Foundations of International Flow-of-Funds Accounts

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Abstract

The current version of the balance of payments statistics (BPM6) consists of the goods and services account, the primary income account, the secondary income account, the capital account, and the financial account. The accounts are to be compiled on a horizontal double-entry bookkeeping basis; it ensures the consistency of recording for each transaction category by counterparties. The nature of horizontal double entry allows the bilateral international transactions to be presented in a from-whom-to-whom matrix format; several international organizations publish such statistics. This paper is an attempt to tentatively make an international flow of funds accounts using the available data. The from-whom-to-whom matrix consists of 242 economic regions, and covers the goods and services account, the primary account, and FDI and portfolio investment portion of the financial account of the balance of payments statistics. The enhancement of balance of payments statistics in the from-whom-to-whom format and accompanying analytical tools will surely promote the better understanding of the flow of funds at the global perspective.

Keywords: Balance of Payments; From Whom To Whom; Structural Analysis; Matrix Triangulation; Dispersion Indices.

1. Introduction

The balance of payments is by far the most widely used statistics to depict the international transactions, however, there is a pervasive conceptual confusion about the meaning of ‘balance of payments’. It is widely acknowledged that Misselden (1623) was the first author who used the expression ‘balance of trade’. The impression very generally given in economic literature is that the Mercantilists’ ‘balance of trade’ was a balance of commodity trade (Fetter (1935)). This is far from the truth because Misselden took freight and other services provided by merchants into consideration when he wrote of ‘balance of trade’ (Ibid. p. 124). Petty (1690) wrote that the labor of seamen and freight of ships are of the nature of an exported or imported commodity (p. 19). The word ‘balance of debt’ was first introduced by Foster (1804), which was defined as the difference between the amount payable and amount receivable (p. 4). While ‘balance of trade’ covers only the current transactions, such as sales of goods and services, remuneration for labor, etc., ‘balance of debt’ also includes lending, borrowing, sale of negotiable instruments, etc. The term ‘balance of payments’ soon replaced ‘balance of debt’. For example, Bosanquet (1810) frequently used the former expression but with a slightly different connotation.

In the year of 1792, France declared war on Great Britain so that the British government’s military expenses rose very quickly. By 1797, the Bank of England’s gold reserves had been reduced to dangerously low levels as a result of heavy demands for gold redemptions from both domestic and foreign note holders; to save the Bank from bankruptcy, the British government passed the Bank Restriction Act to free the central bank from
converting bank notes and other financial claims into gold. However in 1809, the newly-officialized United Kingdom experienced a rapid depreciation of its currency and a mass exodus of gold bullion. A committee of House of Commons was appointed to ‘inquire into the cause of the high price of bullion, and to take into consideration the state of the circulating medium, and of the exchanges between Great Britain and foreign parts’. Bosanquet and his contemporary authors used the expression ‘balance of payments’ as a synonymous to the ‘international shipment of gold bullion’.

As Frisch (1947) remarked, as far as exchange transactions are concerned, the balance settled in anything with highest degree of liquidity is commonly referred to as ‘balance of payments’; obviously it could be gold but it is not necessary to be gold. The Bretton Woods system was an international monetary system, which was developed at the United Nations Monetary and Financial Conference held in Bretton Woods, New Hampshire, on July 1-22, 1944. Although gold formally served as the base reserve, the U.S. dollar was mainly used as an international reserve currency, which was then convertible to gold. On the 15th of August 1971, after the prolonged negative balance of payments, the United States finally terminated convertibility of the U.S. dollar to gold. The currencies of the world are no longer pegged to gold either directly or indirectly. In the current IMF regime, the currency of the members that the IMF considers to be in a sufficiently strong external position that their currency can be used to settle international accounts is classified as ‘usable currencies’ (IMF (2014), p. 22); specifically the four currencies, the U.S. dollar, euro, Japanese yen, and pound sterling, whose basket the value of the SDR is based on, are widely regarded as ‘international currency’.

2. Balance of Payments Statistics

The sixth edition of Balance of Payments and International Investment Position Manual, widely known as BPM6, defines that the balance of payments statistics as a statement that summarizes economic transactions between residents and nonresidents of an economic territory during a specific time period (BPM6 2.2). It consists of the goods and services account, the primary income account, the secondary income account, the capital account, and the financial account. The accounts for an economy are to be compiled on a vertical double-entry bookkeeping basis from the perspective of the residents of that economy. The main characteristic of vertical double-entry bookkeeping is that each transaction leads to at least two corresponding entries, traditionally referred to as a credit entry and a debit entry. Because each transaction is either an exchange or a transfer, it requires two entries. This principle ensures that the total of all credit entries and that of all debit entries for all transactions are equal (BPM6 3.27). The concept of horizontal double-entry bookkeeping is that if unit A provides something to unit B, the accounts of both A and B show the transaction for the same amount: as a payment in A’s account and as a receipt in B’s account. Horizontal double-entry bookkeeping ensures the consistency of recording for each transaction category by counterparties (BPM6 3.28).

