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Economic analyses and forecasts

Supply and Use Tables and Input-Output Tables 1995-2007 for Belgium
Methodology of Compilation

Luc Avonds, la@plan.be, Geert Bryon, gb@plan.be,

Caroline Hambÿe, ch@plan.be, Bart Hertveldt, bh@plan.be,

Bernhard Michel, bm@plan.be, Bart Van den Cruyce, bv@plan.be

Federal Planning Bureau

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Federal Planning Bureau
Avenue des Arts 47-49, 1000 Bruxelles
Phone : +32-2-5077311
Fax : +32-2-5077373
e-mail : contact@plan.be
http://www.plan.be

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May 2012

Luc Avonds, la@plan.be, Geert Bryon, gb@plan.be,

Caroline Hambÿe, ch@plan.be, Bart Hertveldt, bh@plan.be,

Bernhard Michel, bm@plan.be, Bart Van den Cruyce, bv@plan.be

Abstract – Users of Supply and Use Tables (SUT) and Input-Output Tables (IOT) compiled in different national accounts (NA) vintages face a problem of consistency of their data due to revisions in the NA. This paper describes the methodology that has been followed to compile a consistent time series of Belgian SUT and IOT for the period 1995-2007, in line with the NA published in November 2010.

Abstract – Les utilisateurs de tableaux des emplois et des ressources (TER) et de tableaux entrées-sorties (TES) compilés dans des versions différentes des comptes nationaux (CN), font face à des problèmes de cohérence de leurs données dans le temps, suite aux révisions des CN. Cette étude décrit la méthodologie qui a été suivie pour calculer une série cohérente de TER et de TES pour la période 1995-2007, qui soient compatibles avec les CN publiés en novembre 2010.

Abstract – Bij het gebruik van Aanbod- en Gebruikstabellen (AGT) en Input-Outputtabellen (IOT) die opgemaakt zijn op basis van verschillende versies van de Nationale Rekeningen (NR), ontstaat, als gevolg van herzieningen in de NR, een probleem van coherentie in de tijd. In deze paper wordt de methodologie beschreven die gevolgd werd bij de opmaak van een coherente tijdreeks van AGT en IOT voor de periode 1995-2007, vertrekkend van de NR gepubliceerd in november 2010.

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Executive summary

Users of Supply and Use Tables (SUT) and Input-Output Tables (IOT) compiled in different national accounts (NA) vintages face a problem of consistency of their data due to revisions in the NA. This paper describes the methodology that has been followed to compile a consistent time series of Belgian SUT and IOT for the period 1995-2007, in line with the NA published in November 2010.

As part of the system of national accounts, SUT and IOT provide detailed information about economic flows: they describe production processes, the supply and use of goods and services, and income generated through production. SUT relate products and industries, and therefore constitute the central integration framework for balancing the NA. Symmetric IOT are analytical tables that are derived from SUT; they constitute a useful tool for analysing inter-industry or interdependent product relations.

The Belgian SUT and IOT are currently being compiled based on the methodology of the 1995 European System of Accounts (ESA95). According to the ESA95 transmission programme, current price SUT have to be compiled and delivered to Eurostat annually, and IOT every five years (for the benchmark years ending in 0 and 5). As compiling SUT and IOT is a very demanding task and as NA should be sufficiently stable for the reference year, Eurostat allows a maximum transmission period of 36 months and does not ask for revisions of SUT and IOT. In practice, however, NA can still be subject to major revisions, even after 36 months, giving rise to a problem of consistency when using time series of SUT and IOT.

The updating exercise presented here brings Belgian SUT and IOT in line with the NA published in November 2010, which is the last full version of the NA in NACE Rev.1.1. In particular, the updated tables take into account the major revision of the GDP expenditure approach introduced in the Belgian NA in 2009. The exercise was implemented at the working format disaggregation level of the NA, i.e. with a breakdown into about 130 industries (NACE Rev.1.1) and some 320 products (CPA 2002).

The updated database provides a consistent time series of SUT for Belgium for the years 1995 to 2007, as well as IOT for the benchmark years 1995, 2000, and 2005. More specifically, the following tables have been calculated: SUT at purchasers' and basic prices for the years 1995 to 2007, use tables at basic prices for domestic production and for imports for the years 1995 to 2007, and IOT for 1995, 2000, and 2005. All tables have been compiled at current prices and at constant prices (with base year 2005). Within this list of tables, constant price IOT are a novelty for Belgium.

