

**Unclassified**

**STD/CSTAT/WPNA(2008)24**

Organisation de Coopération et de Développement Économiques  
Organisation for Economic Co-operation and Development

**03-Oct-2008**

**English - Or. English**

**STATISTICS DIRECTORATE  
COMMITTEE ON STATISTICS**

**Working Party on National Accounts**

**MEASUREMENT ERROR AND BALANCING IN THE SNA**

**CAPITAL AND FINANCIAL ACCOUNT**

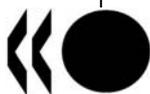
**To be held on 14-16 October 2008  
Tour Europe, Paris la Défense  
Beginning at 9:00 a.m. on the first day**

*This document has been prepared by Patrick O'Hagan, Statistics Canada, and will be presented under item 6 of the draft agenda*

For further information please contact:  
Patrick O'Hagan  
Patrick.O'Hagan@statcan.gc.ca

**JT03251950**

Document complet disponible sur OLIS dans son format d'origine  
Complete document available on OLIS in its original format



**STD/CSTAT/WPNA(2008)24  
Unclassified**

**English - Or. English**

## MEASUREMENT ERROR AND BALANCING IN THE SNA

### *CAPITAL AND FINANCIAL ACCOUNT*

#### I. The Measurement error issue

1. International standards for national accounting — **SNA93**, as well as the forthcoming **SNA08** — present a complete and conceptually sound model for classifying and measuring macroeconomic activity and positions. However, for the most part, this model does not explicitly deal with measurement error in its economic and financial activity framework. In practice, macroeconomic estimates of GDP, balance of payments, saving-investment, sector account flows and financial instrument transactions/positions are measured with error. In most cases, statistical errors or discrepancies are a standard part of country SNA component accounts. However, statisticians in the various OECD countries handle measurement error in different ways.

2. For countries that produce and combine their *Financial Account* and *Capital Account*, there are two specific types of errors – sector measurement errors and category-instrument measurement errors. The integrated nature of these errors in the *Capital and Financial Account (CFA)*, or *Flow of Funds Account (FFA)* creates additional challenges for compilers. In addition, these errors are related to any aggregate discrepancy between income-based and expenditure based GDP.

3. The topic of balancing the **CFA-FFA**, or dealing with sector measurement error, has come up in discussion at the last two WPFS-WPFA meetings. It was decided, following last year's meeting, to have a panel discussion on the issues and challenges in balancing this SNA component account. This is a background note that focuses on the structure and related issues as well as the approach in the Canadian context.

#### II. Financial Account framework

##### *Asset-liability transactions' instrument error*

4. A large number of OECD countries produce a *Financial Account (FA)*. In short, this account is a time series matrix of net transactions in financial assets and liabilities organized into institutional sectors<sup>1</sup>. The balance of financial transactions for each of the institutional sectors of the economy is a measure of net lending or borrowing (sometimes referred to as net financial investment).

5. In the *Financial Account*, the sum of all asset financial transactions (by instrument) must equal the sum of all transactions in liabilities (by instrument). Imbalances are essentially financial instrument discrepancies, or instrument measurement error. These can arise due to differences in the quality of data by instrument and by sector. Data sources may be such that it becomes difficult to set a control total on either side of the matrix. If this is the case, compilers may chose to adjust assets or liabilities and/or they may opt to let the sum of sectors' asset-side and liability transactions differ, by using an instrument discrepancy entry to balance. The instrument discrepancy will show up in the **discrepancy column** in the

---

<sup>1</sup> This is essentially a rough *to-whom from-whom* matrix, with the level of such detail produced varying by country.

FA matrix. The **discrepancy column** (Table 1, column 7) is sometimes referred to more generally as the **un-allocable sector**, though this construct is not an institutional sector.

6. Imbalances by financial instrument can include:

- Different sources or approaches to measurement and/or valuations between the asset side (e.g., balance sheet changes for securities) and the liability side (e.g., debt inventory system for securities);
- Breaks in the series due to significant source data changes (e.g., new survey, survey re-design);
- Different definitions for instruments between the asset side and liability side, where one side is presented gross (e.g., of float for deposits) and the other side is presented net (e.g., of deposit items in transit).

