

2 Data

2.1 Preliminaries on National Annual Sectoral Accounts (NASA) Data

The European System of Accounts¹ as laid down in Eurostat (2013) provides a consistent framework to compile annual data on

1. Assets, liabilities, net worth;
2. Financial and non-financial transactions of and between all agents;
3. In the disaggregation necessary for our model;
4. for all EU countries, 1995-2014.

The datasets are constructed for Austria by Statistik Austria (non-financial transactions, government sector) and the Austrian National bank (financial assets and liabilities, financial transactions, revaluation account). They relate to the annual nominal flows between and stocks of different assets/liabilities held by so-called “institutional units” (sectors of the economy), for different years, economic activities, and regarding different asset classes.

The major **institutional units** are as following, Eurostat (2013)[chapter 2]:²

1. S1: Total economy
2. S11: Non-financial corporations (NFC)
3. S12: Financial corporations (FC)
4. S13: General government (Govt)
5. S14: Households
6. S15: Non-profit institutions serving households (NPISH)³
7. S2: Rest of World (Row)

In our model aggregation, 3. financial corporations will be disaggregated into sub-units due to the focus of the SFC model on the financial side of the economy (see section 2.2.1), while 5. households and 6. NPISH are aggregated in one household sector.

Essentially, there are five **main data sets** provided by Eurostat that form the basis of our model dataset:

A. Balance sheet (BS) data for all agents, 1995 - 2014: These data document the yearly stocks of assets and liabilities for the institutional units. They are valued at market prices. The creation of a financial asset by one agent is always accompanied by the assumption of a respective liability by another agent, thus the sum over financial assets and liabilities of one asset class is always zero. Agents’ net worth is the residual (balancing item) on the liabilities side of the

¹The reader already familiar with NASA data may choose to skip this introductory chapter.

²Similar to Input-Output tables, each digit signifies a sub-grouping of an existing group. For example, S11 is as subgroup of S1.

³NPISHs are private legal entities which serve households and which are private non-market producers, see Eurostat (2013)[pp. 46]. Their principal source of revenue are voluntary contributions by households in cash or in kind, from payments by the government and from property income. The main kinds of entities included in this sector are trade unions, professional or learned societies, consumers’ associations, political parties, churches and other religious societies, as well as charities, aid and relief organisations.

balance sheet. The differences in the amount of assets and liabilities held between balance sheets of different years give us information on the necessary adding up requirements that we have to meet with the annual flow data from sectoral accounts to replicate these year-to-year differences of the balance sheets. The following major asset classes are considered in NASA data:

1. F1: Monetary gold and special drawing rights (SDRs)
2. F2: Currency and deposits
3. F3: Debt Securities
4. F4: Loans
5. F5: Equity and investment fund share units
6. F6: Insurance, pension and standardised guarantee schemes
7. F7: Financial derivatives and employee stock options
8. F8: Other accounts receivable/payable

Balance sheet data can either be given in consolidated or non-consolidated form, i.e. showing net or gross positions by sector. Generally, in NASA data asset positions are obtained gross, and we stick to this form since it reveals the interrelations of debt in this economy that are of major interest for a SFC model. The interested reader is referred to Eurostat (2013)[Chapter 5] for further detail. We will set the assets in our model aggregation, and refer to the definitions of these asset classes shortly in section 2.2.2.

B. Non-financial transactions (NFTR), 1995 - 2014: comprise transactions in products and non-produced assets, as well as distributive transactions.

As defined in Eurostat (2013)[Chapter 3], **transactions in products and non-produced assets** are all products and services created in Austria by the inputs of labour, capital, as well as goods and services to produce outputs of goods and services. Supplies of products are valued at basic prices, i.e. net of taxes and subsidies as well as transport charges and holding gains. Uses are recorded at purchaser's prices, including the latter surcharges. They are either resources or uses of funds.

The main categories of transactions are distinguished as follows (resources and uses):

1. P.1: Output (resource)
2. P.2: Intermediate consumption (use)
3. P.3: Final consumption expenditure (use)
4. P.4: Actual final consumption (use)
5. P.5: Gross capital formation (use in capital account)
6. P.6: Exports of goods and services (use)
7. P.7: Imports of goods and services (resource)

Distributive transactions are transactions whereby the value added generated by production is distributed to labour, capital and government, as well as transactions redistributing income and wealth, Eurostat (2013)[chapter 4]. They are at the same time sources of funds for some agents, and a corresponding use for other agents as recorded in the transaction flow matrix, see section 2.2.1. Distributive transactions include:

1. D1: Compensation of employees

2. D2: Taxes on production and imports
3. D3: Subsidies
4. D4: Property income
5. D5: Current taxes on income, wealth, etc.
6. D6: Social contributions and benefits
7. D7: Other current transfers
8. D8: Adjustments for the change in pension entitlements
9. D9: Capital transfers

The challenge is to create a stock-flow consistent transaction flow matrix from these accounts, since in the production account, sources of funds are generally not recorded as uses of funds for other agents, unlike in the distributive transactions account.