Synthèse

Les utilisateurs de tableaux des emplois et des ressources (TER) et de tableaux entrées-sorties (TES) compilés dans des versions différentes des comptes nationaux (CN), font face à des problèmes de cohérence de leurs données dans le temps, suite aux révisions des CN. Cette étude décrit la méthodologie qui a été suivie pour calculer une série cohérente de TER et de TES pour la période 1995-2007, qui soient compatibles avec les CN publiés en novembre 2010.

En tant que parties intégrantes du système des CN, les TER et les TES fournissent une description détaillée des flux économiques : ils décrivent les processus de production, les ressources et les emplois des biens et services et les revenus qui sont générés par la production. Les TER relient les produits aux branches d'activité et forment le cadre central d'intégration qui permet l'équilibrage des CN. Les TES symétriques sont des tableaux analytiques dérivés des TER ; ils constituent un outil d'analyse des relations entre branches d'activité et des interdépendances entre catégories de produits.

Les TER et les TES belges sont actuellement élaborés conformément à la méthodologie du Système européen des comptes SEC 1995. Selon le programme de transmission du SEC 1995, les Etats membres sont tenus de transmettre à Eurostat des TER annuels et des TES quinquennaux (pour les années se terminant par 0 et 5). Etant donné que la compilation des TER et des TES constitue un travail de grande ampleur et que les CN doivent être suffisamment stables pour l'année concernée, Eurostat accorde un délai de transmission de maximum 36 mois pour ces tableaux et ne demande pas leur mise à jour. En pratique, cependant, les CN peuvent toujours faire l'objet de révisions approfondies après ce délai de 36 mois, ce qui donne lieu à des problèmes de cohérence lors de l'utilisation de séries temporelles de TER et de TES.

L'exercice de révision qui est présenté dans ce papier rend compatibles les TER et les TES belges avec les CN publiés en novembre 2010, qui représentent la dernière version complète des CN en Nace Rév.1.1. En particulier, les tableaux révisés intègrent la révision occasionnelle de l'optique dépenses du PIB, qui a été introduite en 2009 dans les CN. L'exercice de révision a été réalisé au niveau du format de travail des CN, qui distingue environ 130 branches d'activité (Nace Rév.1.1) et 320 catégories de produits (CPA 2002).

La base de données révisée fournit une série cohérente de TER pour la Belgique pour la période 1995-2007, de même que les TES pour les années de référence 1995, 2000 et 2005. Plus précisément, les tableaux suivants ont été calculés : les TER aux prix d'acquisition et aux prix de base pour les années 1995 à 2007, les tableaux des emplois de la production intérieure et des importations aux prix de base pour les années 1995 à 2007 et les TES des années 1995, 2000 et 2005. L'ensemble de ces tableaux ont été estimés à prix courants et à prix constants (année de base 2005). Des TES à prix constants n'avaient jamais été compilés pour la Belgique auparavant.

Synthese

Bij het gebruik van Aanbod- en Gebruikstabellen (AGT) en Input-Outputtabellen (IOT) die opgemaakt zijn op basis van verschillende versies van de Nationale Rekeningen (NR), ontstaat, als gevolg van herzieningen in de NR, een probleem van coherentie in de tijd. In deze paper wordt de methodologie beschreven die gevolgd werd bij de opmaak van een coherente tijdreeks van AGT en IOT voor de periode 1995-2007, vertrekkend van de NR gepubliceerd in november 2010.

AGT en IOT maken integraal deel uit van het systeem van NR en geven een gedetailleerd beeld van economische stromen: ze beschrijven productieprocessen, het aanbod en het gebruik van goederen en diensten, en inkomens gegenereerd door productie. AGT brengen de relatie tussen producten en bedrijfstakken in kaart; op die manier vormen ze het centrale raamwerk waarbinnen de evenwichten van de NR worden verzekerd. Symmetrische IOT zijn analytische tabellen afgeleid uit de AGT; ze vormen een nuttig instrument voor het analyseren van intersectorale relaties en interdependenties tussen productgroepen.