7. In fact, since OECD tables currently measure only financial assets and liabilities and associated financial transactions, the issue of measurement errors in this environment was an issue for the release of the countries' *Financial Account*. The OECD Statistics Directorate recently introduced a **discrepancy column** (un-allocable sector) and a matrix total column in OECD tables, at the recommendation of the WPFS. This allowed for a transparent accounting of any country's explicit financial asset-liability category-instrument error.

8. In Canada, explicit instrument discrepancies are not a significant element of the *Financial Account (FA)* portion of the **FFA-CFA**. The reason for this is that the **FA** matrix is compiled using a control total for financial instruments, either on the asset or liability side. The control total for each instrument, whether on the asset side or the liability side, is determined by an assessment of the quality of the source data and accuracy of the published data. This assessment is not as subjective as it may appear. For example with deposits, we begin with a control total deposit liabilities from the deposit-taking institutions, which are dominated by the chartered banks. This total, along with "from whom" supplementary reporting schedules allows us to assign liability-matching deposit assets to the sectors of the economy.

### III. The Flow of Funds Account framework

9. In some OECD countries, including Canada, the *Financial Account* is part of a larger integrated database which includes the *Capital Account*. These accounts together comprise the *Capital and Financial Account (CFA)*. This is interchangeably referred to as the *Flow of Funds Account (FFA)*. The **CFA-FFA** is an accumulation account which displays the transactions-based changes in wealth by portraying financial activity in the context of the sources and uses of funds for the sectors of the economy.

10. The **CFA-FFA** is typically organized as a three-dimensional matrix, similar to the *Financial Account (FA)*, discussed above. One dimension articulates the sectors of the economy, and the matrix has an economy-wide coverage of institutional sectors. Another dimension displays the categories-instruments. In contrast to the **FA**, these cover all transaction-based accumulations including saving and capital transfers, non-financial capital acquisition as well as substantial detail on financial transactions by asset and liability types. The third dimension is time, such that time series can be produced for any institutional sector as well as for any non-financial category or financial instrument.

11. The organization of macro-economic and macro-financial statistics into a matrix requires the use of constraints or a set of balancing identities. These balancing identities can themselves be relevant economic indicators, such as the net lending/borrowing (surplus/deficit) of government or the net financial

investment of households. These identities can also give rise to imbalances or statistical discrepancies in the CFA-FFA system.

### ***Capital and Financial Account sector measurement error***

#### *Instrument measurement error or discrepancies*

12. Instrument errors in the **Financial Account** are also part of the larger CFA-FFA system. As such, instrument measurement error figures prominently into the balancing of the sectoral sources and uses of funds.

#### *Sector measurement error or discrepancies*

13. Countries that produce the CFA-FFA have to contend with sector measurement error. In Canada, this is the most significant dimension to measurement error. Generally speaking, sector errors arise due to the fact the sources and uses of funds do not necessarily line up in certain sectors of the economy. When this occurs, the sector net lending/borrowing (surplus/deficit) balance of the **Capital Account** cannot be fully reconciled to that of the **Financial Account**. The difference is measurement error, and is often referred to as **discrepancy**, (or sector discrepancy).

14. The measurement error in the institutional sectors of the economy largely reflect the fact that sector incomes, outlays, capital expenditures and financial transactions are compiled from a wide variety of surveys and other source data. As a result, it is not possible to construct a fully consistent set of sector account flows. Note the resulting differences (Table 1 rows 5 and 7) in the net lending and borrowing estimates from the **Capital Account** (NLBCA) and **Financial Account** (NLBFA). In this generic example, the measurement errors for each sector are reflected in the **discrepancy category** (Table 1, line 16).

#### *Saving-investment discrepancy*

15. The **Capital Account** includes the national accounts' saving and investment flows for the sectors of the economy. At the matrix total level, aggregate saving must equal aggregate investment; however, it typically does not. This measurement error largely arises due to the fact that different sources of data<sup>2</sup> are used for the components of income-based GDP and expenditure-based GDP. The gap, or discrepancy, between aggregate saving and investment might be brought into balance by either allocating it one side of the account or by apportioning it to either side of the account using some set of rules or process.

16. In Canada, the saving-investment discrepancy is allocated by adding  $\frac{1}{2}$  of the difference to the lower of saving or investment and subtracting  $\frac{1}{2}$  of the difference from the higher of saving or investment<sup>3</sup>. This difference between the two measures is allocated to the **discrepancy column**, as adjustments to the saving-investment categories (Table 1, column 7), in order to close the CFA-FFA matrix. As noted above, any financial instrument imbalances will also be reflected in this column. Notably, the balance in this column (Table 1, bottom row, column 7) yields a second type of sector error – one which cannot be allocated to the institutional sectors. The sector errors therefore include the balance of the saving-investment discrepancy that remains unallocated to the income-expenditure categories in the sectors of the economy.

