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Development of U.S.–East Asia Financial Input–Output Table

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Keywords: Financial Input-Output Table, Flow-of-funds
JEL classification: R15, F30

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Abstract

Flow of Funds Accounts (FFAs) are the official statistics describing how funds are transferred and where assets/liabilities exist, both inside and outside a country. At the international level, global FFAs depict the cross-border transfer of funds and the consequent claim/obligation relations among countries. The main purpose of this paper is to comprehend and organize the FFAs of various countries of the world from a financial point of view. We construct a global financial input–output table that shows both international and domestic transactions by each domestic institutional sector for the U.S., Japan, Korea, and China.

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I. Introduction

Flow of Funds Accounts (FFAs) are the official statistics describing how funds are transferred and where assets/liabilities exist both inside and outside a country. At the international level, global FFAs depict the cross-border transfer of funds and the consequent claim/obligation relations among countries. Although the original idea of global FFAs is seen in pioneering works such as Ishida (1993), the worldwide currency and financial crises, especially the 2008 global financial crisis, shed new light on the importance of global FFAs. "The Financial Crisis and Information Gaps, IMF/FSB Report to the G-20," or the so-called "G20 Data Gap Report," was published in 2009 to frame a guideline for filling the data gap between existing and necessary statistical assets on the global financial system, and the development of global FFAs was set as its key objective.

The development of global FFAs has been primarily driven by the International Monetary Fund (IMF), which is responsible for monitoring the functions of the global financial system. For example, in line with the global FFA scheme of Errico et al. (2013, 2014), the IMF has worked on the improvement of relevant international statistics such as the Coordinated Portfolio Investment Survey (CPIS) and the Coordinated Direct Investment Survey (CDIS). Global FFAs, however, have not been produced so far, mainly due to the absence of "from-whom-to-whom" FFAs at the national level, which comprise integral segments of global FFAs.[4]

Against this backdrop, this paper considers the possibility and relevance of compiling global FFAs, and in particular its extension to international financial input–output (FIO)

[4] Some countries are expected to produce these tables in the near future, in compliance with IMF's Special Data Dissemination Standards (SDDS) Plus.

tables, based on information obtained from a series of dialogues with experts of the IMF as well as of the Bank of Japan, the Bank of Korea, the U.S. Federal Reserve Board, and Statistics Canada, each of which is responsible for compiling their respective country's FFAs. In the section that follows, we first present a method of transforming national FFAs into FIO tables, and then show how the consequent FIO tables are integrated with CPIS, CDIS, and other international statistics within the framework of an international FIO table, with a particular focus on the Asia–Pacific region. In the latter section, we discuss potential uses of an international FIO table in reference to the input–output analysis.

Some previous research has examined international flow of funds analyses. For example, Tsujimura and Tsujimura (2008, 2010, 2011) constructed financial transaction tables between multiple countries. Zhang (2005, 2009, 2015) built a model of the global flow of funds that is composed of the financial instruments of major countries, and estimated several multiple-equation models. However, compilation of an international flow of funds table that consists of multiple countries' institutional sectors has not yet been attempted because of lack of appropriate data.

The authors' previous study, Hagino et al. (2018), converted the FFAs of Japan, Korea, the U.S., and Canada into their FIO tables and compiled an international FIO connecting these four countries. It represented a preliminary global FFA focusing on the Asia–Pacific region. In doing so, the authors exchanged views with experts from the Bank of Japan, the Bank of Korea, the U.S. Federal Reserve Board, and Statistics Canada, who are compilers of their countries' FFAs, as well as those at the IMF, to discuss a method of converting countries' FFAs into FIOs and putting those FIOs, CPIS, CDIS, and other international statistics into the framework of a global FIO. For a future project, we proposed to include China, Brazil, and Chile as well as Indonesia and Columbia, which

were developing FFAs at the time, and thus compiled a comprehensive Asia–Pacific FIO.

The authors' preliminary research, Hagino and Kim (2018), reported the usefulness of the preliminary Asia–Pacific FIO covering Japan, Korea, the U.S., and Canada at the 2018 annual meeting of the Society of Economic Measurement and exchanged views with researchers of the National Accounts Institute of Beijing Normal University Measurement as to the above-mentioned future project. With the goal of the inclusion of China in the Asia–Pacific FIO in mind, it was suggested that the most important obstacle is the absence of stock data for China's FFA, in addition to obstacles derived from the relatively slow pace of China's statistics development in CPIS and CDIS.

Under these circumstances, the authors decided to estimate a stock table of China's FFA, and then compile an FIO table as described in Hagino et al. (2018) with the aim of including China in Asia–Pacific FIOs. In this respect, it may be efficient to replace Canada, which was included in the preliminary Asia–Pacific FIO of Hagino et al. (2018), with China. This is because the compilation of Canada's FIO required many assumptions due to a lack of source data, while China's slow development in CPIS and CDIS implies that mirror data of China's partner countries may be used. Thus, a new Asia–Pacific FIO will consist of Japan, Korea, the U.S., and China. To achieve this goal, this paper attempts to produce a stock table for China's FFA as of the end of 2015, examining the use of various financial data.

The remainder of this paper is organized as follows. Section II explains the basic concept and framework of the FFA. After demonstrating conversion of FFAs into FIOs for Japan, Korea, and the U.S. in section III, we describe the estimation of a stock table for China's FFA and its conversion into an FIO table for China in Section IV. By examining the usefulness of various international investment and position data for China,

a new Asia–Pacific international FIO as of the end of 2015 is demonstrated in Section V,. Section VI discusses features of asset and liability portfolios and finally Chapter VII presents the conclusion as well as prospects for future projects.

II. Concept of FFA

An FFA[5] represents the financial economy in matrix form with economic sectors such as financial institutions (FIs), nonfinancial corporations (NFCs), general government (GG), households (HHs), and the rest of the world (ROW) in columns and financial transaction or asset/liability items such as deposits, loans, debt securities, equity and shares, and insurance/pension reserves (IPs) in rows. Even though FFAs include stock tables of financial assets/liabilities along with flow tables of financial transactions as their major components, the compilers of the accounts came to adopt common usage of the term "flow of funds" following the seminal work of Copeland (1952).[6] Thus, financial transaction or flow tables and financial asset/liability or stock tables are major components of FFAs.

Currently, Japan, Korea, and the U.S. submit FFA data to the Organization for Economic Cooperation and Development (OECD), which publishes these countries' FFA data in a standardized form. Table 1 shows examples of financial transaction data and stock data, each presenting the differences between asset-side and liability-side totals, in the bottom rows.

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[5] In the System of National Accounts (SNA hereafter), however, financial transaction or flow tables refer to financial accounts and financial asset/liability or stock tables refer to sectoral balance sheet. It appears that this SNA terminology has been widely used in Europe and was recently adopted by the Federal Reserve Board as well. Nevertheless, this paper uses the terminology of flow of funds, as it is a convenient for covering both flow and stock tables.

[6] In contrast, the System of National Accounts (SNA) refers to financial transactions (= flow tables) as financial accounts and financial asset/liability (= stock tables) as sectoral balance sheet. While it appears that such SNA terminology is commonly used in European countries (and recently even in the U.S. by the Federal Reserve Board), we use the expression "flow of funds" throughout the paper since it covers both aspects of flows and stocks.

The differences in financial transaction tables represent the amount of financial surplus/deficit of each economic sector. When an increase of assets surpasses that of liabilities, the difference becomes positive and the corresponding sector is considered to run a financial surplus. In the opposite case, the difference becomes negative, which indicates the sector's financial deficit. In the financial transaction tables, NFCs and HHs in Japan, for example, are shown to run financial surpluses; that is, NFCs gain positive returns on investments and the HHs earn sufficient income to cover consumption and housing acquisition.

In contrast, the difference in financial stock tables represent the net financial position of a sector. Since financial surplus/deficit is equivalent to net saving, the performance of real economies can be considered in relation to financial surplus/deficit status. For example, when a sector runs into a significantly negative position through the accumulation of liabilities, its investment is likely to be curbed.

Further, the gross values of financial assets/liabilities have an important implication for economic performance of the countries concerned. This is especially true in developed economies whose HHs have accumulated a large amount of financial assets. Asset diversification, such as foreign investment, has a significant impact on a country's performability. Likewise, governments are generally prone to accumulate debt, and at its extremity, their default risks may cause global currency/financial instability. The euro crisis as triggered by Greece's financial problems revealed the vulnerability of such an intertwined financial system.[7]

[7] As of the end of 2015, financial assets held by Japanese HHs exceed 15 trillion USD, while Japanese government's debts exceed 10 trillion USD, which can be held by investors of the ROW.

In considering the impact of currency/financial crises, it is important to identify who has assets/liability with whom since the impacts propagate across economic sectors through these asset/liability (or claim/obligation) relations within the financial system. The 1993 SNA proposed to augment conventional FFAs by expanding information on financial instruments by economic sectors of origins (so-called "detailed" FFAs). For the sake of analytical convenience, however, it is preferable to have the accounts in a symmetric form, presenting economic sectors in both columns and rows and thereby directly elucidating claim/obligation relations between them. FFAs of this kind are now called "from-whom-to-whom" tables in the major international statistics fora, but the current paper explicitly refers to its original naming of FIO tables in order to emphasize the benefit of analytical reference to the traditional input–output methodology.

In the past, conventional FFAs were transformed into a symmetric matrix by mathematical proration, using information on each sector's financial asset/liability composition ratios. In recent years, however, FFA compilers are also trying to estimate inter-sectoral transactions by directly exploiting "from-whom-to-whom" information in their source data. For example, deposits and loans are by nature associated with the commitment of FIs. IPs and investment trust equity are generally held by HHs. Financial derivatives are issued mostly by economic sectors such as FIs.[8] In next section, we show compilation methods of FIO tables in detail.

[8] As for debt securities and shares, the availability of relevant information differs among countries. For example, euro-area countries have developed comprehensive security-by-security databases, and hence it is possible to identify issuing and holding sectors of securities.

III. Compilation Methods of FIO Tables

In this section, we first summarize the compilation methods of FIO tables for Japan, Korea, and the U.S. using stock data of FFAs. However, stock data of China's FFA has not been released officially. We then explain how to estimate stock data for China and create an FIO table.

III.1. Compilation of FIO Table for Japan

Table 2 presents an FIO table for Japan converted from Japan's FFAs. This shows the liabilities of each sector in rows and the assets of each sector in columns. As such, when focusing on a specific column, the holdings of the relevant sector's liabilities can be identified by sector. For example, of the 13,652 billion USD total liabilities of the NFC sector, 6,222 billion USD are held by FIs and 3,859 billion USD are held by NFCs. Using the explanation for industrial IO tables, such data implies how each sector's financial needs have been satisfied by their own and other sectors.