The nature of horizontal double entry allows the bilateral international transactions to be presented in a from-whom-to-whom matrix format; several international organizations publish such statistics. The OECD STAN Bilateral Trade by Industry and End-use (BTDixE) consists of values of imports and exports of goods, broken down by reporting and partner countries, and by both industrial activities and end-use categories. Estimates are expressed in nominal terms, in current US dollars and are presented in the form of time-series for more than a hundred reporters and partners, including all 34 OECD member countries, as well as a wide range of non-member economies. OECD Statistics on International Trade in Services aims to assemble and disseminate balance of payments data on trade in services shown in US dollars.
at the most detailed partner-country and service-category level available. To the extent that countries report them, data are also broken down by type of service according to the Extended Balance of Payments Services Classification (EBOPS). These two datasets provide the from-whom-to-whom matrices that correspond to the goods and services account of the balance of payments statistics.

OECD Database on Foreign Direct Investment (FDI) Statistics include annual and quarterly aggregate FDI statistics for 34 OECD member countries and for seven non-OECD G20 countries (Argentina, Brazil, China, India, Indonesia, Saudi Arabia and South Africa). Datasets related to FDI financial flows and positions by partner country are presented on a directional basis. Under the directional presentation, the direct investment flows and positions are organized according to the direction of the investment for the reporting economy—either outward or inward; inward and outward FDI statistics by partner country are presented by immediate host and immediate destination country. IMF Coordinated Portfolio Investment Survey (CPIS) reflect end-June and end-December data on portfolio investment holdings (equity and debt securities) reported by participating economies. Global Tables comprise tables for cross-border holdings of securities and derived liabilities based on the creditor data; the geographic breakdown of the reported data is limited to the CPIS participating economies, while the geographic breakdown of the derived data covers all economies that issue securities that are held by CPIS participating economies. These two datasets provide the from-whom-to-whom matrices that correspond to the financial account of the balance of payments statistics; however, financial derivatives, employee stock options, and other investment are excluded.

3. Tools for Structural Analysis

In linear algebra, a triangular matrix is a special kind of square matrix. The principal diagonal of a square matrix $X$ is the collection of entries $x_{ij}$ where $i = j$; a square matrix is called lower triangular if all the entries above the principal diagonal are zero. Triangulation is a technique to simultaneously rearrange the rows and columns of a square matrix to transform it into lower triangular; if the $i$’th row of the original matrix is shifted to the $j$’th row, then the $i$’th column must be shifted to the $j$’th column. If all the entries above the principal diagonal are zero as a result of the rearrangement, the matrix is referred to as strictly (lower) triangular matrix. Although several algorithms for triangulation were proposed by Simpson and Tsukui (1965) and Fukui (1986), there are more simple alternatives. Let $R_i$ be the number of zero entries in the $i$’th row; and $C_i$ be the number of zero entries in the $i$’th column. The triangulation that rearrange the rows and columns in the descending order of $R_i$ is referred to as triangulation according to row. The triangulation that rearrange the rows and columns in the ascending order of $C_i$ is referred to as triangulation according to column. The triangulation that rearrange the rows and columns in the descending order of $R_i + (n - C_i)$, where $n$ is the number of rows and columns, is the hybrid method of triangulation. As Leontief (1963) pointed out, in the hierarchical order of a structure with a strictly triangular from-whom-to-whom matrix, the lower units affect the upper units but not vice versa.

There is no universal indicator of from-whom-to-whom matrix structure, however, Rasmussen (1956) proposed in relation to the input-output accounts to use Leontief inverse rather than the input coefficients to create indicators. Let $X$ be a square matrix, then $\Gamma = (I - XT^{-1})^{-1}$, where $T = \text{diag}\left(\maxi(Xi, Xi)\right)$, is known as Leontief inverse; maxi is
an operator that gives a vector each of whose element is the max of the corresponding elements of the vectors shown in the parenthesis. Rasmussen referred to $\gamma_{PDI} = \Gamma i(i'\Gamma i)^{-1}$ as power of dispersion indices; and $\gamma_{SDI} = \Gamma i(i'\Gamma i)^{-1}$ as sensitivity of dispersion indices. If a square matrix $X^S$ represents from-whom-to-whom relationship, there is a corresponding matrix $X^K = (X^S)'$ that represents to-whom-from-whom relationship so that there are two pairs of dispersion indices $\gamma_{PDI}^S$, $\gamma_{SDI}^S$, $\gamma_{PDI}^K$ and $\gamma_{SDI}^K$; the former pair is referred to as Stone formula while the latter pair is as Klein formula. While the triangulation depicts the direct linkage hierarchy between units, the dispersion indices measure the degree of indirect as well as direct interdependence among the units.