<sup>2</sup> For example, enterprise-based survey data, establishment-based survey data, household survey data, administrative data, etc.

<sup>3</sup> This saving investment gap reflects the measurement error between GDP income-based and GDP expenditure-based.

### Summary of CFA-FFA sector errors

17. Generally speaking and for Canada, the sum of the discrepancy row plus the discrepancy column account for all of the measurement error in the closed matrix. For the sum of all sectors, including the Rest of the World (ROW), all errors sum to zero (Table 1, bottom row, column 8).

**Table 1. Flow-of-Funds Account (Capital and Financial Account)**

Sectors/ categories	FIN CORPS	NONFIN CORPS	GOVT	HH+NPISH	ROW	S-I DISCRE- PANCY; INSTRUMENT IMBALANCES	MATRIX TOTAL
<b>CAPITAL ACCOUNT</b>							
1. Saving	5	30	-5	50	15	+5	100
2. Investment	5	50	10	40		-5	100
<i>NLBCA (1-2)</i>	0	-20	-15	10	15	10	0
<b>FINANCIAL ACCOUNT</b>							
<i>NLBCA (3-4)</i>	0	-30	-10	20	20		0
3. Asset flows	150	30	0	80	40		300
A: Deposits	...	...	...	...	...		...
A: Debt	...	...	...	...	...		...
A: Equity	...	...	...	...	...		...
4. Liab. flows	150	60	10	60	20		300
L: Deposits	...	...	...	...	...		...
L: Debt	...	...	...	...	...		...
L: Equity	...	...	...	...	...		...
<b>SECTOR DISCREPANCY</b>	0	10	-5	-10	-5	10	0

18. Instrument measurement errors contain useful information, as they can serve to highlight chronic problems and/or conceptual differences with certain *Financial Account* data<sup>4</sup>. Drift in the discrepancies over time may provide a useful indication of changes in the accuracy of certain data over time, as financial markets and activity evolve. Discrepancies can also help assess the effectiveness of introducing asset-liability control totals for different instruments. Lastly, discrepancies can also help to set objectives in content revisions of survey source data and/or new approaches to obtaining source data

19. Similarly, sector measurement errors contain useful information. For example, fluctuations in their size can relate to significant economic events or source data changes, such as a survey re-design. In addition, trend-cycle movements can shed light on potential bias problems over the course of economic or investment cycles. Lastly, the sign of sector discrepancies indicate whether sources of funds exceed uses of funds, or vice-versa. Such errors can also assist in refining collection vehicles and preparing for historical revisions in terms of identifying data vulnerabilities.

### Interdependence of errors

20. Measurement errors are not independent of each other, as implied by the matrix structure in Table 1. For example, an allocation of the saving-investment discrepancy to the domestic sectors would mitigate sector errors. As another example, the discrepancy in the non-resident sector (BOP net errors and omissions) largely reflects non-matching transactions between non-residents and resident corporations.

<sup>4</sup> This is also the case for the *Financial Balance Sheet Account*

Reducing one of these sector discrepancies with improved data would improve the quality of the other sector.

21. Sector errors are not independent of instrument errors. For example, if borrowing in the form of new bond issues is misstated in one sector, this will give rise to an imbalance of sources and uses of funds for that sector; and, if total issues of bonds are misstated in one sector, this will also give rise to a problem elsewhere in the closed **CFA-FFA** matrix. In particular, bond activity as measured by financial transactions will be misstated. If liability transactions are misstated, financial asset transactions will follow suit. As a result this will give rise to a second sector error elsewhere in the closed matrix, unless an un-allocable sector (discrepancy column) is used to absorb the imbalance. Therefore substituting net issues of bonds from a comprehensive debt inventory system (for non-financial enterprise survey-based data) will likely lead to more accurate estimates of borrowing via this instrument, both in total (improved instrument balance) and for non-financial corporations (improved sector balance).

