

Jellema, Tjeerd; Keuning, Steven; McAdam, Peter; Mink, Reimund

**Working Paper**

## Developing a euro area accounting matrix: issues and applications

ECB Working Paper, No. 356

**Provided in Cooperation with:**

European Central Bank (ECB)

*Suggested Citation:* Jellema, Tjeerd; Keuning, Steven; McAdam, Peter; Mink, Reimund (2004) : Developing a euro area accounting matrix: issues and applications, ECB Working Paper, No. 356, European Central Bank (ECB), Frankfurt a. M.

This Version is available at:

<https://hdl.handle.net/10419/152790>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



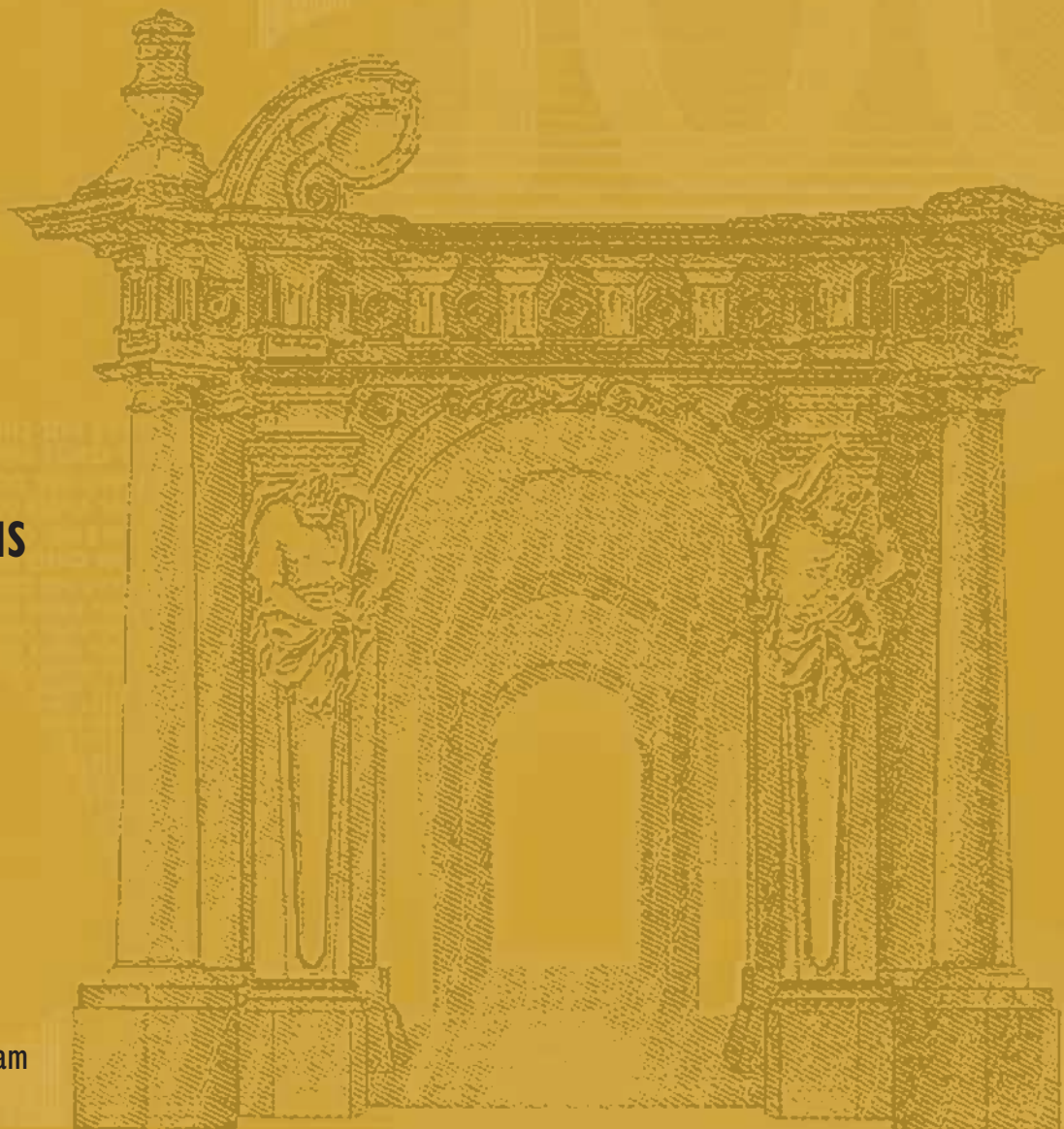
EUROPEAN CENTRAL BANK

**WORKING PAPER SERIES**

**NO. 356 / MAY 2004**

**DEVELOPING A  
EURO AREA  
ACCOUNTING  
MATRIX: ISSUES  
AND APPLICATIONS**

by Tjeerd Jellema,  
Steven Keuning, Peter McAdam  
and Reimund Mink





EUROPEAN CENTRAL BANK



## WORKING PAPER SERIES

NO. 356 / MAY 2004

# DEVELOPING A EURO AREA ACCOUNTING MATRIX: ISSUES AND APPLICATIONS <sup>1</sup>

by Tjeerd Jellema <sup>2</sup>,  
Steven Keuning <sup>3</sup>, Peter McAdam <sup>4</sup>  
and Reimund Mink <sup>5</sup>

In 2004 all publications will carry a motif taken from the €100 banknote.

This paper can be downloaded without charge from <http://www.ecb.int> or from the Social Science Research Network electronic library at [http://ssrn.com/abstract\\_id=533025](http://ssrn.com/abstract_id=533025).

<sup>1</sup> Without implicating, we thank Dieter Gerdesmeier, Celestino Giron, Jérôme Henry, Linda Kezber, Kalle Sijlander and, especially, two anonymous ECB working paper referees and the Editorial Board as well as seminar participants at a conference in honour of Erik Thorbecke at Cornell University, October 2003 for their valuable contributions. The views expressed in this paper are not necessarily those of the ECB.

<sup>2</sup> DG Statistics, European Central Bank, Kaiserstrasse 29, D-60311, Frankfurt am Main, Germany.  
<sup>3</sup> DG Statistics, European Central Bank, Kaiserstrasse 29, D-60311, Frankfurt am Main, Germany.  
<sup>4</sup> DG Research, European Central Bank, Kaiserstrasse 29, D-60311, Frankfurt am Main, Germany.  
<sup>5</sup> DG Statistics, European Central Bank, Kaiserstrasse 29, D-60311, Frankfurt am Main, Germany.

© European Central Bank, 2004

**Address**

Kaiserstrasse 29  
60311 Frankfurt am Main, Germany

**Postal address**

Postfach 16 03 19  
60066 Frankfurt am Main, Germany

**Telephone**

+49 69 1344 0

**Internet**

<http://www.ecb.int>

**Fax**

+49 69 1344 6000

**Telex**

411 144 ecb d

*All rights reserved.*