The estimates in Okuma (2013) in Table 3 were used for compiling an FIO table for Japan. Specifically, based on Okuma (2013)'s FIO stock table with the reference to the end of 2011, the ratios of financial assets and liabilities can be identified (the ratios of holding amount by a sector to the total liabilities of a sector). Assuming that the relationship between domestic assets and liabilities is rather stable, such ratios have been applied to the data of the end of 2015. In contrast, the international asset/liability relationship is derived from ratios of foreign asset/liability holding ratios by sector calculated by the net international position.

In this table, the vertical total and horizontal total should match but in practice they do not. This is because different sources have been used and the net position at the end of

2015 differs from that in 2011. Although such discrepancies can be eliminated by a convergence calculation of the matrix, they have been absorbed in HHs' assets and liabilities by calculating them as residual.

Okuma (2013) classified FFAs data into four categories. The first category refers to instruments whose issuers or holders can be identified by themselves from the definition of financial instruments. This includes currency, deposits, and loans. The second category refers to instruments whose holders can be identified by additional sources. For example, foreign deposits held by the government can be identified from Ministry of Finance data. The third category refers to government bonds of financial investments and loan program bonds whose issuers are FIs or GGs. In this case, the total liabilities are split into two types of bonds in each holding sector based on the total amounts of issues. The fourth category refers to instruments for which irrelevant issuing/holding sectors can be eliminated by judgment.

Such categorization and corresponding estimation methods are similar to the summary of FIO table compilation methods as mentioned in the beginning of this section. The peculiarity of the method used by Okuma (2013) is its minimization of proration as much as possible, which can therefore improve the accuracy of FIO data. At the same time, Okuma (2013) notes the difficulties in compiling FIO tables for Japan, such as the problem of pension funds' assets being regarded as those of entrusted FIs in a share-holding sector survey. At any rate, it is expected that the Bank of Japan will overcome such difficulties and come up with qualified FIO tables for Japan that comply with IMF's SDDS Plus.

III.2. Compilation of FIO Table for Korea

Lee (2014) estimated FIO tables for Korea using data up to the end of 2012. This data identified partner sectors for 60% of the total financial assets. Broken down by sectors, partner sectors were identified for more than 70% of the FI, GG, and HH sectors. In contrast, partner sectors were identified for less than 30% of the NFC and ROW sectors, mainly because these sectors use shares, foreign direct investments, and trade credits more than other sectors.

Looking at the financial asset/liability composition ratios, the share of FI holdings relative to the total GG liabilities is 0.44, which is higher than their shares relative to the total liabilities of other sectors. The shares of the same sectors' holdings are more than 0.30 for the FI and GG sectors and less than 0.05 for the NFC sector.

Based on this information (shadowed parts derived from Lee (2014)), we estimated the entire financial asset/liability composition ratios as shown in Table 5. Using these ratios and the net international position statistics at the end of 2015 in the same way as Japan's FIO tables, Korea's FIO tables are compiled as shown in Table 4.

The Bank of Korea is working on the compilation of FIO tables for Korea in line with the G20 Data Gap Report. In doing so, the biggest obstacle is to link issuing and holding sectors of securities. Although the Bank of Korea shares a security-by-security database with the Korea Securities Depository, the database covers only publicly subscribed bonds and does not cover privately placed bonds, which account for approximately 10% of total issues. Also, in terms of sectorization, the nonfinancial sector is not sub-classified into GG, NFCs, and HHs. The Bank of Korea, in cooperation with Korea Securities Depository, is considering improving such aspects. Financial derivatives are based on data sources on a residential basis. In Korea, most derivative holders/issuers have been

FIs. Trade credits are based on data sources for balance of payments statistics.

III.3. Compilation of FIO Table for the U.S.

As far as the U.S. data is concerned, the IMF has been compiling a financial corporations survey based on U.S. flow of funds accounts. This survey presents U.S.FIs' claims on the GG and on the ROW, which can be used for financial asset/liability ratios between FIs and these two sectors (shadowed parts in Table 7). Also, the U.S. net international investment statistics show NFCs' and the GG's claims on the ROW (parts without shadow in Table 7). By using such information, judging issuing/holding sectors based on characteristics of financial instruments at the same time, and calculating HH assets/liabilities as a residual, we estimated a U.S. FIO table as shown in Table 6.

The U.S. Federal Reserve Board, the compiler of the U.S. FFAs, plans to compile FIO tables for the U.S. to comply with SDDS Plus and provides the IMF with financial corporation survey data. To compile such surveys, "from-whom-to-whom" information of financial corporations' assets/liabilities needs to be identified. To realize this, the IMF has asked its member countries to provide financial data in its standardized reporting form. The U.S. has not yet complied with the IMF's request. To meet these requirements, the U.S. Federal Reserve Board is collecting information that helps to identify "from-whom-to-whom". The U.S. FIO tables will be compiled as a result of such work.

IV. China's FFA stock table and FIO

In China, the People's Bank of China, the central bank (CB) of China, compiles and publishes the FFA. It then publishes a flow table on an annual basis as shown in Table 8, but has not published a stock table. Given that China's stock table is indispensable for an Asia–Pacific FIO, the authors estimated such a table using various currently available financial data. Then, the authors converted this stock table into an FIO for China. The following sections explain the estimation and conversion processes.

IV.1.1. Estimation of Financial Assets and Liabilities of HHs

China's HHs' financial assets have been estimated until the end of 2014 (see Table 9) based on HH surveys in China, which is introduced in Tang (2018). By adding flows in 2015, we can broadly estimate the stocks at the end of 2015, although we cannot reflect revaluations of shares and so on in the stocks. In doing so, currency and deposits are classified into deposits, bonds are classified into debt securities, and insurance reserves are classified into IPs in the framework of Table 1 without further examination. In contrast, trust funds should be examined, but we classified them as investment trusts and counted them as shares and other equity.

"Fund" in China refers to private placement funds and hedge funds invested by HHs,

in which wealth management products and trust products are included. Wealth management products are banks' off-balance liabilities and trust products are trust companies' liabilities. They are referred to as China's shadow banking, which has developed very rapidly. Funds in China have different characteristics from bank deposits in that their returns and risks are larger than bank deposits. In many countries, financial products with such characteristics are treated as investment trust shares, and therefore we applied a similar treatment to funds in China.

For HH liabilities, we used data on credit to the non-financial sector published by the Bank for International Settlements (hereafter BIS). According to these statistics, FIs' claims on HHs amount to 26,564 billion USD, of which claims on HHs (including nonprofit institutions serving as HHs) amounts to 4,122 billion USD (26,330 billion CNY). We recorded such claims as loans to HHs.

IV.1.2. Specification of Issuing Sectors of Debt Securities

The amounts of debt securities issued in China are published with the details of government bonds, CB bonds, FI bonds, and NFC bonds (the combination of corporate bonds, convertible bonds, and so forth) as Table 10, which can be linked to sectors in the FFA. In contrast, the amount of local government bonds and nonresident bonds remains

to be estimated in the process of estimating financial assets/liabilities of the GG and ROW sectors, respectively.

As a result of the above-mentioned processes, HHs' financial assets and liabilities have been estimated and debt securities issuances of FIs, NFCs, and GG can be recorded as a preliminary estimation in Table 11. For the debt security issuance of the NFC sector, for which balance sheet data do not exist, such preliminary estimations become the final figure, where those of the NFC and GG sectors are replaced in the process of using their balance sheet data.

IV.1.3. Estimation of Financial Assets and Liabilities of ROW

In China, the State Administration of Foreign Exchange (SAFE) publishes the international investment positions (hereafter IIP), which can be used as financial assets/liabilities of the ROW as shown in Table 12. It should be noted that an FFA describes cross-border claims/obligations from the viewpoint of nonresidents of a country (who are counterparts of residents), while net international positions describe claims/obligations from the viewpoint of residents. Thus, residents' claims in IIP are recorded as the ROW's liabilities in an FFA, and residents' liabilities in IIP are recorded as the ROW's claims in an FFA.

As to financial asset/liability items, most direct investments are in shares and can be classified as shares and other equity. In contrast, portfolio investments include both debt securities and shares, and other investments can include deposits and loans. Official

reserves include at least debt securities and loans. Splitting these items into detailed categories is ideal but source data does not always allow for this. We therefore classified portfolio investments and official reserves as debt securities and other investments as loans. As a result, USD-denominated financial assets/liabilities of the ROW sector can be estimated. Incidentally, HHs' holding and NFCs issuing amounts of debt securities are finalized in USD by converting by the foreign exchange rate at the end of 2015 as shown in Table 13.

IV.1.4. Estimation of Financial Assets and Liabilities of FIs

For the FI sector, the People' Bank of China publishes the balance sheet of the CB and of other depository corporations (ODCs, commercial banks) in the framework of IMF monetary and financial statistics as the CB survey and the deposit money bank survey, respectively. These surveys are posted in the Almanac of China's Finance and Banking 2016. Additionally, a balance sheet of insurance companies, which are classified as IPs in the FFA, as well as balance sheets of securities and trust companies, which are classified as other financial corporations (OFCs), are posted in the Bulletin. By aggregating these balance sheets, financial assets/liabilities of FIs should be identified. However, there are some issues to examine.

For depository corporations, surveys of the CB and ODCs (commercial banks) classify their assets by counterpart sector. Although such data are useful in compiling an FIO,

which is discussed later, we face shortcomings in the source data when compiling the FFA in identifying financial asset/liability items. For CBs, we classified the survey's claims on GGs and the ROW as debt securities and the survey's claims on FIs and other private sector as loans, in the absence of source data. For ODCs (commercial banks), we used the balance sheets of major banks posted in the Almanac of China's Finance and Banking 2016 for splitting financial asset/liability items. However, this type of balance sheet is based on commercial accounting rules, which attach importance to holding purposes. Although long-term equity investments can be classified as shares and equity in an FFA, held-to- maturity and tradable investments could be debt securities or shares and other equity. In the absence of source data for splitting these two types of investments into two items, we classified them as debt securities while taking account of the terms of maturity.

For insurance, securities, and trust companies, financial assets/liabilities are obtained by using a consolidated balance sheet or by aggregating individual balance sheets. However, assumptions must be made in splitting securities in debt securities or share and other equity, in the same way as the estimation of ODCs. Also, it appears that the coverage of shadow banking such as trust companies is not sufficient in the China Financial Bulletin 2016. Therefore, we added HHs' holdings of funds as well as wealth management and trust products financial assets in Table 9 to investment fund shares issued by other

financial intermediaries. For assets, we assumed that 60% is lent in the form of loans and 40% is invested in debt securities.