***Digression: Link to the Balance Sheet Account***

22. Notably, the **CFA-FFA** sector flow errors (discussed above) exist at a point in time. As a result, they are not cumulative and are not explicitly carried over to the **Balance Sheet Account (BSA)**. This implies that, in reconciling stocks and flows in the **Other Changes in Assets Account (OCAA)**, any sector measurement errors should be articulated. However, as mentioned above, measurement error is not featured in the international standards.

23. As with most countries, the Canadian **BSA** matrix does not contain explicit sector errors, even though the absence of measurement error in the wealth accounts is unlikely. This means that any measurement error falls into sector estimates of net worth.

**IV. Balancing Methodology**

***General remarks***

24. Production of the **Capital and Financial Account (CFA-FFA)** in Canada rests with the **Financial and Wealth Accounts (FWA)** staff<sup>5</sup>. Historically, this group has been alternately attached to both the division in charge of the international accounts as well as the division responsible for quarterly GDP.

25. The balancing process for the flow of funds in Canada seeks to produce high quality quarterly estimates which are well integrated with the other components of the quarterly SNA. In the process, a multi-faceted analysis of data series takes place – in relation to income and spending, different segments of financial markets (including supply-disposition of funds), and current economic indicators. Notably, each quarterly SNA production process is only two weeks in length; and, the core SNA transaction accounts (including the 30 sector **CFA-FFA**) are released about 60 days after the close of the reference period.

26. High-frequency and accurate source data are essential in producing the **CFA-FFA**. Measurement error arises largely from issues with source data – lack of data, inconsistent data, timing issues in the data, unusual transactions only partially accounted for, etc. FWA analysts need to understand the source data for which they are responsible, in order to facilitate the balancing of the accounts. Combined with this pre-requisite is the necessity of the knowledge of data shortcomings and special economic/financial events and/or institutional changes (e.g., regulatory changes) that can affect the data.

---

<sup>5</sup> As the name suggests, this group is responsible for both the **Flow of Funds Account** and the companion quarterly **Balance Sheet Account**.

27. In Canada, we take advantage of the sequence of accounts in building the **CFA-FFA**. The integration of the accounts is an important consideration in the balancing process, so as to be able produce a complete and consistent picture of economic and financial activity in the period. The points above speak to the need for data confrontation by experienced analysts, as well as to the necessity for close co-operation among the statisticians responsible for the various components of the quarterly SNA.

### *Summary Process*

28. The latter point underlines the need for effective communication within the FWA group as well as with colleagues working on the other SNA components. During a typical production process, each area of the quarterly SNA components has at least 2 production meetings, which are usually attended by team members from other SNA areas. In addition, there is daily dialogue across the SNA areas on the treatment of particularly large transactions as well as how to resolve other issues specific to the current quarter. This dialogue also encompasses data suppliers from outside the SNA (e.g., survey areas at Statistics Canada). These steps work to ensure coherent quarterly SNA estimates. Lastly, in Canada, senior SNA managers (divisional directors) are typically involved in data production and, as such, are well briefed on issues and progress as the quarter progresses.

29. More specifically, the FWA staff connects with their colleagues in the balance of payments. As well, they work very closely with staff involved in the production of quarterly GDP estimates, which include sector incomes, outlays and capital transactions. In addition, they review source data carefully and contact survey areas with respect to any unexplained irregularities in the data. The latter can result in various approaches to resolving issues which can include, for example:

- review of imputation results and impact for the non-sampled portion of non-financial enterprises; or,
- Contact with a survey respondent for clarification.

It should be noted that data are also referenced against selected financial indicators (some compiled by the Bank of Canada), such as data on exchange rates, interest rates and share prices.

30. Improved and more complete source data arrive, and adjustments may be made to the data as part of the analysis process, as the production cycle unfolds. When all analysis has been completed, near the end of the work cycle, there is sometimes a need to make some final adjustments to the data for mis-stated transactions – the essence of measurement error. Even at this stage, any adjustments are based on knowledge of the shortcomings of the data in the current period, and sector errors are reviewed in concert with each other. In other words, final adjustments are based on an assessment of the state of the data – a subjective-objective approach.

31. One other point is worth noting, before proceeding further. The process described below relies heavily on efficient software programs and systems in order to function smoothly. In Canada, the **CFA-FFA** is compiled using FAME (since 1993). FAME is flexible and handles large files rapidly, with an average turnaround for an update of the matrix of one minute<sup>6</sup>. FAME also has the advantage of a wide range of analytical functionality.