De Belgische AGT en IOT worden vandaag opgesteld op basis van de methodologie vervat in het Europees Systeem van Rekeningen 1995 (ESR95). Het ESR95-transmissieprogramma verplicht de lidstaten jaarlijkse AGT en vijfjaarlijkse IOT (voor de jaren eindigend op 0 en 5) tegen lopende prijzen op te maken en aan Eurostat te leveren. Aangezien de opmaak van AGT en IOT een zeer data- en arbeidsintensief werk is en NR voldoende stabiel moeten zijn voor het betrokken jaar, staat Eurostat een deadline toe van maximaal 36 maanden na het referentiejaar en worden lidstaten niet verplicht AGT en IOT te herzien. In praktijk echter, kunnen NR, zelfs na 36 maanden, nog grondig herzien worden, wat leidt tot een probleem van coherentie in de tijd bij het gebruik van reeksen van AGT en IOT.

De actualisatie-oefening die hier wordt gepresenteerd, brengt de Belgische AGT en IOT in lijn met de NR van november 2010, die de laatste gedetailleerde versie van de NR is in de NACE Rev.1.1. Concreet betekent dit dat de geactualiseerde tabellen rekening houden met de benchmark-revisie van de bestedingsoptiek van het bbp, die in 2009 in de Belgische NR werd doorgevoerd. De updating werd uitgevoerd op het werkformaat van de NR, namelijk op het niveau van een 130-tal bedrijfstakken (NACE Rev.1.1) en een 320-tal producten (CPA 2002).

De geactualiseerde databank levert een coherente tijdreeks van AGT voor België voor de jaren 1995 tot 2007, alsook IOT voor de sleuteljaren 1995, 2000 en 2005. Meer specifiek werden volgende tabellen berekend: AGT tegen aankoop- en basisprijzen voor de jaren 1995 tot 2007, gebruikstabellen tegen basisprijzen van de binnenlandse productie en de invoer voor de jaren 1995 tot 2007, en IOT voor de jaren 1995, 2000 en 2005. Alle tabellen werden opgesteld tegen lopende en constante (van het jaar 2005) prijzen. IOT tegen constante prijzen werden voor België voorheen nooit opgesteld.

1. General description and scope of the exercise

As part of the system of national accounts, Supply and Use Tables (SUT) and Input-Output Tables (IOT) provide detailed information about economic flows (in monetary terms): they describe production processes, the supply and use of goods and services, and income generated through production. For Belgium, SUT and IOT are currently being compiled according to the 1995 European System of Accounts (ESA95).

SUT relate products and industries, and therefore constitute the central integration framework for balancing the national accounts (NA). The supply of goods and services, i.e. domestic production by industry and imports, is given in the supply table, while the use of goods and services for intermediate consumption by industry and for final use by component (final consumption, gross capital formation and exports) is reported in the use table. The latter also contains the components of value added by industry (compensation of employees, mixed income, gross operating surplus and net taxes on production). Thus, a vertical reading of the use table (combining intermediate consumption and value added components) shows the structure of the production costs by industry.

IOT are analytical tables that are derived from SUT; they constitute a useful tool for analysing inter-industry or interdependent product relations. IOT are symmetric tables: they can either be product-by-product or industry-by-industry tables[1]. In ESA95, compiling product-by-product IOT is promoted. Product-by-product IOT are derived from SUT based on technology assumptions regarding the relationship between outputs and inputs.

According to the ESA95 transmission programme, current price SUT have to be compiled and delivered to Eurostat annually, and IOT every five years (for the benchmark years ending in 0 and 5). As compiling SUT and IOT is a very demanding task and as NA should be sufficiently stable for the reference year, Eurostat allows a maximum transmission period of 36 months and does not ask for revisions of SUT and IOT. In practice, however, NA can still be subject to major revisions, even after 36 months, giving rise to a problem of consistency when using time series of SUT and IOT. To overcome this problem, the database described in this paper provides an updated and consistent time series of current and constant price SUT for Belgium for the years 1995 to 2007, as well as consistent current and constant price IOT for the years 1995, 2000 and 2005.

Within the framework of the EUKLEMS project, the Federal Planning Bureau (FPB) compiled a consistent time series of current and constant price SUT for Belgium for the period 1995-2004 (Avonds et al., 2007). This exercise consisted in adapting officially published SUT to the latest NA (in particular taking into account the benchmark revisions of 2005 and 2006), estimating the missing SUT for 1996 and 1998, disaggregating several industries and products, and deflating the current price SUT.