As a result of such estimation, financial assets/liabilities of the FI sector with the breakdown of its subsector can be identified in CNY as shown in Table 14, and the sector's aggregated amount is converted into USD using the foreign exchange rate at the end of 2015 in Table 15.

IV.1.5. Estimation of Financial Assets and Liabilities of GG

For the GG sector, deposits (assets) and debt securities (liabilities) have been specified in the process of estimating other sectors and financial assets/liabilities items. However, other items as well as financial assets/liabilities of local governments remain to be estimated. In this respect, there are no official statistics on the financial assets/liabilities of GG. However, we have used the estimates of the Chinese Academy of Social Sciences on the Chinese government's financial assets/liabilities as of the end of 2015 (see Table 16), which are published in the "Chinese Government Balance Sheet in 2017."

For financial assets, we recorded the equity in state-owned corporations as shares and equity. After deducting shares and equity as well as already estimated deposits from the total assets, we regarded the residual as debt securities. As for liabilities, the issue is how

to split local governments' direct liabilities into debt securities and loans. According to research on local government debt in China, until 2013 loans were a main fund-raising tool. After the modification of China's budget law in 2014, however, they started to raise funds through debt securities. Taking into account that the weight of debt securities has been increasing, we classified 60% of their direct liabilities as debt securities and 40% as loans.

As a result, the financial assets/liabilities of the GG sector as well as those of the HH and FI sectors have been identified on a CNY basis as shown in Table 17.

IV.1.6. Specification of Issuing Sectors of Shares and Other Equity

The total market capitalization in China as of the end of 2015 is published in the Almanac of China's Finance and Banking 2016. From this amount, we deducted the amount of shares issued by FIs, which is derived from their balance sheet and added to government equity in state-own enterprises, as presented in Table 16. We regarded this amount as shares issued by the NFC sector. The amount of total shares issued by the FI sector is the sum of shares issued by FIs, which were derived from their balance sheet, and investment fund shares held by HHs, which were estimated during the initial process (see Table 18).

IV.1.7. Estimation of Financial Assets and Liabilities of Non-financial and Adjustment of Negative Figures

We calculated the amounts of financial asset/liability items that were not yet estimated residually by deducting already estimated amounts from the total amount. In this way, deposits, debt securities, shares, and equity on the asset side as well as loans on the liability side are shown in Table 19. As a result, holdings of debt securities become negative. We therefore reexamined the estimation processes.

Our conclusion on this issue is that the residual becomes negative due to the overestimation of FIs holdings of debt securities. This amount has been estimated by aggregating balance sheet data. As explained above, balance sheet data are based on commercial accounting rules, which emphasize holding purposes. In the absence of detailed source data, we regarded both held-to-maturity and tradable investments as debt securities.

If this is true, FIs' holdings of debt securities should be decreased and the corresponding amount should be added to shares and other equity. We set the adjustment amount to the level that makes the NFCs' holdings of debt securities zero rather than negative. In this way, we have come up with an FFA stock table without negative figures,

as shown in Table 20.

IV.2. Compilation of FIO Table for China

The above-mentioned FFA stock data table, which has a matrix form with sectors in columns and financial assets/liabilities in rows, cannot represent counterpart sectors in the matrix table. It therefore cannot show asset/liability or claim/obligation relationships among sectors. In contrast, an FIO, which uses a square matrix with economic sectors in both columns and rows, can demonstrate the claim/obligation relationship (and flow of funds as necessary) among sectors, as Hagino et al. (2018) explained in more detail.

To compile an FIO for China, information on counterpart sectors is needed. In this respect, there are financial asset/liability items for which counterpart sectors are evident from their characteristics. For example, deposits are assumed and loans are held by FIs. IPs and investment trusts are generally held by HHs. Financial derivatives are held and assumed mostly by FIs. Thus, financial asset/liability stocks for which counterpart sectors can be identified are shown in Table 21.

In contrast, counterpart sectors cannot be identified for debt securities and shares. Globally speaking, there are countries that have developed a comprehensive security-by-security database and can identify the issuing and holding sectors of securities. China has not provided such data. For financial assets/liabilities whose issuing and holding sectors cannot be identified, a method of prorating to sectors based on the weight of total financial asset/liability stocks of each sector was used, and the results are listed in Table 22.

By combining financial asset/liability stocks for which counterpart sectors can be identified and those for which counterpart sectors cannot be identified, Table 23 is produced in the same way that financial subsectors are consolidated. Table 24 is converted into a USD basis using the foreign exchange rate at the end of 2015.

V. Compilation of International FIO for Japan, Korea, the U.S., and China

Hagino et al. (2018) tried to produce FIO tables for Japan, Korea, the U.S. and Canada as well as an international FIO covering these countries by interlinking each country's FIO by international asset and position data. Now we can incorporate China, instead of Canada, in the international FIO as China's FIO has been produced. In this section, we summarize the framework and compilation methods of the international FIO table.

V.1. Framework of Bilateral FIO Tables

An international FIO table is the combination of several countries' FIO tables compiled from their FFAs. If Japan's and Korea's FIO tables are connected explicitly, the framework of an international FIO table can be shown as Table 25. In this table, figures represent claims/obligations among domestic sectors. To identify cross-border relationships or claims/obligations between domestic sectors and foreign sectors, the ROW has to be sub-classified into Japan, Korea, and others, and then Japan and Korea have to be further sub-divided into domestic sectors as partners.

As a result, cells in the upper-right represent the claims of Japan's domestic sectors on Korea's domestic sectors, or obligations of Korea's domestic sectors to Japan's domestic sector, and cells in the lower-left represent obligations of Japan's domestic sectors to

Korea's domestic sector, or claims of Korea's domestic sectors on Japan's domestic sectors. More specifically, (a) in Table 25 represents claims of Japanese FIs on Korea's FIs, (b) represents claims of Japanese FIs on Korea's GG, (c) represents obligations of Japanese FIs to Korea's FIs, and (d) represents obligations of Japan's GG to Korea's FIs. In this table, "Others" corresponds to partner countries other than Japan and Korea.

V.1.1. Source Data for Cross-border Claims/Obligations

To demonstrate cross-border claims/obligations as shown in Table 4, source data specifying "from-whom-to-whom" sectors in such claim/obligation relations are necessary. For this purpose, net international positions and related statistics are useful.

Net international positions refer to statistics that represent the cross-border claims/obligations of a country or a region. While balance of payments statistics record cross-border transactions and describe flows, net international positions describe stocks and correspond to balance sheets. In terms of their relationship with FFAs, cross-border claims/obligations represented in net international positions correspond to the ROW. While FFAs describe cross-border claims/obligations from the viewpoint of nonresidents of a country, net international positions describe claims/obligations from the viewpoint of residents. Since residents' claims correspond to nonresidents' liabilities and residents'

liabilities correspond to residents' claims, figures in net international positions figures are mirror images of those in FFAs.

V.1.2. International Statistics Developed by International Organizations

Major countries in the world have published net international positions by sector, and they are strong source data for international FIO tables. However, the details of such data vary particularly in terms of sector breakdowns of issuers/holders. This makes it difficult to incorporate such data into international FIO tables.

In contrast, the IMF has developed internationally harmonized statistics for portfolio and direct investments, and it has published CPIS and CDIS. This paper has made use of such surveys as their harmonized frameworks are very useful. Incidentally, the IMF has collected data on foreign reserve assets held by monetary authorities (central governments and/or CBs) and has published Securities Held as Foreign Exchange Reserves (SEFER). The results of SEFER are incorporated in CPIS.

Given that international FIO tables combine FIO tables with sectors in both rows and columns, identifying partner countries is not sufficient and it is necessary to identify sectors in both home and partner countries. In this respect, the IMF has tried to develop data classified by home sectors and partner countries and cross-classified by them in its

enhanced CPIS. However, only a few countries have provided data classified by sectors in partner countries. Also, CDIS does not contain data classified by sectors. Therefore, for the time being, assumptions have to be made in terms of sector breakdowns. For example, this paper regards all cross-border direct investment positions as being among NFCs.

In terms of deposits and loans, the BIS has published cross-border positions by residence in its International Banking Statistics (IBS). Thus, such data are useful for identifying partner countries in compiling international FIO tables. However, as BIS data are not further broken down by sector, this paper classifies all cross-border deposit/loan positions as being among FIs.

V.1.3. Trial Estimation of a Japan–Korea International FIO Table

CPIS data for both Japan and Korea contain sector breakdowns in home countries but do not contain such breakdowns in partner countries. Thus, the assets of a home country sector were allocated to partner country sectors based on ratios of the entire liability amounts by sector in partner countries. CPIS data for both Japan and Korea can be incorporated into an international FIO table as shown in Table 26.

Since CPIS data for both Japan and Korea do not contain sector breakdowns for home

and partner countries, direct investments were classified as being among NFCs. In addition, data for Korea does not identify direct investments to Japan. Thus, this paper used Japan's inward and outward data to cover this absence in data for Korea. Such data are shown as positions among NFCs between the two countries in Table 27. As for deposit/loan positions between the two countries, data are available in Japan's and Korea's IBSs. Such data are shown as positions among FIs between the two countries, as shown in Table 27. If these sources are combined in a matrix, a Japan–Korea international FIO table is estimated as shown in Table 28.

V.2. Compilation of International FIO for Japan, Korea, the U.S., and China

In the previous sub-section, we explained how to compile a bilateral FIO table for Japan and Korea. In the same manner, it is possible to create an FIO table for all four countries. We now have Table 29, which shows an international FIO table covering Japan, Korea, the U.S., and China. A global FIO table is produced by combining countries' FIOs compiled from their FFA stock tables. In doing so, the authors used international investment statistics developed by international organizations. As we mentioned, the IMF develops portfolio and direct investment statistics in unified format and publishes data as CPIS and CDIS. These useful statistics are the main sources for compiling an

international FIO. Given that an international FIO combines FIOs with sectors in both rows and columns, identifying counterpart countries is not sufficient. It is necessary to identify which sector of the partner country is connected with a given sector of a home country by cross-border claims/obligations. In this respect, the IMF is encouraging countries to develop data classified by sectors in home and counterpart countries as well as cross-classified data for its enhanced CPIS. Such data are useful for compiling an international FIO. However, at this stage, only a few countries in Europe have provided data classified by sectors in counterpart countries. Also, CDIS does not contain data classified by sectors. Therefore, for the time being, assumptions have been made in terms of sectors in counterpart countries. For example, the authors regarded all cross-border direct investment positions as being between NFCs. As for portfolio investments, the authors prorated counterpart countries' claims/liabilities into sectors using the weight of total assets/liabilities by sector. For deposits and loans, we adopted IBS data in the same manner as for the bilateral FIO table in the previous sub-section.