### *Sources of data*

32. Data for the *Capital and Financial Account (CFA)* or *Flow-of Funds Account (FFA)* arise from a large number of different sources, including: Survey data, administrative data; databases of

---

<sup>6</sup> Longer when seasonally-adjusted data are included.

securities, national accounts series; as well as a supplementary set of economic-financial indicators. These are briefly described below, organized by the major institutional sectors in the economy.

#### *Saving-investment estimates*

33. For the 4 main sectors of the economy – governments, corporations, non-residents and households – saving, capital consumption allowances, capital transfers, capital investment, and inventory changes are provided by the staff that compiles the components of quarterly GDP in the Income and Expenditure Accounts Division<sup>7</sup>. Estimates of flows of existing assets (including land) are compiled by FWA staff, using various sources of data (e.g., new housing sales including-excluding land) and information about significant sales of assets from one sector to another. In the corporate sector, the sectoring of the capital account estimates into the 20 institutional sub-sectors of the CFA-FFA is also undertaken by FWA staff.

#### *Government sector*

34. The government sector is comprised of federal, provincial (including, health and education sub-sectors) local governments, and social security funds. Data are largely balance sheet based, supplemented by transactions data. Basic information is largely drawn from the (annual) audited public accounts and (higher frequency) administrative records. In addition there is some survey-based information for local governments. Most of the source data are supplied by Public Institutions Division, which is part of the SNA branch. Source data are supplemented by a debt inventory system, the most comprehensive of which in the SNA branch is compiled in the balance of payments area. Data on federal government debt are routinely cross-checked against those of the Bank of Canada.

35. While the compilation of government sector data seems relatively straightforward, there have been many changes in recent years. Governments alter their structures on a regular basis, creating or disposing of government business enterprises or converting special funds and agencies into government business enterprises (or vice-versa). They can also have significant shifts in assets and liabilities from engaging in special transactions with their enterprises (e.g., assuming the debt of enterprises). Governments can decide to alter the asset composition of special funds (e.g., allowing certain funds to hold marketable securities), but an adequate source of data may take some time to develop. In addition, certain revenue and expenditure components related to the surplus-deficit balance from source data are adjusted to meet SNA concepts, and it is essential that FWA compilers make the corresponding adjustments. The latter can be challenging when the government engages in some new type of activity (e.g., spectrum licenses).

36. Many of these adjustments are related to the fact that, historically, accounting in the public sector has been on a cash basis, whereas, that of the national accounts is more on an accrual basis. However, more recently governments have moved towards a full accrual basis in their financial statements. This has had the effect of going farther than the Canadian SNA can accommodate, short of a historical revision. This has also included certain things that are out-of-scope for the SNA (environmental clean-up provisions). The challenge of producing real and financial activity in the face of changing government reporting can pose significant challenges.

#### *Corporate sector*

37. The corporate sector includes not only corporations but other types of organizations. The latter includes pension funds, investment funds, and issuers of asset-backed securities. For the most part data are

---

<sup>7</sup> This includes the Balance of Payments Division's current account components.

supplied by the Business and Trade Statistics Field at Statistics Canada, supplemented by social side surveys and external information (e.g., information from umbrella organizations such as the Investment Funds Institute of Canada). Data on government business enterprises are largely survey based and submitted alongside government sector data.

### Non-financial corporations

38. Data are drawn from an enterprise-based survey, covering all non-financial industries. Enterprises are defined as booked-in-Canada complex and simple entities. For each industry, there is a take-all, take-some and take-none stratification of the universe, commonly referred to as a sampled and non-sampled portion. Because of the large number of non-financial corporations, imputations (derived by incorporating tax data benchmarks) can be significant. This factor does not typically adversely affect total (asset and liability) transactions, but imputations can lead to inaccurate estimates of transactions by type of financial instrument. This underlines the need to supplement survey outputs, with counterpart data as well as securities' issues inventories.

39. Financial flows are derived using adjusted balance sheet changes as compiled by the by the data supplying division. Essentially, for assets- liabilities by underlying instrument, a detailed industry-by-industry statement of change in financial position is constructed, by adjusting for items that are not transactions (e.g., capital gains/losses and organizational changes).