The time series of SUT compiled as part of the EUKLEMS project has served as starting point for the updating exercise presented in this paper. In the present updating exercise, the time series of SUT has

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[1] In the former, products can be interpreted as homogenous industries, i.e. without secondary production. In the latter, industries are heterogeneous, i.e. with secondary production.

been extended to cover the period from 1995 to 2007. The SUT for the years 1995 to 2004 have been brought in line with the NA published in November 2010[2], which is the last full version of the NA in NACE Rev.1.1. In particular, these tables have been adapted to take into account the major revision of the GDP expenditure approach introduced in the NA in 2009. As for the current price SUT for 2005-2007 published by the National Accounts Institute (NAI) in 2010[3], these tables were already in line with the NA vintage of 2010. Regarding the industry and product breakdown, the tables distinguish about 130 industries (NACE Rev.1.1) and some 320 products (CPA 2002), which is similar to the previous updating exercise.

Further steps consisted in compiling valuation tables to obtain SUT at basic prices, splitting the use tables according to the origin (domestic production or imports) of the goods and services, and deflating the SUT using price indices with base year 2005. Finally, IOT at current and constant prices are derived from the SUT for the benchmark years 1995 and 2000. The IOT for 2005 was already consistent with the NA vintage of 2010.[4]

To sum up, the database that results from this updating exercise contains the following tables:

– Current and constant price SUT at purchasers' and basic prices (1995-2007);

– Current and constant price use tables at basic prices for domestic production and for imports (1995-2007);

– Current and constant price IOT (for benchmark years 1995, 2000 and 2005).

The next chapter gives the reader an idea of the scope of the major NA revision of 2009 that mainly affected final demand. In the remainder of this paper, the methodology underlying the different stages of the updating exercise will be briefly described.

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[2]   See NAI (2010c).
[3]   See NAI (2010a, 2010d).
[4]   See NAI (2010b). With base year 2005, the IOT of 2005 is the same in current and constant prices.

2.   Recent revisions in national accounts

In 2009, the National Accounts Institute (NAI) implemented a benchmark revision of the GDP expenditure approach in the NA[5], which originated from the introduction of new calculation methods and the use of new data sources. All major expenditure components of GDP (household consumption, gross capital formation, exports and imports) were significantly affected by this revision, but the overall impact on the level of GDP remained limited.

Graphs 1 and 2 compare domestic household consumption (P31S14), gross capital formation (P5), exports of goods (P61) and imports of goods (P71) at current prices in the 2008 and 2009 vintages of the national accounts.[6]

The revision of household consumption affected a number of specific COICOP categories (in particular beverages, tobacco, purchase of vehicles and operation of personal transport equipment, health care services, tourism services) and consisted in a realignment of some other broad categories to household budget survey data (food, household equipment, communication equipment and services, recreation and culture, and catering and accommodation services). All in all, about 60% of household consumption was affected by this revision. This revision also improved the coherence between real and financial accounts of households. On average for the years 1995-2007, the absolute value of the difference between pre- and post-revision household consumption in Graph 1 amounts to 0.9%.

Graph 1   NA revision of household consumption and gross capital formation
*In billion euro*