In incorporating China into the international FIO, the authors applied the above-mentioned treatment. Also, given the limitation of China's cross-border investment data, the authors paid attention to the following issues. As to China's outward investment (asset), its CPIS data provides information on outward portfolio investment by partner

country. Using such data, each sector's outward claims can be classified by counterpart country. In doing so, sector allocation in partner countries has been based on the total stock of each sector, except that HHs' outward claims are assumed to be on FIs. In contrast, China's CDIS data does not provide information on outward direct investment by partner country. Also, the IBS does not cover China. Under these circumstances, the only way is to allocate all outward claims, including direct investments and other investments, based on CPIS information.

When calculating China's inward investment (liability), its CPIS data does not provide information on inward portfolio investment by partner country. Thus, such investments are estimated using counterpart countries' data by partner country. U.S. data, which provide data by sector in counterpart countries, are used for allocating inward investments to sectors in China. Other countries do not provide such data, and therefore sector allocation in China is based on the total stock of each sector. In contrast, China's CDIS provides information of inward direct investment by partner country. Such liability data are recorded as claims/liabilities among the NFC sector. Other investments remain to be estimated as the IBS does not cover China.

VI. Assets and Liabilities Portfolios of the Four Countries

In this section, we observe global financial transactions of the four countries. At a glance, Japan has relatively larger positions with the U.S. than with Korea and China, as shown in Table 29. Intuitively, positions between large economies tend to be large. In Table 29, we can observe liability compositions vertically and asset compositions horizontally. For example, the third column represents the composition of liabilities of Japan's FI sector. Domestic fund-raising consists of 8,321 billion USD from itself, 3,277 billion USD from NFCs, 1,613 billion USD from the GG, and 14,073 billion USD from HHs. On the other hand, liabilities to foreign countries comprises 7 billion USD from Korean FIs, 13 billion USD from Korean NFCs, 17 billion USD from the Korean GG, 605 billion USD from U.S. FIs, 104 billion USD from U.S. NFCs, 90 billion USD from Chinese FIs, 7 billion USD from Chinese NFCs, 31 billion USD from the Chinese GG, 6 billion USD from Chinese HHs, and 1,498 billion USD from other countries.

In the same manner, the third row presents claims of Japan's FI sector. Domestically, it invests 8,321 billion USD in itself, 6,221 billion USD in NFCs, 8,320 billion USD in the GG, and 3,091 billion USD in HHs. Foreign financial investments consist of 16 billion USD in Korean FIs, 20 billion USD in Korean NFCs, 3 billion USD in the Korean GG, 1,024 billion USD in U.S. FIs, 640 billion USD in U.S. NFCs, 548 billion USD in the

U.S. GG, 7 billion USD in Chinese FIs, 4 billion USD in Chinese NFCs, 4 billion USD in the Chinese GG, and 28,584 billion USD in other countries.

Tables 30, 31, and 32 show the claims and liabilities of each sector in more detail. First, Table 30 shows net liabilities and net financial assets. If total liabilities (L) of a sector are greater than the total financial assets (A), that sector has net liabilities (L − A). In the same manner, if financial assets (A) of a sector are greater than the total liabilities (L), it has net financial assets (A − L). Second, Table 31 indicates liability portfolios. If we read this table vertically, we can see how each sector raises funds. Third, Table 32 represents assets portfolios. In the same vein as the previous table, the horizontal aspect shows how each sector uses funds. There is no doubt that fundraising from domestic sectors is far greater than that from foreign sectors. Letters in red in Tables 31 and 32 show foreign transactions greater than 1.0%. It is understandable that most red letters are written in the U.S. as its scale is obviously much larger than the others. On the other hand, letters in blue mean over 10% transactions with the ROW. To observe the features of individual sectors, below is a comparison of the four countries' sectors.

VI.1. FIs

The main role of FIs is as intermediaries of funds. In Table 30, the net liabilities of FIs

of Korea, the U.S., and China are larger than total financial assets. Only Japan's FI sector has 47.8% of net financial assets.

Table 31 shows liability portfolios. First, we examine domestic financial transactions. Japan's FI sector raises 28.1% of funds from itself, 11.0% from domestic NFCs, 5.4% from the GG, and 47.7% from domestic HHs. The composition of Korea's and China's FI sectors is not so different from that of Japan, in which funds from domestic HHs are the largest at around 40–50%. Korea's FI sector raises 29.1% from itself, 7.7% from NFCs, 10.5% from the GG, and 47.1% from HHs. China's FI sector raises 11.3% from itself, 34.9% from NFCs, 9.4% from the GG, and 40.2% from HHs. Korea's and China's FI sectors raise 4–5% more funds from governments than does Japan. However, funds from NFCs are quite different. Korea's FI sector raises only 7.7% and Japan's FI sector raises 11.0%, but China's FI sector raises 34.9%. On the other hand, the U.S. FI sector shows a totally different composition where fund-raising from HHs is dominant. It consists of 13.9% from itself, 2.5% from NFCs, 0.9% from the GG, and 73.8% from HHs. Fund-raising from the ROW is not so different, where Japan's FI sector raises 5.1%, Korea's FI sector raises 2.7%, the U.S. FI sector raises 5.8%, and China's FI sector raises 3.8%.

Now we focus on asset portfolios. Table 32 provides us ratios of financial assets for

individual sectors. Domestic transactions show a very different structure[9] by country. For example, the FI sectors of the U.S. and China invest half of their funds in domestic NFCs (the U.S. is 46.8% and China is 54.1%). For Korea's FI sector, investment in domestic FIs is the largest (40.9%), but that in the GG is very small (2.6%). On the other hand, domestic investment of Japan's FI sector is smaller than its foreign investment. Fund investment in the ROW is 50.3%. Furthermore, investment in NFCs (11.0%) is even lower than in the GG (14.6%). This phenomenon is understandable given that Japan's interest rate is very low and FIs are unwilling to invest in NFCs, preferring to invest in treasury bonds. Yoshino and Taghizadeh-Hesary (2016) pointed out that one of causes of the slowdown of the Japanese economy is the unwillingness of Japanese banks to lend money to startup businesses and small and medium enterprises, mainly because of Basel capital requirements.

VI.2. NFCs

The NFC sector is the representative investment sector in a country. In general, it raises

[9] Japan's FI sector invests 14.6% of funds in itself, 11.0% in NFCs, 14.6% in the GG, and 5.4% in HHs. Korea's FI sector invests 29.1 % in itself, 25.6% to NFCs, 1.9% in the GG, and 9.0% in HHs. The U.S. FI sector invests 13.9% in itself, 45.8% in NFCs, 15.5% in the GG, and 9.9% in HHs. Lastly, China's FI sector invests 11.3% in itself, 46.3% in NFCs, 7.3% in the GG, and 10.2% in HHs.

funds and invests in real sectors. Therefore, its liabilities are greater than its financial assets, as shown in Table 30. Korean and U.S. corporations have about 75% of net liabilities, which means they actively invest in real sectors. However, Japanese corporations have only 32.1% of net liabilities, reflecting the inactive attitudes of Japanese corporations, which hold large portions of financial assets.

In Table 31, Japan's NFC sector mainly raises funds from domestic FIs (45.6%) and itself (28.3%). For foreign funds, 2.4% is from U.S. FIs, 1.3% from U.S. NFCs, and 7.8% from the ROW. Korea's and China's NFC sectors show more government-dependent fund-raising. Korea's NFC sector consists of 38.3% from domestic FIs and 27.8% from the GG. Also, fund-raising from HHs (14.3%) is a non-negligible value. Foreign fund-raising is slightly larger than in Japan, which raises 3.4% from FIs of the U.S., 1.6% from NFCs of the U.S., and 8.4% from the ROW. China's NFC sector raises 51.6% from domestic FIs and 31.6% from the GG. Foreign fund-raising in China is relatively smaller than in other countries. On the other hand, the U.S. NFC sector shows totally different liability portfolios: FIs (71.0%) are the largest provider, followed by 14.5% from itself, 10.7% from the ROW, and 1.1% and 1.0% from Japanese and Chinese FIs, respectively.

Table 31 provides financial asset portfolios. Chinese NFCs mainly invest in domestic FIs (82.3%). However, the U.S. NFC sector invests a sizeable portion of financial assets

in itself (i.e., in domestic NFCs, 57.4%), and investments in the ROW (21.3%) are also remarkable.

VI.3. GGs

The GGs of Korea (87.4%), the U.S. (60.3%), and China (77.4%) show black-ink balances in Table 30. Only the Japanese GG is in the red (51.6%). These governments mainly raise funds from domestic FIs in Table 31. Furthermore, foreign fund-raising is not ignorable for the U.S. and Korean GGs. Foreign liabilities of the U.S. GG comprise 3.5% from Japan, 0.3% from Korea, 1.6% from China, and 28.3% from the ROW. Korea's GG raises 1.3% from Japan, 6.6% from the U.S., 1.9% from China, and 14.8% from the ROW. Foreign investments of the Japanese and Korean GGs are also distinguished in Table 32. Japan's GG invests 2.1% in U.S. FIs, 2.3% in U.S. NFCs, 1.9% in the U.S. GG, and 21.5% in the ROW. Korea also holds 21.3% of financial assets in the ROW. Conversely, the U.S. GG principally invests in HHs (98.2%), but foreign investment is only 0.3%.

VI.4. HHs

The HH sector is a representative saving sector in a country. Thus, its liabilities are

smaller than financial assets, as shown in Table 30. HHs in Japan (77.1%), Korea (84.3%), and China (76.4%) have relatively large surpluses, but those in the U.S. (6.6%) have only slight net financial assets. Table 31 indicates that HHs in Japan (88.6%), Korea (100%), and China (100%) primarily raise funds from domestic FIs. However, HHs in the U.S. (83.9%) depend on the GG for the most part. Table 32 shows that HHs chiefly invest in domestic FIs.

VI.5. ROW

Tables 33, 34, and 35 are aggregated versions of Tables 29, 31, and 32 and show country by country transactions. In Table 33, we assume positions between the ROW is 0, represented by empty cells in the table, to calculate total liabilities and total financial assets. The ROW largely raises funds from Japan (64.0%), as shown in Table 34, and invests in the U.S. (70.1%), as shown in Table 35.