*Reproduction for educational and non-commercial purposes is permitted provided that the source is acknowledged.*

*The views expressed in this paper do not necessarily reflect those of the European Central Bank.*

*The statement of purpose for the ECB Working Paper Series is available from the ECB website, <http://www.ecb.int>.*

ISSN 1561-0810 (print)  
ISSN 1725-2806 (online)

# CONTENTS

Abstract	4
Non-technical summary	5
1. Introduction	6
2. The EAAM: uses and methodological aspects	7
2.1 Potential uses of euro area accounting matrices	7
2.2 Specific methodological issues when compiling a multi-country accounting matrix	9
3. An EAAM for 1999	11
3.1 Overall structure of the EAAM	11
3.2 Detailed EAAM	15
3.2.1 Supply and use of goods and services	15
3.2.2 Allocation of primary income accounts	17
3.2.3 Secondary distribution of income and use of income	18
3.2.4 The accumulation account due to transactions	19
3.2.5 Discrepancies	20
4. Conclusions	21
References	23
Annex 1: EAAM detailed table	24
Annex 2: EAAM classifications	27
Annex 3: Statistical sources to compile the EAAM	32
Annex 4: EAAM compilation	37
European Central Bank working paper series	50

**Abstract:** An important part of external or policy shocks is transmitted throughout the economy via various channels of transactions. To analyse such channels and to predict the impact of shocks, it is expedient to know who recently exchanged what with whom and for what purpose. The most appropriate format for presenting inter-sectoral linkages at the national level is in a National Accounting Matrix (NAM). A NAM is defined as the presentation of a sequence of integrated accounts and balancing items in a matrix that elaborates the linkages between a supply and use table and institutional sector accounts. This paper compiles the first pilot Euro Area Accounting Matrix (EAAM) and considers its usefulness for the euro area's economic analysis. It also reports on the solution of a number of aggregation and consolidation issues that arise when constructing a multi-country accounting matrix.

**Keywords:** National Accounts, National Accounting Matrix, Euro Area.

**JEL classification:** E00, E19.

## Non Technical Summary

An important part of external or policy shocks is transmitted throughout the economy via various channels of transactions. In order to analyse such channels and to predict the impact of shocks, it is expedient to know who recently exchanged what with whom and for what purpose. The most appropriate format for presenting inter-sectoral linkages at the national level is in a matrix presentation of the system of national accounts.

