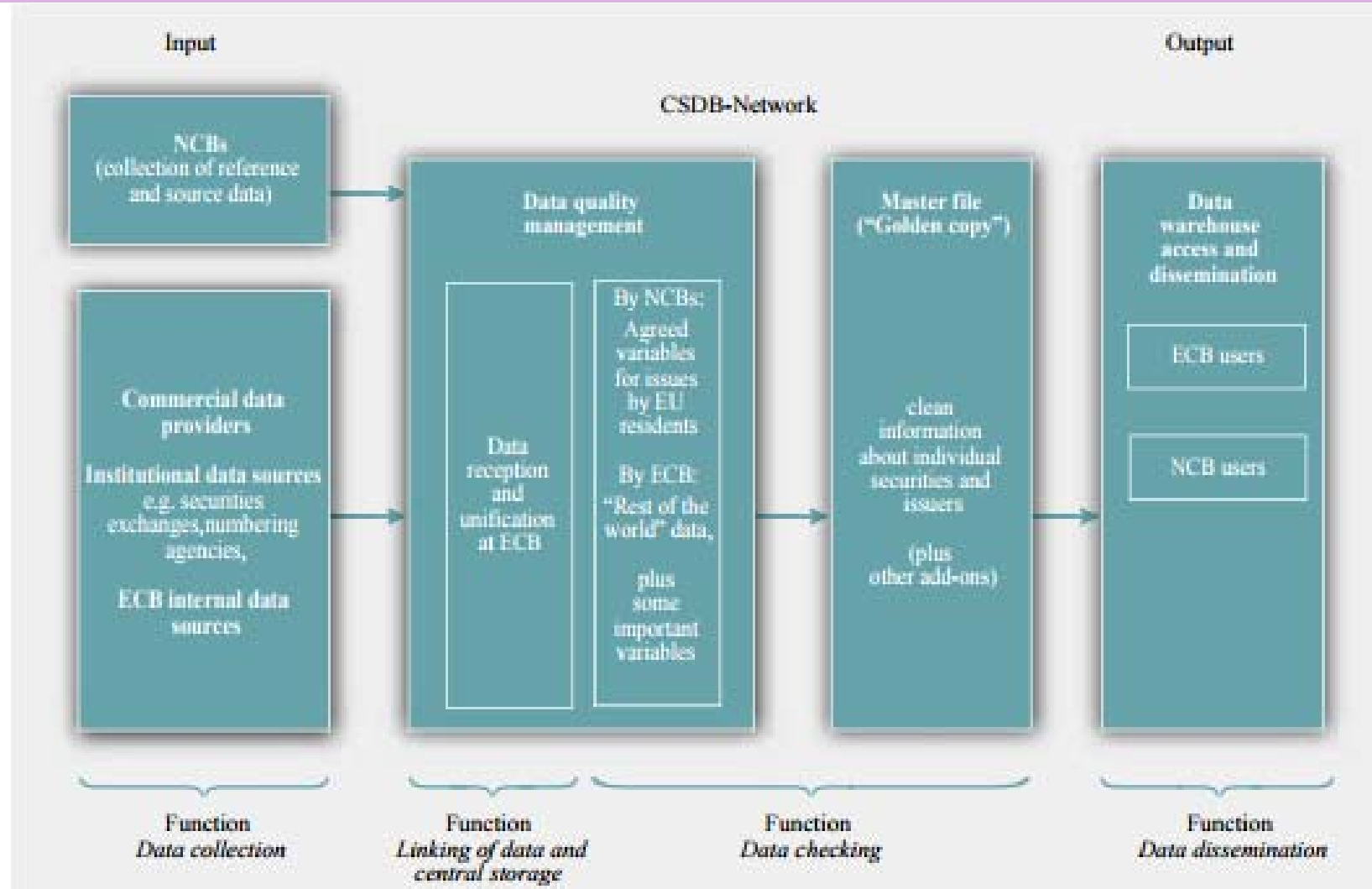


# Federal Reserves data collection system

- Security characteristics: security type, currency of denomination, issue and maturity dates, issuer name, security description, etc.
- Securities characteristics are aggregated and reconciled across reporters to produce the reference security database.
- Additional securities characteristics (e.g., NAICS industry code, coupon type, dividend, coupon rates) obtained from a commercial vendor.



# ECB Centralized Securities Database (CSDB)





## What did we learn from the pilot?

- Exercise confirmed that the sector assignment by home-country reviewers is easier than for external reviewers
- Examples:
  - Government securities correctly classified, but the level of government (state or local) sometimes incorrect
  - Financing arms of nonfinancial firms: can be difficult to assign correct sector
- Home country reviewers best equipped to assign right allocation (sometimes even just based on the issuer name)



## What did we learn from the pilot?

- FED permits to report using any security identifiers (ISIN, CUSIP, SEDOL, even internal codes): difficulty to be able to match both US and EU securities
- ➔ Therefore, standardization proves key:
  - ISIN to identify securities
  - LEI to identify issuers
- Sectorization not always following common (BPM/SNA) rules ➔ common methodology necessary
- Many securities insignificant in terms of cross-border holdings ➔ focus on the most relevant in terms of outstanding amounts/market capitalization