C. Financial Transactions (FTR), 1995 - 2014 Financial transactions between institutional units record the (Eurostat, 2013)[chapter 5]:

1. Simultaneous creation or liquidation of a financial asset and the counterpart liability, or a
2. Change in the ownership of a financial asset, or
3. The assumption of a financial liability.

They are classified in the same categories as financial assets/liabilities described above.

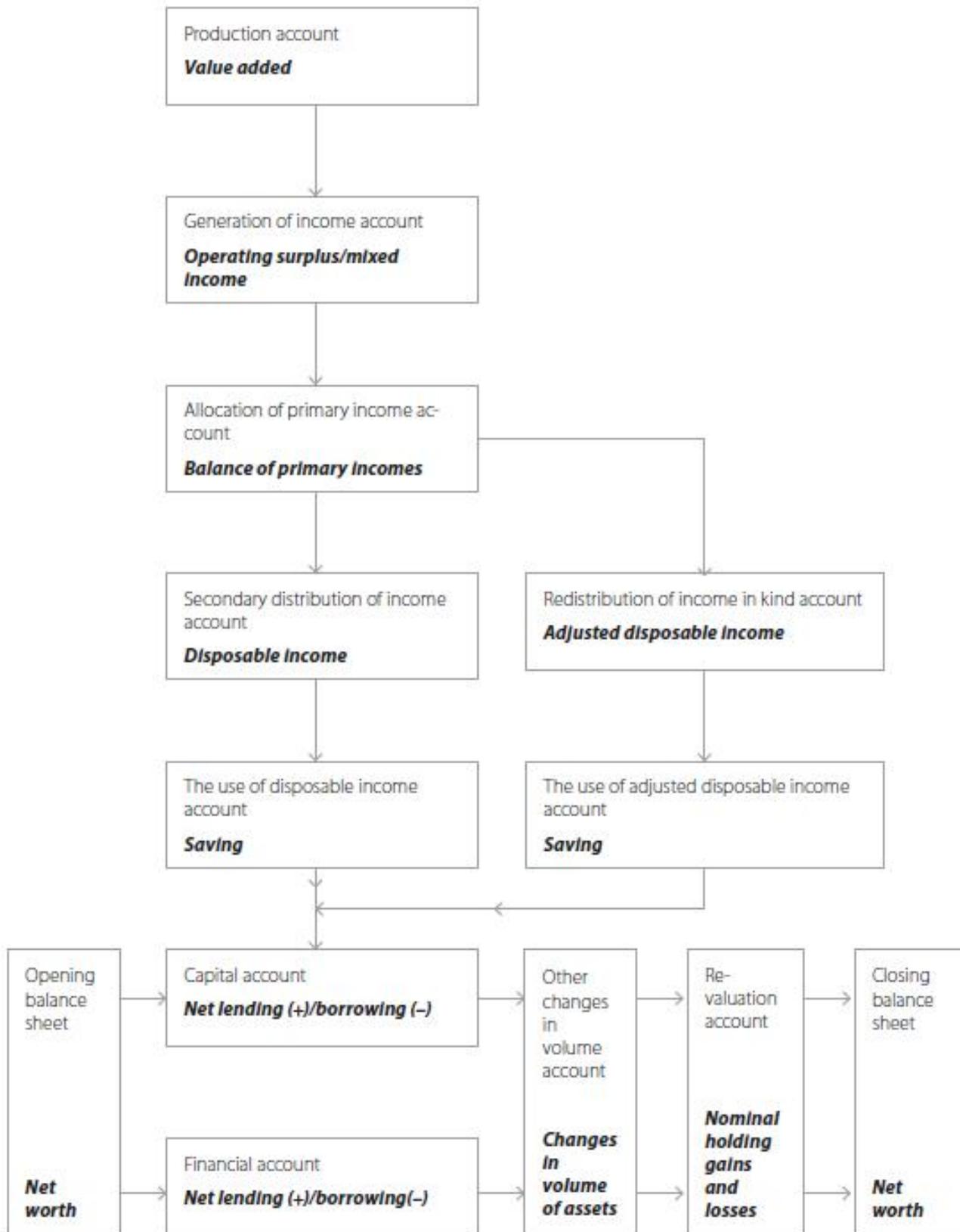
D. Revaluation (REV) and F. other changes in volume (FOC) accounts, 2012 - 2014

These accounts show

1. the revaluation effects resulting from price changes for financial assets and liabilities, as well as
2. Other changes in volume resulting from events not part of the economy (e.g. catastrophic losses) or other financial losses (e.g. write-offs of debt due to default, currency losses).

Since the REV and FOC accounts are available only for a shorter time period than balance sheets (only from the year 2012 onwards) from Eurostat data sources than non-financial and financial transactions data, we have to compensate for this fact in our modelling procedure, see section 2.2.3.

Figure 1: The Sequence of Accounts as in ESA 2010



Source: Eurostat (2013)[p. 20]

Remark: For each account, the **balancing item** is given in bold letters.

2.1.1 The Sequence of Accounts

The sequence of accounts, figure 1, is the basic logic of NASA data that has to be reconciled with the stock-flow logic of our SFC model.