VII. Conclusion and Future Projects

A brief overview of the world economy in recent years reveals that a savings glut causes public debt problems in developed economies. On the other hand, a lack of investment undermines economic growth in underdeveloped countries. However, the discrepancy of financial systems between developed and developing countries hinders the global redistribution of funds. To analyze the global economy, both financial and real sectors should be considered. In fact, financial transactions and trades are two sides of the same coin. Financial transactions between multiple countries represent the global financial market, whereas international trade reflects the real economy. As is well known, international input–output tables, which indicate the real sector, have been developed. However, statistics for international financial transactions, that is, FIO tables, are as yet undeveloped.

The main purpose of this research is to comprehend and organize the FFAs of various countries of the world from a financial point of view. We construct a global FIO table that shows both international and domestic transactions for each domestic institutional sector for the U.S., Japan, Korea, and China. This paper estimated stock tables for China's FFA using various financial and economic statistics that are available at this stage and converted it into an FIO table for China. Then it compiled international FIOs by linking China's FIO table to that for Japan, Korea, and the U.S. There is a possibility that China's FFA stock table will be published soon. If this happens, we will be able to review and reexamine the estimation methods used in this paper.

As stated in Hagino et al. (2018), our work to compile an international FIO for the Asia–Pacific region is in line with the needs of the international statistical community.

Against this background, we would like to expand the coverage by including other major countries in the Asia–Pacific region such as Thailand, Indonesia, Mexico, and Brazil. Another future direction would be to link the international FIO for Asia–Pacific to the international FIO for Europe that is compiled by the European Central Bank, and thus upgrade our international FIO to a global FIO.

Also, we would like to examine how to improve the quality of our international FIO by incorporating newly available official statistics. For example, the CBs of Japan, Korea, the U.S., and China are working on a compilation of their FIOs to comply with IMF's SDDS Plus in line with the G20 Data Gap Report. Thus, it is expected that FIOs of these countries will be available in a few years as official statistics. As for the CPIS, it is expected that international investment data will be cross-classified by sector in home and counterpart countries. Such developments would enhance our international FIO to a large extent.

There are many possibilities for future research using international FIO data. For example, we can apply input–output methods to calculate power of dispersion indices in asset-oriented systems and liability-oriented systems to compare the roles in the global financial market. We expect researchers to develop useful analysis and policy evaluation methods in the future.

References

China Financial Yearbook Magazine (2016) “Almanac of China's Finance and Banking 2016,” China Finance Press Co. (in Chinese) (http://tongji.cnki.net/kns55/Navi/YearBook.aspx?id=N2017040045&floor=1)

Errico, Luca, Artak Harutyunyan, Elena Loukoianova, Richard Walton, Yevgeniya Korniyenko, Goran Amidžić, Hanan AbuShanab, Hyun Song Shin (2014) “Mapping the Shadow Banking System Through a Global Flow of Funds Analysis,” IMF Working Paper WP/14/10.

Errico, Luca Richard Walton, Alicia Hierro, Hanan AbuShanab, Goran Amidzic (2013) “Global Flow of Funds: Mapping Bilateral Geographic Flows,” Proceedings 59th ISI World Statistics Congress, 2825–2830. (https://www.statistics.gov.hk/wsc/STS083-P1-S.pdf)

Hagino, Satoru, Jiyoung Kim and Satoshi Inomata (2018a) “Financial Input-Output Table for Asia-Pacific Region” Institute of Developing Economies Discussion Paper No.719

Hagino, Satoru and Jiyoung Kim (2018) “Financial Input-Output Table for Asia-Pacific Region,” The Society for Economic Measurement 5th Conference, Xiamen, Proceedings

Ishida, Sadao (1993) Flow of Funds in Japanese Economy, Toyo Keizai Shinpo-Sha.

Lee, Hyejin (2014) “Compilation of Detailed Flow of Funds: Korea’s Experiences”, 7th

IFC Conference on Indicators to support Monetary and Financial Stability Analysis: Data Sources and Statistical Methodologies, BIS in Basel. (https://www.bis.org/ifc/events/7ifcconf_lee.pdf)

National Bureau of Statistics of China (2017) “China Statistical Yearbooks 2017,” China Statistics Press (in Chinese) (http://www.stats.gov.cn/tjsj/ndsj/2017/indexch.htm)

Okuma, Ryoichi (2013) “Sectoral Interlinkage in Balance Sheet Approach”, IFC Bulletin No 36.

Tang, Cheng (2018) “Households’ Portfolio Selection in China,” Institute of Developing Economies Asia Economy No. 59

Tang, Linmin, National Academy of Economic Strategy of the Chinese Academy of Social Sciences (2017) “Chinese Government Balance sheet in 2017,” *Financial Minds*, Vol.2, No.5, pp.103-138. (in Chinese)

Tsujimura, Kazusuke and Masako Tsujimura (2008) International Flow-of-Funds Analysis: Techniques and Applications, Keio University Press. (in Japanese)

_____(2010) “A Flow-of-Funds Analysis of Quantitative Monetary Policy,” in Shinichi Ichimura and Laurence R. Klein (eds.) *Macroeconometrics Analysis of Japan*, London: World Scientific, pp.193-193.

_____(2011) “Balance Sheet Economics of the Subprime Mortgage Crisis,”

Economic Systems Research, Vol.23, No.1, pp.1-25.

Yang, Zhiyong, Bin Zhang, Linmin Tang (2017) “Chinese Government Balance sheet in 2017,” Social Sciences Academic Press China (in Chinese)

Yoshino, Naoyuki and Farhad Taghizadeh-Hesary (2016) “Causes and Remedies of the Japan's Long-lasting Recession: Lessons for China,” China & World Economy, Vol.24, Issue.2, pp. 23-47. (https://doi.org/10.1111/cwe.12149)

Zhang, Nan (2005) “The Composition of the Global Flow of Funds in East Asia,” *Quantitative Economic Analysis, International Trade and Finance*, Kyushu University Press, pp.175-187.

_____(2009) “Re-examination of the Theoretical Model for Global-Flow-of-Funds Analysis,” Journal of Economic Sciences, Vol. 12, pp. 21-35.

_____(2015) “Measuring Global Flow of Funds and Integrating Real and Financial Accounts: Concepts, Data Sources and Approaches,” Proceeding, 2015 IARIW-OECD Conference: "W(h)ither the SNA?" (http://www.iariw.org/papers/2015/zhang.pdf)

Table 1. FFAs of Japan, Korea, and the U.S. (in units of 1 billion of USD)

Financial Flow for 2015

Japan,	FI		NFC		GG		HH		ROW	
transactions	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	718	1,132	130	0	218	0	118	0	7	59
Debt securities	142	122	-2	-46	-185	-27	-13	0	107	0
Loans	-25	-83	36	1	-114	-2	-1	69	52	-38
Equity and shares	83	174	75	11	61	14	22	0	-41	0
IPs	-17	35	0	-13	0	0	39	0	0	0
Derivatives	0	0	0	1	0	0	1	0	0	0
Others	429	23	136	83	-76	43	-38	56	56	302
Total	1,330	1,402	374	38	-95	29	129	125	180	325
Difference		-71		336		-124		4		-145

Korea,	FI		NFC		GG		HH		ROW	
transactions	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	37	172	51	0	5	10	95	0	-5	0
Debt securities	99	64	16	-9	8	44	7	0	-6	25
Loans	190	4	0	68	0	0	0	112	0	7
Equity and shares	30	46	-7	19	47	2	15	0	-2	16
IPs	3	86	4	0	0	0	79	0	0	0
Derivatives	0	0	0	0	0	0	0	0	0	0
Others	57	32	25	21	15	1	0	2	2	44
Total	417	403	89	99	75	58	197	114	-12	93
Difference		14		-10		18		83		-105

U.S.,	FI		NFC		GG		HH		ROW	
transactions	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	-515	220	103	0	106	0	529	0	-44	-252
Debt securities	598	160	-1	408	-4	734	264	-8	407	-31
Loans	792	-24	31	412	118	0	-60	411	-108	98
Equity and shares	454	574	289	-93	13	0	-91	0	289	474
IPs	280	478	-8	115	0	176	499	2	0	0
Derivatives	0	0	0	0	0	0	0	0	0	0
Others	-237	-197	1369	890	39	58	10	4	8	-2
Total	1,372	1,212	1,783	1,733	273	969	1,150	408	552	287
Difference		160		49		-696		742		265

Financial Assets and Liabilities as of End of 2015

Japan,	FI		NFC		GG		HH		ROW	
stocks	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	4012	14,581	2107	0	667	0	7851	0	82	138
Debt securities	9287	2373	219	603	691	8665	324	0	1119	0
Loans	10620	3926	467	3562	189	1378	19	2744	1312	996
Equity and shares	1966	2666	2362	6841	1595	451	2374	110	1770	0
IPs	258	4355	19	252	0	0	4330	0	0	0
Derivatives	591	625	24	38	0	0	9	6	295	249
Others	4049	1133	4021	2356	2033	246	385	656	498	6593
Total	30,811	29,661	9,218	13,652	5,205	10,756	15,292	3,516	5,093	8,005
Difference		1150		-4434		-5551		11776		-2912

Korea,	FI		NFC		GG		HH		ROW	
stocks	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	595	2,340	440	0	172	45	1162	0	17	0
Debt securities	1315	829	55	468	253	594	142	0	207	81
Loans	2172	118	0	851	0	13	0	1129	6	67
Equity and shares	540	666	599	1608	430	26	542	0	344	154
IPs	13	870	14	0	0	0	843	0	0	0
Derivatives	93	102	5	5	1	1	0	0	38	29
Others	878	618	900	845	314	90	24	84	325	804
Total	5,614	5,546	2,012	3,777	1,169	768	2,714	1,214	939	1,139
Difference		68		-1765		401		1500		-200

U.S.,	FI		NFC		GG		HH		ROW	
transactions	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	-515	220	103	0	106	0	529	0	-44	-252
Debt securities	598	160	-1	408	-4	734	264	-8	407	-31
Loans	792	-24	31	412	118	0	-60	411	-108	98
Equity and shares	454	574	289	-93	13	0	-91	0	289	474
IPs	280	478	-8	115	0	176	499	2	0	0
Derivatives	0	0	0	0	0	0	0	0	0	0
Others	-237	-197	1369	890	39	58	10	4	8	-2
Total	1,372	1,212	1,783	1,733	273	969	1,150	408	552	287
Difference		160		49		-696		742		265

Source: created by authors using OECD.Stat data.