The European System of Accounts (ESA) 1995 (Eurostat, 1996) puts this as follows: “A matrix presentation permits each transaction to be represented by a single entry and the nature of the transaction to be inferred from its position. Each account is represented by a row and column pair and the convention is followed that resources are shown in the rows and uses are shown in the columns.” In each account, the row total (total incomings) is then by definition equal to the column total (total outgoings) and each cell describes how much the ‘sector’ in the corresponding row received from the ‘sector’ in the corresponding column on the account concerned. A National Accounting Matrix (NAM) is defined as the presentation of a sequence of national accounts and balancing items in a matrix which elaborates the linkages between a supply and use table and institutional sector accounts.

A very useful option of such a presentation of the accounts in a matrix is that different types of actors and groupings thereof can be selected in each account, without giving up the coherence and integration of the complete accounting system. Another advantage of a matrix format is that it is suitable for mathematical treatment using matrix algebra, which is in turn quite expedient for its use in all kinds of analyses and when balancing the accounts.

This paper serves to familiarise readers with the concepts and conventions of a NAM so that they are able to better appreciate the value added such a statistic tool might offer. Secondly, it presents a first, pilot Euro Area Accounting Matrix (EAAM) and considers its usefulness for the euro area’s economic and policy analysis. It also reports on the solution of a number of aggregation and consolidation issues that arise when constructing a multi-country accounting matrix. Finally, the paper serves to stimulate discussion and to initiate further work, because only if EAAMs are compiled with a sufficiently high frequency and with an acceptable delay, they can significantly contribute to the understanding of the euro area economy.

## 1. INTRODUCTION

An important part of external or policy shocks is transmitted throughout the economy via various channels of transactions. In order to analyse such channels and to predict the impact of shocks, it is expedient to know who recently exchanged what with whom and for what purpose. At the macroeconomic level, such an analysis obviously requires considerable aggregation. For that reason, the national accounts are often taken as a starting point. However, whereas conventional national accounts contain much information on production, income, expenditure and financial transactions, they are less well developed when it comes to the inter-sectoral linkages, or, in other words, they lack “from-whom-to-whom” accounts. In view of the intricate relationship between financial and non-financial transactions, the inter-sectoral linkages should ideally be shown in both the financial and the non-financial accounts.

The most expedient format for presenting inter-sectoral linkages is in a matrix. The European System of Accounts (ESA) 1995 (Eurostat, 1996) puts this as follows: “A matrix presentation permits each transaction to be represented by a single entry and the nature of the transaction to be inferred from its position. Each account is represented by a row and column pair and the convention is followed that resources are shown in the rows and uses are shown in the columns.” In each account, the row total (total incomings) is then by definition equal to the column total (total outgoings) and each cell describes how much the ‘sector’ in the corresponding row received from the ‘sector’ in the corresponding column on the account concerned.

National Accounting Matrices (NAM) are defined as the presentation of a sequence of national accounts and balancing items in a matrix which elaborates the linkages between a supply and use table and institutional sector accounts.<sup>1</sup> A very useful option of such a presentation of the accounts in a matrix is that different types of actors and groupings thereof can be selected in each account, without giving up the coherence and integration of the complete accounting system. In other words, in each account a unit (e.g. institutional units, kind-of-activity units, products, financial assets) and a classification of units (e.g. sectors, industries, product groups, financial asset categories) can be selected that are most relevant to the kind of transactions that are depicted in that account (income distribution, production, supply and use of goods and services, financial transactions, etc.). Thus it is not necessary to distinguish a certain subsector in all accounts just because one would like to distinguish this subsector in some accounts. A case in point is the financial corporations sector that should be broken down by subsector in the primary distribution of income and the financial transactions, but can be consolidated in e.g. the secondary distribution of income account. Another advantage of a matrix format is its suitability for mathematical treatment using matrix algebra, which is in turn quite expedient for its use in all kinds of analyses and when balancing the accounts.<sup>2</sup>

This paper considers the usefulness of such a NAM in the framework of the ECB’s monetary policy analysis. Obviously, that requires a euro area instead of a national perspective, which poses particular statistical challenges (e.g. on the split of national balance of payments data into intra- and extra-euro area transactions so that a euro area rest-of-the-world account can be compiled,

---

<sup>1</sup> Cf. Chapter XX (Social Accounting Matrices) of the 1993 System of National Accounts (SNA 93), p.461ff. (United Nations *et al.*, 1993).