40. The challenges faced in non-financial corporations have been related to two issues: Differences in source data and the evolution of businesses. Firstly, the income and expenditure for this sector are constructed from a combination of enterprise and establishment statistics. Therefore, any incoherencies between these sources will be reflected in sector discrepancies. Secondly, business activity is not static. Some of the influences impacting on estimates include the substantial undistributed earnings of corporations over the last 10 years, the increased use of hedging in certain industries, and the impact of actuarial evaluations of defined-benefit pension plans.

### Financial institutions

41. Financial corporations' sub-sectors comprise a wide variety of institutions, including monetary authorities, banks and near-banks, investment dealers, insurance institutions (by type), sales finance companies, investment funds, pension funds, issuers of asset-backed securities, government business enterprises and investment management and holding companies. Estimates are largely constructed from the aforementioned enterprise-based survey, supplemented by other data. Data quality is relatively higher than for non-financial corporations (with the exception of holding companies), as most financial industries have close to universe coverage. As a result, only selected sub-sectors have explicit measurement error, including banks and holding companies. It should be noted that the financial sub-sectors provide the overwhelming proportion of the counterpart data used in other sectors.

42. However, there remain some issues with these data. First, care must be taken with the allocation of saving-investment data across the sub-sectors. Second, the holding company sub-sector is large and data accuracy is low. In particular, the presence of takeover activity in the holding company sector requires regular adjustment to those data. Third, financial institutions have embraced the use of new financial instruments somewhat faster than the statistical system can keep pace. Related to that last point, the growth of securitization activity has created new measurement challenges, faced by most OECD countries. Data on the issuers of asset backed securities are derived from a survey of SPV assets-liabilities (compiled and analyzed by the FWA team), information from debt rating services on issues, and supplemented by an analysis of the changes in the corresponding large lending institutions involved in

securitization. Essentially, financial market activity and credit market debt are not as straightforward to compile now as they were in the past, as securitization has expanded and evolved.

#### *Non-resident sector*

43. The non-resident sector is supplied by the Balance of Payments Division of the SNA branch. Balance of payments data – both the current and the capital-financial account – are, by nature, challenging data to compile. The universe of transactors is very different than in the other sectors, in that they are a non-homogeneous group. As a result, BOP estimates are pieced together using a variety of different and largely unrelated sets of data for its main components – trade in goods and services, investment income, transfers, direct investment estimates, portfolio investment flows, banking transactions and the activities of monetary authorities<sup>8</sup>. In addition, the patterns of international trade and finance continue to evolve rapidly, in response to worldwide consolidation of production and financial events.

44. The non-resident sector measurement error (*BOP Net errors and omissions*) is, on average, larger than errors in other sectors in many/most quarters. Given the inter-related nature of the sector errors, this fact affects the balancing of the matrix. In particular, given that most transactions of non-residents are with resident corporations, there has been a tendency to increase the corporate sector measurement error (in absolute terms) in order to accommodate the non-resident sector error in the closed matrix system. This has led to a medium term data quality project to better link the BOP with the **CFA-FFA**, by developing a more comprehensive set of current indicators that will look at further leveraging domestic sources of information as well as a more detailed assessment of country counterpart data.

#### *Persons and unincorporated business sector*

45. The last sector to be discussed is the household sector. There is a tendency to describe this sector as being residually-derived, but this paper disagrees with that portrayal. In fact, in Canada, the sector is almost all built from counterpart data or its equivalent.

46. The economic activity of the household sector is compiled from numerous sources of information. The major sources are:

- Labour income which is largely based on a combination of monthly household surveys, establishment-based business administrative payrolls data as well as tax data (with a lag);
- Personal expenditure which is largely compiled from the establishment-based monthly retail trade survey, annual household survey data as well as various other sources.
- Capital expenditure is dominated by housing investment, which is derived from administrative data and surveys.

47. The financial activity of the household sector is compiled from numerous sources of information. Essentially, the bulk of the financial transactions are largely based on counterpart entry data from enterprise-based surveys and administrative/regulatory data for some categories, while other instruments are residually-derived.

48. Supplementary schedules from deposit-taking and lending institutions provide the counterpart data used to construct the bulk of the household sector liability flows (i.e., consumer credit and mortgages) as well as the deposit asset flows. In addition, the net liability transactions of pension funds comprise the pensions' asset flows of the household sector. The flows of the insurance and investment fund net liability are largely allocated to household asset transactions. Non-marketable federal and provincial savings bond

---

<sup>8</sup> A discussion of balance of payments sources, while useful, is too lengthy for this paper.

liabilities can only be the assets of households, and account for the majority of debt securities held by households.