Source: NAI
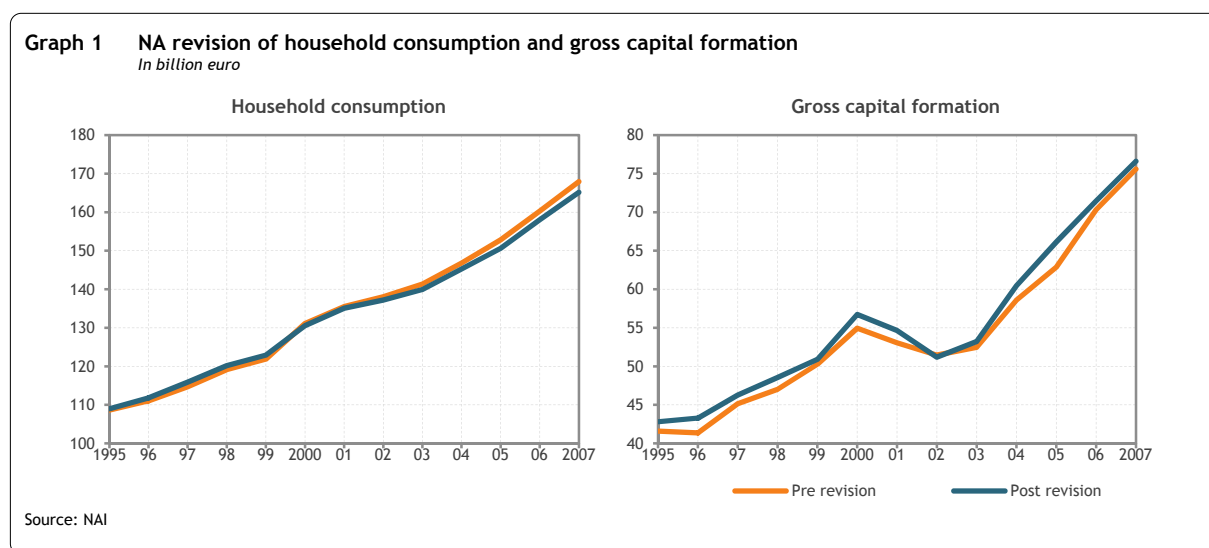
Changes in calculation methods and new data sources have also led to a revision in gross capital formation (both gross fixed capital formation and changes in inventories). It mainly concerned housing investment and sales of capital goods, and, to a lesser extent, investment in a number of specific industries (e.g. health and social work; education; recreational, cultural and sporting activities). All in all, gross capital formation was revised upwards for all years except 2002. In Graph 1, the absolute value of

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[5]   An elaborate description of this revision can be found in: NAI (2009). Previous NA benchmark revisions (the current price revision of 2005 and the constant price revision of 2006) were already introduced in the EUKLEMS database.
[6]   The graphs are based on data taken from NAI (2008) and NAI (2009). The difference between these two vintages is not only the result of the benchmark revision described here, but also of continuous regular revisions.

the difference between pre- and post-revision gross capital formation amounts to 2.6% on average for the years 1995-2007.

Graph 2   NA revision of exports and imports of goods
In billion euro

Source: NAI
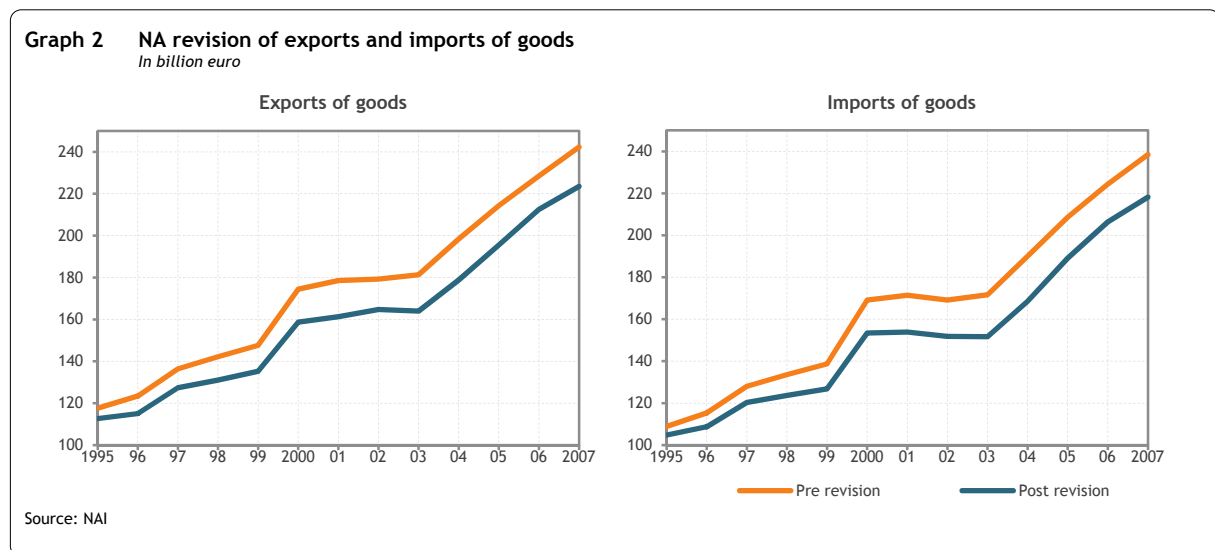
The most important revision concerned exports and imports of goods. It originated from a more rigorous application of the methodology for computing export and import data according to the 'national concept', which is used in the NA.[7] Foreign trade statistics are initially collected according to the 'EU community concept' and then transformed into the 'national concept' by excluding imports and exports of a certain number of non-resident companies. The difference between the two concepts is important for Belgium due to its central location in Europe and the presence of a large logistics infrastructure. The correction used to be underestimated, and therefore, as a result of the revision, exports and imports have been substantially corrected downwards in the NA. On average for the period 1995-2007, the downward revision amounts to 8.0% for exports and 8.5% for imports as shown in Graph 2.