4. From-Whom-To-Whom Balance of Payments Structure of the World

As we have already mentioned, several international organizations publish balance of payments statistics in the from-whom-to-whom matrix format: BTDIXE, EBOPS, FDI Statistics and CPIS. While the first two statistics cover the goods and service accounts, the latter two do the FDI and portfolio investment part of the financial accounts. Since both FDI Statistics and CPIS publish from-whom-to-whom stock matrices, we compiled from-whom-to-whom investment income matrices by allocating each country’s investment income according to the investee’s share. In addition to that, we composed from-whom-to-whom compensation-of-employees matrix in the same manner using the stock of foreign population by nationality published as a part of the OECD International Migration Database. These three matrices cover almost entire part of the primary income account. Finally, we made a from-whom-to-whom balance-of-payments matrix by adding up all the above matrices. In this matrix, the balance of payments include not only deposits and reserves, which is considered to be the main components of the ‘balance of payments’ but also what should be dealt in the secondary income and capital accounts, however, in most economic regions the latter two accounts are negligible.

Our from-whom-to-whom balance-of-payments matrix for 2012 consists of 242 economic regions of the world, plus international organizations that include IMF and World Bank. The top five gross payers are United States, China, Germany, United Kingdom and France; top five gross recipients are United States, Germany, China, United Kingdom and Japan in that order. The top five net payers are United States, Hong Kong, Japan, Luxembourg and Singapore; top five net recipients are China, Russia, Saudi Arabia, Malaysia and Taiwan. We will confine the following discussion to the top 30 gross payers and recipients of the world.

As we have mentioned, the triangulation is an analytical technique that examines the direct linkage hierarchy between economic regions. Since international payments between economic regions are more or less balanced, it is rather difficult to directly triangulate the balance-of-payments matrix so that we modified the original matrix before triangulation. Let $Y^* = Y - Y'$ where $Y$ is a from-whom-to-whom payment matrix; if $y^*_{ij} < 0$ then $x^*_{ij} = 0$ else $x^*_{ij} = y^*_{ij}$. The five countries at the top of the lower triangle are Taiwan, Thailand, Brazil, Russia and China. These countries export their products such as manufactured goods to all over the world so that receive payments from many regions; and invest the surplus funds by purchasing negotiable instruments from a limited number of economic regions, however, it
might be because of missing data in CPIS. The five countries at the bottom of the lower triangle are United States, Norway, Hong Kong, Belgium and Luxembourg. Indeed, these countries are great importers, however, the most prominent thing is that they are most active investors of the world in terms of FDI so that they invest in almost anywhere in the world.

The dispersion indices measure the degree of indirect as well as direct interdependence among the economic regions. Stone-formula PDI is an indicator of the region’s presence in the world as either an exporter or investee. Austria, Poland, Belgium, Russia and Sweden have the largest Stone-formula PDI while Hong Kong, Singapore, United States, India and Luxembourg’s PDI are the smallest among the big players. The economic regions with the largest Stone-formula SDI, such as United States, Germany, United Kingdom, China and France, are supposed to be a last resort as a fund supplier. In contrast to this, Saudi Arabia, Malaysia, United Arab Emirates, Thailand and Taiwan have the smallest SDI. Klein-formula PDI is an indicator of the region’s presence in the world as either an importer or investor. Canada, Austria, Germany, Norway and United Kingdom have the largest Klein-formula PDI while Saudi Arabia, Malaysia, Taiwan, Russia and China’s PDI are the smallest among the big players. The economic regions with the largest Klein-formula SDI, such as United States, China, Germany, United Kingdom and France, are supposed to be the final destination of the surplus funds. In contrast to this, United Arab Emirates, Thailand, Hong Kong, Turkey and Poland have the smallest SDI. Unlike PDI, the Stone-formula and Klein-formula SDI are highly correlated. The economic regions with highest SDI are considered to be the financial centers of the world.

5. Concluding Remarks

This paper is meant to be an attempt to tentatively make the international flow of funds accounts using the available data. The from-whom-to-whom matrix consists of 242 economic regions, and covers the goods and services account, the primary income account, and FDI and portfolio investment portion of the financial account of the balance of payments statistics. Therefore, the balance of payments include not only deposits and reserves, which is considered to be the main components of the ‘balance of payments’ but also what should be dealt in the secondary income and capital accounts. Although in most economic regions the latter two accounts are negligible, it will be desirable if the international organizations supply from-whom-to-whom matrices that covers the two remaining accounts. Another problem is that there are so many missing entries in the metadata of the investment statistics. The enhancement of balance of payments statistics in the from-whom-to-whom format and accompanying analytical tools will surely promote the better understanding of the flow of funds at the global perspective.

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Table: From-whom-to-whom balance-of-payments matrix for 2012 (million US dollars, top 30 payers and recipients)