Table 2. FIO Table for Japan (in units of 1 billion USD)

L/A	FI	NFC	GG	HH	ROW	Difference (L>A)	Total
FI	8,321	6,221	8,320	3,091	4,857	0	30,811
NFC	3,277	3,858	218	245	1,619	4,434	13,652
GG	1,613	1,088	966	88	1,451	5,551	10,756
HH	14,073	846	240	0	78	0	15,292
ROW	2,377	1,639	1,011	66	0	2,912	8,005
Difference (A>L)	1,150	0	0	11,776	0		
Total	30,811	13,652	10,756	15,292	8,005		

Source: calculated by authors using Japan's FFAs. A, assets; L, liabilities.

Table 3. Japan's Financial Asset/Liability Composition Ratios

L/A	FI	NFC	GG	HH	ROW	Difference (L>A)	Total
FI	0.28	0.46	0.77	0.20	0.61	0.12	1.00
NFC	0.11	0.28	0.02	0.03	0.20	0.27	1.00
GG	0.05	0.08	0.09	0.00	0.18	0.57	1.00
HH	0.49	0.09	0.05	0.00	0.01	0.00	1.00
ROW	0.06	0.09	0.07	0.00	0.00	0.37	1.00
Difference (A>L)	0.02	0.00	0.00	0.76	0.00		
Total	1.00	1.00	1.00	1.00	1.00		

Source: calculated by authors based on Okuma (2013). A, assets; L, liabilities.

Table 4. FIO Table for Korea (in units of 1 billion of USD)

L/A	FI	NFC	GG	HH	ROW	Difference (L>A)	Total
FI	1,643	1,445	106	505	320	0	5,614
NFC	434	189	8	0	329	1,765	3,777
GG	594	1,051	72	0	489	0	1,169
HH	2,656	542	22	0	0	0	2,714
ROW	314	550	69	0	0	200	1,139
Difference (A>L)	68	0	401	1,500	0		
Total	5,614	3,777	768	2,714	1,139		

Source: calculated by authors using Korea's FFAs. A, assets; L, liabilities.

Table 5. Korea's Financial Asset/Liability Composition Ratios

L/A	FI	NFC	GG	HH	ROW	Difference (L>A)	Total
FI	0.30	0.38	0.29	0.42	0.28	0.00	1.00
NFC	0.08	0.05	0.02	0.03	0.29	0.47	1.00
GG	0.11	0.28	0.20	0.00	0.43	0.00	1.00
HH	0.48	0.14	0.06	0.00	0.00	0.00	1.00
ROW	0.06	0.15	0.09	0.00	0.00	0.18	1.00
Difference (A>L)	0.01	0.00	0.34	0.55	0.00		
Total	1.00	1.00	1.00	1.00	1.00		

Source: calculated by authors based on Lee (2014). A, assets; L, liabilities.

Table 6. FIO Table for the U.S. (in units of 1 billion USD)

L/A	FI	NFC	GG	HH	ROW	Difference (L>A)	Total
FI	12,320	40,487	13,713	8,775	11,197	1879	88,369
NFC	2,229	8,289	193	160	3,576	32,998	57,014
GG	825	0	0	51909	137	18,210	70,943
HH	65,248	0	0	1003	0	0	14,575
ROW	7,747	8,238	7,057	0		0	23,043
Difference (A>L)	0	0	0	56,368	5727		
Total	88,369	57,014	23,365	70,943	23,043		

Source: calculated by authors using U.S. FFAs. A, assets; L, liabilities.

Table 7. U.S. Financial Asset/Liability Composition Ratios

L/A	FI	NFC	GG	HH	ROW	Difference (L>A)	Total
FI			0.16		0.13		1.00
NFC					0.16		1.00
GG	0.01				0.01		1.00
HH							1.00
ROW	0.09	0.36	0.11				1.00
Difference (A>L)							
Total							

Source: created by authors. FFAs. A, assets; L, liabilities.

Table 8. China's Flow Table for 2015 (in units of 100 million CNY)

Sectors / Items	Non-financial Enterprises		Financial Institutions		Governments		Households		All Domestic Sectors		The Rest of the World		Total	
	Utilization	Source	Utilization	Source	Utilization	Source	Utilization	Source	Utilization	Source	Utilization	Source	Utilization	Source
Net Financial Investment	-10807		-61245		11508		81185		20641		-20641		-0.028521192	
Uses of Funds	130106		290968		65901		122682		609657		-17996		591661	
Sources of Funds		140913		352213		54393		41497		589017		2645		591661
Currency	266		353	2957	59		2101		2780	2957	177		2957	2957
Deposits	67002		30346	155584	23972		46818		168138	155584	-7056	5498	161083	161083
Demand Deposits	31202			63491	11522		20768		63491	63491			63491	63491
Time Deposits	21601			53635	7102		24932		53635	53635			53635	53635
Fiscal Deposits				-914	-914				-914	-914			-914	-914
Foreign Exchange Deposits	7049		-2086	1045	107		1148		6218	1045	325	5498	6543	6543
Other Deposits	7149		32433	38327	6155		-30		45708	38327	-7381		38327	38327
Deposits with Margin Securities Trading Account	3715		1313	11201	1837		4232		11096	11201	104		11201	11201
Loans		82867	144190	15781				41497	144190	140145	-897	3147	143293	143292
Short-term Loans and Notes Financing		35650	46723					11074	46723	46723			46723	46723
Medium & Long-term Loans		35406	65929					30523	65929	65929			65929	65929
Foreign Exchange Loans		-7182	-3130	14				-7	-3130	-7174	-897	3147	-4027	-4027
Credit Loans		15913	15913						15913	15913			15913	15913
Other Loans		3080	18754	15766				-92	18754	18754			18754	18754
Undiscounted Bankers' Acceptances	-10569	-10569	-10569	-10569					-21137	-21137			-21137	-21137
Insurance Reserve Funds	970			8391		7025	14446		15416	15416			15416	15416
Inter-financial Institutions Accounts			-8167	-18134					-8167	-18134	-10461	-494	-18628	-18628
Deposit Reserve			-17471	-17513					-17471	-17513	-42		-17513	-17513
Securities	7191	37097	110432	44111	4093	47252	8156		129872	128460	1063	2475	130934	130935
Bonds	3529	29340	107795	42416	2695	47252	4938		118957	119008	50		119007	119008
Government and Public Bonds	25		45121		-6	47252	2112		47252	47252			47252	47252
Financial Bonds	381		41654	42366	331				42366	42366			42366	42366
Central Bank Bonds			0	50					0	50	50		50	50
Corporate Bonds	3124	29340	21020		2370		2826		29339	29340			29339	29340
Stock	3662	7757	2637	1695	1397		3218		10914	9452	1013	2475	11927	11927
Investment Funds	7837		2770	23630	3876		8927		23410	23630	220		23630	23630
Cash in Vault			-208	-222					-208	-222		14	-208	-208
Central Bank Loans			-1038	-1038					-1038	-1038			-1038	-1038
Others	38273	32000	62433	138772	32064		38001		170772	170772			170772	170772
Direct Investments	11298	15169							11298	15169	15169	11298	26467	26467
Changes in Other Foreign Assets and Debts	4123	-3910	-2026	-738		116			2097	-4532	-4532	2097	-2435	-2435
Changes in Reserve Assets			-21390						-21390			-21390	-21390	-21390
Errors and Omissions in the Balance of Payments		-11742								-11742	-11742		-11742	-11742

Source: China Statistical Yearbook 2017

Table 9. China's Financial Assets (in units of % for ratios, 100 million CNY for amounts)

	2004 ratio	2006 ratio	2008 ratio	2010 ratio	2012 ratio	2014 ratio	2014 amount
Currency	9.9	8.9	8.3	7.6	6	5.6	57,792
Deposits	71.8	68.3	66.6	63.8	55.4	49.1	506,713
Bonds	3.5	2.8	1.5	0.5	0.6	0.5	5,160
Pension reserves	7.8	9	11	10.6	9.5	10.2	105,264
Shares	4.9	6.8	5.9	11.4	8.1	7.7	79,464
Fund	1.1	2.2	5	1.5	1.5	0.9	9,288
Guarantee deposits	0.7	1.2	1.4	0.9	0.3	0.1	1,032
Wealth management Products	0	0	0	3	8.8	13.4	138,288
Trust products	0.2	0.8	0.3	0.6	9.8	12.4	127,968
Total amount	180,369	251,600	342,870	494,832	761,964	1,032,002	1,030,970

Source: Tang (2018)

Table 10. Outstanding Amount of Debt Securities Issued (in units of 100 million CNY)

Year	Government Bonds	Central Bank Notes	Financial Debentures	Nonfinancial Corporations Bonds
2001	15,618.00			
2002	19,336.10			
2003	22,603.60			
2004	25,777.60			
2005	28,774.00			
2006	31,448.70			
2007	48,741.00			8,181.73
2008	49,767.83		41,330.58	14,310.47
2009	57,949.98		50,990.71	25,107.31
2010	67,684.90		58,789.99	38,255.26
2011	73,826.50		74,598.22	51,628.08
2012	71,993.60	13,380.00	92,281.60	74,011.78
2013	95,471.00	5,462.00	106,182.21	92,037.64
2014	107,275.00	4,222.00	125,489.00	115,443.77
2015	154,524.00	4,222.00	184,596.00	144,152.58

Source: Almanac of China’s Finance and Banking 2016

Table 11. Estimation of HHs and Debt Securities (in units of 100 million CNY)

	FI		NFC		GG		HH		ROW	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits							9,450			
Debt securities		188,818		144,152		154,524	156			
Loans								4,122		
Equity and shares							5,656			
IPs							1,844			
Derivatives										
Others							682			
Total							17,788	4,122		
Difference								13,666		

Source: created by authors.

Table 12. China’s IIPs (in units of 100 million USD)

		End of 2013	End of 2014	End of 2015	End of 2016
Net positions		19,960	16,028	16,728	18,005
Financial assets		59,861	64,383	61,558	64,666
	Direct investments	6,605	8,826	10,959	13,172
	Portfolio investments	2,585	2,625	2,613	3,651
	Other investments	11,867	13,938	13,889	16,811
	Official reserves	38,804	38,993	34,061	31,028
Liabilities		39,901	48,355	44,830	46,660
	Direct investments	23,312	25,991	26,963	28,659
	Portfolio investments	3,865	7,962	8,170	8,086
	Other investments	12,724	14,402	9,643	9,849

Source: SAFE

Table 13. Estimation of China's HH and ROW Sectors and Debt Securities (in units of 1 billion USD)

	FI		NFC		GG		HH		ROW	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits							9,450			
Debt securities				2,221			156		817	3,667
Loans							0	4,122	964	1,389
Equity and shares							5,656		2,696	1,096
IPs							1,844			
Derivatives							0			
Others							682			
Total							17,788	4,122	4,478	6,152
Difference								13,666		1,673

Source: created by authors.