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[7]   Furthermore, export and import deflators were also revised significantly. That revision improved the comparability of Belgian import and export deflators with other countries.

3. Updating Supply and Use Tables

3.1. Current price SUT

Users of time series of SUT compiled in different NA vintages face a problem of consistency of their data, due to NA revisions. The figures for the NA revision described in the previous chapter illustrate that revisions may cause substantial breaks in the data series. In order to overcome this problem, the present updating exercise consists in a revision of the current price SUT for the years 1995 to 2004 so as to respect the NA published in November 2010. This is the last full version of the NA in NACE Rev.1.1. As the current price SUT for 2005-2007 published in 2010 were already in line with this NA vintage, no updating was necessary for these tables.

The updating exercise was implemented at the disaggregation level of the working format of the NA, i.e. with a breakdown into approximately 130 industries (NACE Rev.1.1) and 320 products (CPA 2002). It was based on the following revised NA current price data provided by the National Bank of Belgium (NBB) at this level of disaggregation:

– Data by industry: production (P1), intermediate consumption (P2) and gross value added (B1g) by component (D1: compensation of employees; B2n+B3n: net operating surplus and mixed income; K1: consumption of fixed capital; D29: taxes on production; D39: subsidies on production);

– Data by product: final demand by component (P31S14: final consumption expenditure of house-holds; P31S15: final consumption expenditure of NPISH; P3S13: final (individual and collective) consumption expenditure of general government; P51: gross fixed capital formation; P6: exports of goods and services)[8] and imports of goods and services (P7).

These detailed NA data were taken as given and hence entered the update of the SUT for 1995 to 2004 as constraints. This update comprised the following sequential steps:

1. *Updating of the make tables*[9] so that the 2010 NA vintage output totals by industry are respected. For each year, this is done by allocating the changes in the industry totals to all products (including five types of trade margins)[10] based on the product composition of the original make tables. Joining the vectors of revised imports by product results in updated supply tables.

2. *Adapting the product flow equilibria*. Total supply by product is obtained from the updated supply tables, while final demand by product has been provided by the NBB. First estimates of total intermediate consumption by product are obtained as the difference between total supply and total final demand by product. These first estimates have then been assessed individually for each product together with the product flow equilibrium. Where necessary they have been corrected so as to make them consistent over time and to respect certain basic principles, e.g. zero intermediate

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[8] Changes in inventories (P52) by product were mechanically updated by the FPB and aligned to the economy-wide total in the 2010 vintage of the NA.

[9] The make table is the production part of the supply table.

[10] To ensure consistency with the SUT for 2005-2007, transport margins have been set to zero for the years 1995-2004. They have been allocated to the corresponding transport services or to wholesale margins.

consumption for certain products. The product flows were brought back into equilibrium through a balancing process.[11]

3. *Updating the intermediate use matrix*. An updated intermediate use matrix has then been estimated by applying the RAS method based on the structure of the intermediate use matrix before revision. The row and column totals for this RAS were respectively the industry totals of intermediate consumption (provided by the NBB) and product totals of intermediate consumption resulting from the previous step.

The result of this updating exercise are current price SUT at purchasers' prices for the period 1995-2004 that are consistent with the 2010 vintage of the NA. This time series is completed by the tables for 2005-2007 that were already up-to-date.

Use tables at purchasers' prices include margins, taxes and subsidies on products. To obtain use tables at basic prices, valuation tables for margins, taxes and subsidies need to be estimated and subtracted from use tables at purchasers' prices. In practice, these tables are calculated by allocating total margins, taxes and subsidies by product to industries and final demand categories. Valuation tables compatible with the updated SUT in purchasers' prices were compiled as follows:

– For the years 1995-2004, total margins, taxes and subsidies by product were allocated to industries and final demand categories on the basis of their respective shares in the use tables at purchasers' prices computed for the previous updating exercise (see Avonds et al., 2007). Then, manual corrections were made for particular cells where the sum of margins and net taxes on products exceeded the use in purchasers' prices.