49. Remaining components of debt securities in the household sector are residually-derived, but constitute a very small component of assets and hence asset flow. Corporate equities are also residually-derived but, given the quality of this instrument (assets and liabilities) across the sectors of the CFA-FFA matrix, these are considered to be reasonably good estimates. “Other financial assets” are also residually-derived and these contain any data shortcomings elsewhere in the matrix (e.g., any capital gains/losses remaining in the financial transactions for specific instruments, including derivatives).

### ***Balancing the capital and financial account***

50. Three types of tabulations are used in the balancing process:

- The Financial Market Summary Table (FMST), which presents total funds raised (by financial instrument) on credit and equity markets for each of the sectors of the economy;
- the full CFA-FFA matrix with sources and uses of funds for the 30 sectors of the economy (which incorporates the FMST); and,
- the financial instrument/market tables, derived from the matrix, that articulate the borrowing and lending activity in the economy.

At each stage of the balancing process, financial market activity tables are cross-referenced to institutional sector tables.

51. Processing of the data has the typical steps: Compiling initial sector data and checking for series breaks and outliers; consultations with data suppliers; data substitution for specific instruments (e.g., use of debt and equity issues inventories); initial data analysis against economic events, real activity and financial indicators; and, initial assessment of the sectoral balances.

52. From this point, portions of the data are closed in sequence. The sequence is based on descending order of the quality of the data (from highest to lowest), such that the higher quality data are fully leveraged in the construction of the matrix. In this way, the higher quality data are relatively larger contributors to the overall final picture.

53. The FMST is closed first, making use of debt inventory systems equity issues information and counterpart data for loans (from lenders’ supplementary schedules and detail on standard survey forms). However, this exercise has become more difficult in more recent years resulting from securitization. The FMST is then drawn into the overall CFA-FFA matrix, and those totals are set. Next, deposit asset flows by sector are finalized, making use of counterpart data (from deposit-takers’ supplementary schedules and detail on standard survey forms). Following this, the asset side of transactions in securities, which are concentrated in the large institutional investors (e.g., pension and investment funds) are completed, as are most of the financial institutions (the notable exception being holding companies). At the same time, certain aspects of the balance of payments which are finalized (e.g., cross-border investment flows in securities) come into play. Subsequent to this, the government sector is closed, with the final review being that of reconciling the two measures of net lending/borrowing. Based on the preceding, the major financial transactions in the household sector are also closed (borrowing, and investment flows in deposits, pensions, insurance, equities and investment funds).

54. At this point, a good part of the balancing of the CFA-FFA matrix is complete, but what is left can be quite challenging in some quarters. Remaining segments of the matrix to be closed are non-financial corporations, holding companies, parts of banking (linked to the BOP), non-residents and smaller

parts of the household sector. Next, cross-border takeover activity is finalized and the holding company sector is close to final. When the BOP is closed, the non-resident sector and the remaining banking data are close to final. At this point, final adjustments tend to be concentrated on the lower quality financial instruments – most notably, “Other financial assets/liabilities”. FWA staff meets one last time to discuss any final adjustments.

55. **ASIDE:** An absolutely larger GDP and/or BOP error will have an adverse effect in the other sectors<sup>9</sup> in the matrix, given the integrated nature of the SNA. Consultations with GDP analysts on the nature of the problems faced in the quarter provide some light as to which sector(s) to allocate any adjustment(s). BOP statisticians also provide some light as to where the issues were in the quarter, which helps in allocating any adjustments(s) to the corporate sub-sectors (non-financial, banking, etc.).

### *Seasonally-adjusted data*

56. In the Canadian SNA the balancing process takes on an additional dimension, with the production of seasonally-adjusted (SA) financial transactions in the flow-of-funds framework. Seasonal adjustment of these data leads to some degree of smoothing of financial transactions<sup>10</sup>. It does not, however, eliminate significant movements that are a hallmark of financial activity.

57. Financial transactions are complex to seasonally adjust by their very nature, given the high degree of substitutability across instruments. The matrix structure adds a further complication to the process, but this is somewhat offset by the reduction in the dimensions of the matrix in seasonal space. The working level matrix represents a reduction of sectors by two-thirds and a reduction in instrument detail by one-third. The condensed sectors-assets matrix has the advantage of better identification of seasonality; and, the reduced number of instruments partially addresses the aforementioned substitutability problem.