Table 14. Estimation of China's FI Sector (in units of 100 million CNY)

	FI		CB		ODC		IP		OFC	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	374,111	1,885,659		369,600	290,951	1,514,815	29,858	0	53,302	1,245
Debt securities	792,886	251,048	269,143	6,572	313,841	226,800	62,275	3,719	147,626	13,956
Loans	1,476,643	184,751	33,355		1,195,667	108,614	21,548	4,869	226,074	71,267
Equity and shares	18,348	469,848		220	3,111	147,281	11,997	21,678	3,240	300,669
IPs	0	119,711			0	0	0	119,711	0	0
Derivatives	4,229	3,855			4,014	3,544	0	3	215	308
Others	227,014	133,018			183,973	65,394	40,547	18,004	2,494	49,620
Total	2,595,730	2,747,909	302,498	376,391	1,991,556	2,066,448	166,226	167,985	135,449	137,086
Difference		-152,180		-73,893		-74,891		-1,759		-1,636

Source: created by authors.

Table 15. Estimation of China's HH, ROW, and FI Sectors and Debt Securities (in units of 1 billion USD)

	FI		NFC		GG		HH		ROW	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	5,763	29,048					9,450			
Debt securities	15,499	3,867		2,221			156		817	3,667
Loans	22,747	2,846						4,122	964	1,389
Equity and shares	3,568	7,238					5,656		2,696	1,096
IPs	0	1,844					1,844			
Derivatives	65	59								
Others	3,497	2,049					682			
Total	39,987	42,331					17,788	4,122	4,478	6,152
Difference		-2,344						13,666		1,673

Source: created by authors.

Table 16. China's GG's Financial Assets/Liabilities (in units of 100 million CNY)

(Financial assets)		(Liabilities)	
Government deposits	242,545.80	Domestic government bo	105,547.48
Social security funds	17,966.51	Local governments' dire	147,568.37
Equity in state-owned er	457,651.49	Direct foreign bonds	7,233.87
FIs	79,549.79		
NFCs	378,101.70		
Total	718,163.80	Total	258,269.72

Source: Chinese Government's Financial Assets/Liabilities 2017

Table 17. Estimation of China's HH, FI, and GG Sectors and Debt Securities (in units of 100 million CNY)

	FI		NFC		GG		HH	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	374,111	1,885,659			27,179		613,424	
Debt securities	792,886	251,048		144,152	233,533	243,065	10,098	
Loans	1,476,643	184,751				15,205		267,580
Equity and shares	18,348	469,848		715,261	457,651		367,154	
IPs		119,711					119,711	
Derivatives	4,229	3,855						
Others	227,014	133,018					44,297	
Total	2,595,730	2,747,909			718,364	258,270	1,154,684	267,580
Difference		-152,180						

Source: created by authors.

Table 18. Outstanding Amount of Shares Issued (in units of 100 million CNY)

Year	Total Market Capitalization		
		Shanghai Stock Exchange	Shenzhen Stock Exchange
2001	43,582.90	27,590.57	15,992.33
2002	38,338.79	25,363.72	12,975.07
2003	42,477.63	29,804.92	12,672.71
2004	37,080.95	26,014.34	11,066.61
2005	32,446.02	23,096.13	9,349.89
2006	89,441.35	71,612.38	17,828.97
2007	327,291.31	269,838.87	57,452.44
2008	121,541.05	97,251.91	24,289.14
2009	244,103.91	184,655.23	59,448.68
2010	265,422.59	179,007.24	86,415.35
2011	214,758.09	148,376.22	66,381.87
2012	230,357.62	158,698.44	71,659.18
2013	239,077.19	151,165.27	87,911.92
2014	372,546.96	243,974.02	128,572.94
2015	531,462.70	295,386.90	236,075.80

Source: Almanac of China’s Finance and Banking 2016

Table 19. Financial Assets/Liabilities Before Adjusting Negative Figures (in units of 1 billion USD)

	FI		NFC		GG		HH		ROW	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	5,763	29,048	13,417		419		9,450			
Debt securities	12,214	3,867	-3,285	2,221	3,598	3,744	156		817	3,667
Loans	22,747	2,846		15,120		234	0	4,122	964	1,389
Equity and shares	283	7,238	3,667	11,018	7,050		5,656		2,696	1,096
IPs		1,844					1,844			
Derivatives	65	59		6						
Others	3,497	2,049		2,130			682			
Total	39,987	42,331	13,799	30,496	11,066	3,979	17,788	4,122	4,478	6,152
Difference		-2,344		-16,696		7,088		13,666		1,673

Source: created by authors.

Table 20. FFA Stock Table after Adjusting Negative Figures (in units of 1 billion USD)

	FI		NFC		GG		HH		ROW	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits	5,763	29,048	13,417		419		9,450			
Debt securities	8,929	3,867	0	2,221	3,598	3,744	156		817	3,667
Loans	22,747	2,846		15,120	0	234		4,122	964	1,389
Equity and shares	3,568	7,238	382	11,018	7,050		5,656		2,696	1,096
IPs		1,844					1,844			
Derivatives	65	59		6						
Others	3,497	2,049		2,130			682			
Total	39,987	42,331	13,799	30,496	11,066	3,979	17,788	4,122	4,478	6,152
Difference		-2,344		-16,696		7,088		13,666		1,673

Source: created by authors.

Table 21. Financial Asset/Liability Stocks for which Counterpart Sectors can be Identified (in units of 100 million CNY)

Liabilities/Assets	FI	CB	ODC	IP	OFC	NFC	GG	HH	ROW
FI						981,920	15,205	267,580	90,160
CB									
ODC						981,920	15,205	267,580	90,160
IP									
OFC									
NFC	870,946		870,946						
GG	106,729	27,179	79,550			378,102			
HH	1,017,607		613,424	119,711	284,472				
ROW	62,598		62,598						

Source: created by authors.

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Table 22. Financial Asset/Liability Stocks for which Counterpart Sectors cannot be Identified (in units of 100 million CNY)

L/A	FI	NFC	GG	HH	ROW	Difference (L>A)	Total
FI	297,487	234,118	176,878	0	183,745		
NFC	45,419	175,227	6	0	21,263		
GG	141,109	367,744	52,097	0	94,500		
HH	39,817	84,772	2,253	0	9,702		
ROW	45,609	135,845	11,831	0			
Difference (A>L)							
Total							

Source: created by authors. FFAs. A, assets; L, liabilities.

Table 23. CNY-based FIO for China (in units of 100 million CNY)

L/A	FI	NFC	GG	HH	ROW	Difference (L/A)	Total
FI	297,487	1,216,038	192,083	267,580	273,906	735,835	2,247,093
NFC	916,365	175,227	6	0	21,263	1,186,361	1,112,861
GG	247,838	745,845	52,097	0	94,500		1,140,280
HH	1,057,424	84,772	2,253	0	9,702		1,154,150
ROW	108,206	135,845	11,831	0		108,707	255,882
Difference (A/L)			917,746	1,113,187			
Total	1,891,485	1,171,366	1,176,015	1,380,766	290,663		

Source: created by authors. FFAs. A, assets; L, liabilities.

Table 24. USD-based FIO for China (in units of 1 billion USD)

L/A	FI	NFC	GG	HH	ROW	Difference (L>A)	Total
FI	4,583	18,733	2,959	4,122	4,219	11,335	34,616
NFC	14,116	2,699	0	0	328	18,276	17,143
GG	3,818	11,490	803	0	1,456		17,566
HH	16,289	1,306	35	0	149		17,779
ROW	1,667	2,093	182	0		1,675	3,942
Difference (A>L)			14,138	17,148			
Total	29,138	18,045	18,116	21,270	4,478		

Source: created by authors. FFAs. A, assets; L, liabilities.

Table 25. Japan's and Korea's FIO Transaction Matrices in the International FIO Framework

Liabilities/ Assets		Japan				Korea				Others
		FI	NFC	GG	HH	FI	NFC	GG	HH	
Japan	FI	8,321	6,221	8,320	3,091	(a)		(b)		
	NFC	3,277	3,858	218	245					
	GG	1,613	1,088	966	88					
	HH	14,073	846	240	0					
Korea	FI	(c)		(d)		1,643	1,445	106	505	
	NFC					434	189	8	0	
	GG					594	1,051	72	0	
	HH					2,656	542	22	0	
Others										

Table 26. Incorporation of CPIS data for Japan and Korea into the International FIO Framework

Liabilities/ Assets		Japan				Korea			
		FI	NFC	GG	HH	FI	NFC	GG	HH
Japan	FI					11	20	3	0
	NFC					5	9	1	0
	GG					0	0	0	0
	HH					0	0	0	0
Korea	FI	3	2	1	0				
	NFC	13	9	5	0				
	GG	17	0	0	0				
	HH	0	0	0	0				

Table 27. Incorporation of CDIS data for Japan and Japan's and Korea's IBS into the International FIO Framework

Liabilities/ Assets		Japan				Korea			
		FI	NFC	GG	HH	FI	NFC	GG	HH
Japan	FI					4			
	NFC						31		
	GG								
	HH								
Korea	FI	3							
	NFC		3						
	GG								
	HH								

Table 28. Japan–Korea International FIO Table

Liabilities/ Assets		Japan				Korea				Others
		FI	NFC	GG	HH	FI	NFC	GG	HH	
Japan	FI	8,321	6,221	8,320	3,091	16	20	3	0	4,819
	NFC	3,277	3,858	218	245	5	41	1	0	1,572
	GG	1,613	1,088	966	88	0	0	0	0	1,450
	HH	14,073	846	240	0	0	0	0	0	78
Korea	FI	7	2	1	0	1,643	1,445	106	505	310
	NFC	13	12	5	0	434	189	8	0	298
	GG	17	0	0	0	594	1,051	72	0	473
	HH	0	0	0	0	2,656	542	22	0	0
Others		2,341	1,625	1,004	65	304	571	67	0	

Table 29. International FIO Covering Japan, Korea, the U.S., and China (in units of 1 billion USD)