– For 2005, valuation tables had already been compiled in the context of the construction of IOT.

– For 2006 and 2007, the valuation tables were calculated according to the same method as for the years 1995-2004, but based on the margin, tax and subsidy shares for 2005.

Finally, these updated valuation tables were used to obtain SUT at basic prices that are consistent with the 2010 vintage of the NA for all years from 1995 to 2007.

A further necessary step, prior to the deflation of the SUT and the derivation of IOT, consisted in separating the use of imported goods and services from the use of domestically produced goods and services. This is done at basic prices. The methodology for calculating use tables for imports, which is applied in IOT benchmark years, is described in Van den Cruyce (2004) for goods and in Hambÿe (2001) for services. Detailed cross-tabulated import data by industry and by product are used in combination with specific assumptions about possible uses of imports. This constituted a substantial improvement with respect to a purely proportional distribution of imports over uses for each product. In the previous updating exercise, the original use tables for imports for the IOT benchmark years 1995 and 2000 have served as the basis for constructing use tables for imports for the years 1995 to 2004. The current updating exercise proceeded as follows:

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[11] In this balancing process, it has, in some cases, been necessary to change some of the detailed NA data provided by the NBB.

– For the years 1995-2004, import shares were calculated from use tables for imports estimated in the context of the previous updating exercise. These were then compared with and aligned to the import shares for 2005 so as to avoid a break in the series between 2004 and 2005. Multiplying the updated use tables at basic prices by these import shares cell by cell yields an estimate of the use table for imports, which was subsequently adapted to respect the import totals by product from the updated current price supply table.

– For 2005, the use table for imports had already been calculated in the context of the construction of IOT.

– For 2006 and 2007, use tables for imports were calculated according to the same method as for the years 1995 to 2004, but based on import shares for 2005.

SUT at current basic prices with a split of uses according to their origin are the basis for calculating constant price SUT as well as for deriving IOT. The latter will be described in Chapter 4. In the next section, the focus is on the deflation exercise.

3.2. Constant price SUT

The basic principles of the deflation in the current exercise are to a large extent the same as in the previous one (Avonds et al., 2007): the deflation is done at basic prices, separate price indices for domestic production and imports – provided by the NBB – are used, and for each product the assumption of an identical price in all uses is made. The base year for the price indices used for deflation is 2005.

A first estimate of SUT at constant basic prices is then obtained by:

– Deflating the make tables and the use tables for domestic production by the price indices for domestic production, and

– Deflating the use tables for imports by the price indices for imports.

The use table at constant prices is then obtained as the sum of the constant price use tables for domestic production and imports.[12]

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[12] Even deflation at basic prices requires a treatment of margins, taxes and subsidies since their totals figure in the use table at basic prices as separate rows. Here, margins, taxes and subsidies have been treated differently compared with the previous exercise. For the base year 2005, margin, tax and subsidy rates have been computed by dividing margins, taxes and subsidies at current prices by uses at current basic prices. These rates were then multiplied for each year with the first estimate for the constant price use table, resulting in constant price valuation tables. These allow to compute not only total margins, taxes and subsidies at constant prices by industry and by final demand category (by summing over the rows) but also use tables at constant purchasers' prices.

SUT at constant prices should respect constant price NA totals. Since the first estimates of the SUT at constant prices are not consistent with constant price NA totals[13], the following sequential adjustments were implemented:

1. Supply tables were adjusted column-wise, proportionally to the NA totals for constant price output by industry and total imports of goods and services.

2. Use tables were adjusted column and row-wise by means of a RAS procedure. Constant price intermediate consumption by industry and final demand by category from the NA were used as column totals, and total supply by product coming from the previously adjusted supply tables were used as row totals.

As a result, the full set of constant price SUT at both basic and purchasers' prices for the years 1995 to 2007 is compatible with constant price totals of the 2010 vintage of the NA.

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[13]   The following constant price NA totals were provided by the NBB: output (P1) and intermediate consumption (P2) by industry, total imports of goods and services (P7), total final consumption expenditure of households (P31S14), total final consumption expenditure of NPISH (P31S15), total final (individual and collective) consumption expenditure of general government (P3S13), total gross fixed capital formation (P51), and total exports of goods and services (P6).