58. Two products are available on an SA basis: First, the data on funds raised in the FMST, which are often linked to final domestic demand; and second, the **CFA-FFA** matrix, which is ultimately compressed to 5 sectors<sup>11</sup> – Households (including unincorporated business), non-financial corporations, financial corporations, governments and non-residents. This allows for the production of complete seasonally-adjusted sector accounts in the SNA – that is, current incomes and outlays, non-financial capital acquisition and financial transactions underlying aggregate economic activity.

59. The seasonal adjustment of the data takes place once the unadjusted **CFA-FFA** matrix is close to final. At this point, the seasonally adjusted FMST is generated. Seasonal factors in the FMST are assessed and sometimes adjusted when they are unstable – say, as the result of unusually large transactions in one instrument or the other. The link to real activity (e.g., consumer credit borrowing to consumer spending detail) is analyzed. The total of financing activity for each sector is also taken into account in the analysis of the individual instruments.

60. When the FMST is closed, the seasonal adjustment of the **CFA-FFA** matrix takes place. The FMST SA estimates are transferred to the SA matrix as control totals for the sector borrowing estimates. Most of the SA FMST series are also initially inserted as counterpart lending entries in the aggregate financial sector. Each sector is then seasonally-adjusted (excluding the FMST borrowing/lending series) and analyzed. The personal sector estimates (except for the borrowing series) are derived (most of them

<sup>9</sup> That is normally the case unless the GDP and BOP errors offset each other.

<sup>10</sup> All series are seasonally-adjusted.

<sup>11</sup> The 30 institutional sectors of the **CFA-FFA** are first reduced to 12 sectors to compile and analyze the seasonally-adjusted data. Then, the sectors are further reduced to the five key ones for purposes of release.

being counter-part entries).<sup>12</sup> Seasonal factors are reviewed and adjustments might be made, by sector across the instruments, to deal with the potential instability of the SA series (seasonal factors) on the one hand and to balance the sectors on the other. It should be noted that if the measurement errors are small in the unadjusted CFA-FFA matrix, there is typically little need to make significant adjustments in the seasonally adjusted data. Problems can occur, however, if a given sector has large back-to-back transactions or same-sign discrepancies.

61. As a last step, a final detailed graphical analysis (unadjusted versus SA data) is undertaken for sector totals and key instruments to review the seasonally adjusted series and to detect the presence of any important imbalances in sectors and across financial instruments.

## V. Final remarks

### *Summary*

62. The production of quarterly *Capital and Financial Account*, or *Flow of Funds Account*, estimates is not a simple undertaking. The matrix structure and dimensions of the matrix make this exercise complex. Data sources are varied, and of uneven quality, and are ideally supplemented by other indicators and considerable analysis. In Canada, the latter also involves extensive consultations with data suppliers and counterparts in the other areas of the SNA. Knowledge and experience of staff, therefore, play a fundamental role in balancing the accounts.

63. At the end of the process described above, the quarterly production cycle is not quite complete in Canada. As the CFA-FFA is released, work on the quarterly *Balance Sheet Account (BSA)* begins. The BSA is compiled and released about 75 days after the end of the reference period. Much of the same analysis is undertaken, with the additional emphasis being on stock-flow analysis (e.g., revaluations).

### *Experience in other countries*

64. It would be useful to better understand the practices employed in other OECD countries. The process described above for Canada likely varies from one country to another, as a function of the relative strengths and weaknesses of various components of source data. Canada may also put more emphasis on integration of data in the national accounts than might be the case in countries where the *Flow of Funds Account* or *Financial Account* is compiled at a different agency than GDP and/or international accounts.

### *Ongoing challenges*

65. Regardless of where the financial statistics production and development work is housed, the evolution of economic and financial activity will continue to present challenges for compilers. It is likely fair to say that counterpart data and securities' databases will likely continue to play an increasing role in the future development and improvement of CFA-FFA estimates.

66. A further challenge, given the current tightness of labour market, is the current need to replenish retiring and rotating staff with individuals that are well versed in accounting-finance, and have at least a basic understanding of national accounts and the operations of financial markets.

---

<sup>12</sup> These are compared to the directly seasonally-adjusted household sector estimates.