		Japan				Korea				U.S.				China				ROW
		FI	NFC	GG	HH	FI	NFC	GG	HH	FI	NFC	GG	HH	FI	NFC	GG	HH	
Japan	FI	8,321	6,221	8,320	3,091	16	20	3	0	1,024	640	548	0	7	4	4	0	28,584
	NFC	3,277	3,858	218	245	5	41	1	0	89	508	81	0	1	143	1	0	798
	GG	1,613	1,088	966	88	0	0	0	0	111	118	101	0	0	0	0	0	1,120
	HH	14,073	846	240	0	1	0	0	0	16	0	0	0	0	0	0	0	62
Korea	FI	7	2	1	0	1,643	1,445	106	505	46	41	35	0	5	3	3	0	178
	NFC	13	12	5	0	434	189	8	0	20	22	19	0	0	95	0	0	142
	GG	17	0	0	0	594	1,051	72	0	0	0	0	0	1	1	1	0	470
	HH	0	0	0	0	2,656	542	22	0	0	0	0	0	0	0	0	0	0
U.S.	FI	605	322	199	0	91	128	16	0	12,320	40,487	13,713	8,775	55	6	0	0	9,775
	NFC	104	181	45	0	11	20	2	0	2,229	8,289	193	160	52	78	0	0	3,083
	GG	0	0	0	0	0	0	0	0	825	0	0	51,909	1	0	0	0	137
	HH	0	0	0	0	0	0	0	0	65,248	0	0	1,003	0	0	0	0	0
China	FI	90	40	31	0	27	18	4	0	875	564	231	0	4,583	18,733	2,959	4,122	2,340
	NFC	7	3	2	0	2	1	0	0	68	44	18	0	14,116	2,699	0	0	182
	GG	31	14	11	0	9	6	1	0	302	195	80	0	3,818	11,490	803	0	807
	HH	6	0	0	0	2	0	0	0	59	0	8	0	16,289	1,306	35	0	75
ROW		1498	1,498	1,065	716	65	150	316	41	0	5,138	6,107	5,936	0	1,546	1,764	174	0

Source: created by authors.

Table 30. Net Liabilities and Net Financial Assets

	Total Liabilities (L)	Total Financial Assets (A)	Net Liabilities (L-A if L>A)		Net Financial Assets (A-L if A>L)	
			Amount (1 billion USD)	$(\frac{L-A}{L})$ × 100%	Amount (1 billion USD)	$(\frac{A-L}{A})$ × 100%
F(JP)	29,661	56,802	0	0.0%	27,141	47.8%
C(JP)	13,652	9,265	4,387	32.1%	0	0.0%
G(JP)	10,756	5,206	5,550	51.6%	0	0.0%
H(JP)	3,490	15,238	0	0.0%	11,748	77.1%
F(KR)	5,641	4,020	1,621	28.7%	0	0.0%
C(KR)	3,777	961	2,816	74.6%	0	0.0%
G(KR)	277	2,206	0	0.0%	1,929	87.4%
H(KR)	505	3,219	0	0.0%	2,714	84.3%
F(US)	88,369	86,491	1,879	2.1%	0	0.0%
C(US)	57,014	14,448	42,566	74.7%	0	0.0%
G(US)	20,963	52,871	0	0.0%	31,908	60.3%
H(US)	61,847	66,251	0	0.0%	4,404	6.6%
F(CN)	40,473	34,616	5,857	14.5%	0	0.0%
C(CN)	36,320	17,143	19,177	52.8%	0	0.0%
G(CN)	3,979	17,566	0	0.0%	13,587	77.4%
H(CN)	4,122	17,779	0	0.0%	13,657	76.8%

Table 31. Liabilities Portfolios (%)

		Japan				Korea				U.S.				China				ROW
		FI	NFC	GG	HH	FI	NFC	GG	HH	FI	NFC	GG	HH	FI	NFC	GG	HH	
Japan	FI	28.1%	45.6%	77.4%	88.6%	0.3%	0.5%	0.9%	0.0%	1.2%	1.1%	2.6%	0.0%	0.0%	0.0%	0.1%	0.0%	59.9%
	NFC	11.0%	28.3%	2.0%	7.0%	0.1%	1.1%	0.4%	0.0%	0.1%	0.9%	0.4%	0.0%	0.0%	0.4%	0.0%	0.0%	1.7%
	GG	5.4%	8.0%	9.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	2.3%
	HH	47.4%	6.2%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Korea	FI	0.0%	0.0%	0.0%	0.0%	29.1%	38.3%	38.3%	100%	0.1%	0.1%	0.2%	0.0%	0.0%	0.0%	0.1%	0.0%	0.4%
	NFC	0.0%	0.1%	0.1%	0.0%	7.7%	5.0%	3.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.3%	0.0%	0.0%	0.3%
	GG	0.1%	0.0%	0.0%	0.0%	10.5%	27.8%	26.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%
	HH	0.0%	0.0%	0.0%	0.0%	47.1%	14.3%	7.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
U.S.	FI	2.0%	2.4%	1.8%	0.0%	1.6%	3.4%	5.7%	0.0%	13.9%	71.0%	65.4%	14.2%	0.1%	0.0%	0.0%	0.0%	20.5%
	NFC	0.3%	1.3%	0.4%	0.0%	0.2%	0.5%	0.9%	0.0%	2.5%	14.5%	0.9%	0.3%	0.1%	0.2%	0.0%	0.0%	6.5%
	GG	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	83.9%	0.0%	0.0%	0.0%	0.0%	0.3%
	HH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	73.8%	0.0%	0.0%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%
China	FI	0.3%	0.3%	0.3%	0.0%	0.5%	0.5%	1.3%	0.0%	1.0%	1.0%	1.1%	0.0%	11.3%	51.6%	74.4%	100.0%	4.9%
	NFC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.1%	0.0%	34.9%	7.4%	0.0%	0.0%	0.4%
	GG	0.1%	0.1%	0.1%	0.0%	0.2%	0.2%	0.5%	0.0%	0.3%	0.3%	0.4%	0.0%	9.4%	31.6%	20.2%	0.0%	1.7%
	HH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	40.2%	3.6%	0.9%	0.0%	0.2%
ROW		5.1%	7.8%	6.7%	1.9%	2.7%	8.4%	14.8%	0.0%	5.8%	10.7%	28.3%	0.0%	3.8%	4.9%	4.4%	0.0%	0.0%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 32. Financial Asset Portfolios (%)

		Japan				Korea				U.S.				China				ROW	Total
		FI	NFC	GG	HH	FI	NFC	GG	HH	FI	NFC	GG	HH	FI	NFC	GG	HH		
Japan	FI	14.6%	11.0%	14.6%	5.4%	0.0%	0.0%	0.0%	0.0%	1.8%	1.1%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.3%	100%
	NFC	35.4%	41.6%	2.4%	2.6%	0.1%	0.4%	0.0%	0.0%	1.0%	5.5%	0.9%	0.0%	0.0%	1.5%	0.0%	0.0%	8.6%	100%
	GG	31.0%	20.9%	18.6%	1.7%	0.0%	0.0%	0.0%	0.0%	2.1%	2.3%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	21.5%	100%
	HH	92.4%	5.6%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	100%
Korea	FI	0.2%	0.1%	0.0%	0.0%	40.9%	36.0%	2.6%	12.6%	1.1%	1.0%	0.9%	0.0%	0.1%	0.1%	0.1%	0.0%	4.4%	100%
	NFC	1.3%	1.3%	0.6%	0.0%	45.2%	19.7%	0.9%	0.0%	2.1%	2.3%	1.9%	0.0%	0.0%	9.9%	0.0%	0.0%	14.7%	100%
	GG	0.8%	0.0%	0.0%	0.0%	26.9%	47.6%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	21.3%	100%
	HH	0.0%	0.0%	0.0%	0.0%	82.5%	16.8%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
U.S	FI	0.7%	0.4%	0.2%	0.0%	0.1%	0.1%	0.0%	0.0%	14.2%	46.8%	15.9%	10.1%	0.1%	0.0%	0.0%	0.0%	11.3%	100%
	NFC	0.7%	1.3%	0.3%	0.0%	0.1%	0.1%	0.0%	0.0%	15.4%	57.4%	1.3%	1.1%	0.4%	0.5%	0.0%	0.0%	21.3%	100%
	GG	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	98.2%	0.0%	0.0%	0.0%	0.0%	0.3%	100%
	HH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	98.5%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
China	FI	0.3%	0.1%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	2.5%	1.6%	0.7%	0.0%	13.2%	54.1%	8.5%	11.9%	6.8%	100%
	NFC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.3%	0.1%	0.0%	82.3%	15.7%	0.0%	0.0%	1.1%	100%
	GG	0.2%	0.1%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	1.7%	1.1%	0.5%	0.0%	21.7%	65.4%	4.6%	0.0%	4.6%	100%
	HH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	91.6%	7.3%	0.2%	0.0%	0.4%	100%
ROW		6.1%	4.3%	2.9%	0.3%	0.6%	1.3%	0.2%	0.0%	21.0%	24.9%	24.2%	0.0%	6.3%	7.2%	0.7%	0.0%	0.0%	100%

Table 33. Aggregated International FIO Covering Japan, Korea, the U.S., and China (in units of 1 billion of USD)

	Japan	Korea	U.S.	China	ROW	Total
Japan	52,466	87	3,236	159	30,564	86,511
Korea	58	9,268	182	109	790	10,407
U.S.	1,455	268	205,150	191	12,995	220,060
China	234	71	2,443	80,952	3,404	87,104
ROW	3,345	506	17,182	3,483		24,516
Total	57,559	10,201	228,193	84,894	47,751	

Table 34. Aggregated Liabilities Portfolios (%)

	Japan	Korea	U.S.	China	ROW
Japan	91.20%	0.90%	1.40%	0.20%	64.00%
Korea	0.10%	90.90%	0.10%	0.10%	1.70%
U.S.	2.50%	2.60%	89.90%	0.20%	27.20%
China	0.40%	0.70%	1.10%	95.40%	7.10%
ROW	5.80%	5.00%	7.50%	4.10%	0.00%
Total	100%	100%	100%	100%	100%

Table 35. Aggregated Financial Assets Portfolios (%)

	Japan	Korea	U.S.	China	ROW	Total
Japan	60.60%	0.10%	3.70%	0.20%	35.30%	100%
Korea	0.60%	89.10%	1.80%	1.00%	7.60%	100%
U.S.	0.70%	0.10%	93.20%	0.10%	5.90%	100%
China	0.30%	0.10%	2.80%	92.90%	3.90%	100%
ROW	13.60%	2.10%	70.10%	14.20%	0.00%	100%