4. Updating Input-Output Tables

4.1. Current price IOT

The next step of this exercise consisted in deriving updated IOT at current prices for the years 1995 and 2000, in accordance with the 2010 vintage of the NA, from the updated current price SUT for these years.[14] The current price IOT for 2005 was already compatible with the 2010 NA vintage.

According to ESA95, symmetric IOT should ideally be nothing more than mathematical derivations of the underlying SUT at basic prices. The ESA95 transmission programme favours product-by-product IOT. In product-by-product IOT, the heterogeneous industries of the SUT are transformed into so-called homogeneous industries. This means that the secondary products[15] of each industry, together with the associated intermediate and primary inputs, have to be transferred to the industries of which they are the characteristic products.

Since the inputs associated with secondary products are not statistically observed, they have to be estimated by means of transformation methods. The two basic extreme transformation methods for compiling product-by-product IOT are:

– Product technology assumption: each product is produced in its own specific way, irrespective of the producing industry;

– Industry technology assumption: each industry has its own specific way of producing, irrespective of its product mix.

In general, product technology has been preferred for the compilation of the Belgian IOT because it is considered as more plausible and better in line with the principles of input-output analysis.

Simple application of product technology generally leads to negatives in the IOT. Computationally, this occurs when the value of an intermediate or primary input of an industry in the use table is smaller than the amount transferred together with the industry's secondary output[16]. The underlying reasons for such negatives can be of many kinds: e.g. incorrectness of the product technology assumption – which does not automatically mean that the alternative extreme assumption (industry technology) would be better – use of basic statistics at the enterprise-level instead of the plant-level[17], and errors in the underlying SUT.

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[14] This method was preferred to adapting the original 1995 and 2000 IOT.

[15] Secondary production is output that, according to the underlying product and activity classifications, is not characteristic for the industry that actually produces it.

[16] In other words: smaller than they should be according to the assumption of product technology.

[17] Which means that intermediate inputs created during a process of vertical integration are not registered.

While small negatives can be handled by mechanical procedures (RAS, Almon), large negatives[18] need to be examined individually. During the compilation process of the original 1995, 2000 and 2005 IOT, the following corrections, based on basic statistical data, were made:

– Correction of errors in the underlying SUT;

– Statistical disaggregations of industries in the underlying SUT: breakdown of industries which are found to be very heterogeneous into more homogeneous industries;

– Analytical disaggregations: exogenous estimations of inputs to be transferred together with secondary outputs.

Updating the 1995 and 2000 IOT generated many large negatives, calling for the same kinds of solutions as those applied to the original IOT. However, applying these solutions would have been a very demanding task, which was considered disproportionate for this exercise. The corrections for the large negatives were therefore limited to updating the analytical disaggregations. The remaining negatives were handled by mechanical procedures. In a few industries, however, the only feasible solution consisted in applying the assumption of industry technology.

The updated current price IOT for the years 1995 and 2000 were then split into IOT for domestic output and for imports, by means of a method proposed in Eurostat (2008). This method consists in deriving IOT for imports from the use table of imports, by using the assumption that the domestic production/import ratio of a particular input of an industry applies to all products for which this input is used by that industry.[19] The IOT for domestic output is calculated as the difference between the total IOT and the IOT for imports.

4.2. Constant price IOT

Finally, and this is a novelty for Belgium, constant price IOT (at prices of 2005) have been calculated for the years 1995 and 2000. The constant price IOT were derived from the constant basic price SUT following the same method as applied for the compilation of the current price IOT. This is the so-called 'indirect' method[20]. Again, the application of the product technology assumption generated many large negatives. Some of the negatives were eliminated by applying analytical disaggregations at constant prices, which means deflating the transferred inputs by means of the appropriate price indices. The remaining negatives were handled either by mechanical procedures or by applying the assumption of industry technology.

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[18] Large negatives can logically only be caused by large secondary outputs. The degree of heterogeneity of Belgian SUT is large since the statistical unit which is used is the enterprise.

[19] This method is based on the idea that an extension of the product technology assumption to the domestic production/imports divide is not realistic.

[20] The alternative would be to directly derive the constant price IOT from the current price IOT.

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