This is the core of the ESA 2010 system, see Eurostat (2013)[pp. 18 - 22 (summary); chapter 8 (details)]. The interconnected accounts trace the

1. production, generation, distribution and redistribution of income, as well as the use of this income in the form of final consumption (current accounts), and
2. changes in assets/liabilities and net worth (accumulation accounts).

By adding these economic flows to the opening balance sheet of this period (last period's balance sheet), the closing balance sheet is obtained (this period's balance sheet, the opening balance sheet for next period). Each account has a balancing item, which is obtained by subtracting the total value of one side of an account (expenditures/liabilities) from the other (revenues/assets). One could say that these balancing items carry most of the economic information incorporated in these accounts, and are one of the primary goals in constructing them from begin with.

Current accounts - non-financial transactions The sequence starts at the **production account**. Subtracting inputs in the production process from outputs leaves *value added* as the balancing item. Taking value added forward to the **generation of income account**, compensation for employees (wages) in the production process and taxes to the government due to production are subtracted, leaving the production sector's *operating surplus (mixed income for self-employed)* as the balancing item.

Next, value added - already broken down into wages, taxes and operating surplus/mixed income - is taken forward to the **allocation of primary income account**. Here, factor income is allocated to the receiving sector as opposed to the producing sector. This means that e.g. wages are allocated to the household and rest of world sectors, while operating surplus remains in the producing sector where it was generated. Furthermore, property income flowing in and out of a sector is recorded. The balancing item is then the *balance of primary incomes* flowing into a sector. The **secondary distribution of incomes account** then tracks the redistribution of incomes through transfers. The major instruments of redistribution are government taxes on and social benefits for the household sector. *Disposable income* is the balancing item.

Then, disposable income is carried forward to the **use of disposable income account**, recording final household expenditure, and leaving household *saving* as the balancing item.

In parallel, the **redistribution of income in kind** account is generated, which also records social transfers in kind received by the household sector (primarily health and education services, but also e.g. cultural and recreational services). These social transfers in kind are financed by taxes, social security contributions, other government income (government), and out of donations or property income (NPISHs), and are obtained by the household for free or at non-market prices. Here, these transfers in kind are recorded as income for the household sector. The balancing item is *adjusted disposable income*. In the **use of adjusted disposable income account**, these social benefits in kind are recorded as a *use* of income by households, obtaining again household *saving* as a balancing income, equal to the parallel use of disposable income account.

Accumulation accounts - financial transactions Saving is then carried on to the **capital account**. There, it is used to fund capital formation, recording capital transfers in and out of the sectors. Overspending or underspending on the acquisition of real financial assets leads to either a financial surplus or deficit by a sector. The balancing item is *net lending (+)/net borrowing (-)*. Net lending is to loan out a surplus, net borrowing is to finance a deficit.

The **financial accounts** observe the detailed lending and borrowing of the institutional units in financial assets. Again, *net lending/net borrowing (NLNB)* is the balancing item, this time viewed from the financial side of the economy to see how a surplus was loaned out or how a deficit was financed. In theory, net lending/net borrowing viewed from the real and the financial side should exactly match. In practice, this generally is not the case. Any discrepancy that occurs, however, is due to differences in statistical measuring. For Austrian data, this is especially relevant for the sectors non-financial corporations, financial corporations and rest of world, see figure 2.

Changes in balance sheets In absence of other effects, changes in balance sheets due to transactions in real or financial assets - the capital and financial account, respectively - would enable to calculate changes in holdings of assets and liabilities by sectors and to obtain a closing balance sheet.

However, other changes in volume as well as revaluation effects also determine the value of agents' balance sheet positions at the end of the accounting period. The **other changes in volume account** treats events outside the economy such as catastrophic losses or government seizures, but also financial losses due to default or currency risks. The balancing item is *changes in volume of assets*. The **revaluation account** records price effects that result from a change in market prices for assets or liabilities. The balancing item are *nominal holding gains and losses*. In the context of our SFC model, we refer to these effects as *capital gains/losses*, and they comprise a vital part of our analysis, especially for future work.

Considering financial transactions, other changes in volume as well as revaluation effects, the closing balance sheet is obtained by adding the total changes in assets/liabilities to the opening balance sheet.

2.2 Matrices

2.2.1 Transaction Flow Matrix (TFM)

Table 1 shows the large non-financial transaction flow matrix directly from NASA data.

The first step in constructing this matrix was to achieve flow consistency between sectors in order to attribute a flow as expenditure/receipt for each sector, i.e. paid and received funds have to add to zero for each line. The complication that arises here is that for variables stemming from the production account, i.e. final consumption expenditure (P3), net value added (B1N), gross investment (P51G), change in inventories (P52), acquisition/disposal of valuables (P53), exports (P6), and imports (P7) below, there is no counterpart receiving the flow specified in NASA data. We constructed the matrix below to obtain net lending/net borrowing as specified in the non-financial accounts, to aim for consistency with the financial side of the data (flow of funds and differences between balance sheets), since net lending/net borrowing equals the net acquisition of financial assets/liabilities of a sector.