<sup>2</sup> See Keuning (1996, 1997) for a more elaborate discussion of the advantages of a matrix presentation and of the estimation of such a matrix in both current and constant prices.



and on the elimination of asymmetries in the bilateral trade statistics) – henceforth, we will speak about a euro area accounting matrix (EAAM). The EAAM has been designed in such a way that it complies with the requirements centred on what is called the monetary transmission mechanism (MTM): how does the ECB’s monetary policy affect the euro area economy; through what channels does policy operate? Monetary policy is transmitted from the “monetary” part of the economy to the “real” part. This view leads to concentrate on the relative importance of the various links between these two parts. This follows earlier work in this area by Thorbecke *et al.* (1992).

The rest of this paper is organised as follows. Section 2 reviews the potential uses and the specific methodological issues raised by the construction of the multi-country EAAM. Section 3 presents a first pilot version of an annual EAAM and also a detailed description of the transactions in order to guide the reader through the matrix presentation of the accounts. Section 4 concludes.<sup>3</sup> The detailed EAAM, the classifications selected, the data sources used and more details on the compilation method of the EAAM are presented in four Annexes at the end of this paper.

## 2. THE EAAM: USES AND METHODOLOGICAL ASPECTS.

The traditional rationale for the compilation of National and Social Accounting Matrices lies with long-run structural issues such as income distribution, tax reform, welfare analysis, etc. (e.g., Thorbecke *et al.* 1992). Nevertheless, the widespread use of integrated systems of *financial or flow-of-funds accounts* in central banks (e.g., McIntosh *et al.*, 1999) suggests that the approach also has an added value for such policy institutions. In this section, we discuss such issues: first their potential uses (section 2.1) and then methodological and data-related issues which arise from such usage (section 2.2).

### 2.1 Potential uses of Euro Area Accounting Matrices

The main merit of an EAAM is that it can help to understand the structure of the economy, including the financial transactions, and its development over time (provided that a time-series of such matrices is available). This may provide useful, for instance, to gain more insight into (changes of) the monetary transmission mechanism at work in the euro area. Second, an EAAM provides a consistent accounting framework that can be used in the calibration of general equilibrium models. Third, a time-series of EAAMs can be used for more elaborate empirical studies on relationships between sectors of the euro area economy.<sup>4</sup>

In a complex and data-demanding environment, EAAMs provide a consistent and coherent statistical framework for both the real and the financial side of the economy.<sup>5</sup> As such, they offer the user a single, macro-economic accounting framework with harmonised statistical concepts and the most “appropriate” level of classification of economic sectors, financial assets, and the like. Among other uses, this is well suited to the ECB’s monetary policy strategy, which puts

---

<sup>3</sup> A further development of this NAM into a Social Accounting Matrix (SAM) may further enhance the monetary policy analysis, particularly through its additional data on employment and wage rates by type of labour.

<sup>4</sup> Please note that a country breakdown can be inserted in (some accounts of) the EAAM, if and when relevant for the analysis. This then follows the general rule in EAAMs, namely that in each account a breakdown is adopted that is most relevant for the economic processes that are described in this account.

<sup>5</sup> Obviously, this advantage applies to an integrated set of financial and non-financial national accounts more generally, albeit that a matrix integrates the so-called supply and use tables and sector accounts in a single presentation format, a matrix allows for a more flexible selection of the most suitable classification in each account and allows for a more in-depth analysis of inter-sectoral linkages, e.g. spill-over effects of external or policy shocks.

emphasis on monitoring a wide range of economic indicators.<sup>6</sup> Providing that EAAMs become available at a sufficiently high, i.e. quarterly, frequency, and with an acceptable delay of one quarter, say, it may allow a crosscheck of these indicators.

To give an example, central banks are clearly interested in the process by which monetary policy affects prices and output in the economy – i.e., the “Monetary Transmission Mechanism” (MTM). There are a number of (not necessarily competing) views on the transmission process.<sup>7</sup> A more in-depth empirical analysis of these views has been hampered by lack of sufficient data in three respects. First, how do consumers and firms reallocate their portfolio asset or leverage ratios in response to monetary policy changes (i.e. wealth composition effects); second, how sensitive are different parts of the economy to monetary policy changes (i.e. distributional effects); and finally, how can the validity of the various alternative MTM theories be tested. Without claiming that accounting matrices are the panacea to resolving such uncertainties or uniquely delineate the channels of importance for monetary policy, the “from-whom-to-whom” features that are an essential ingredient of accounting matrices clearly facilitate an analysis of the interrelations in the economy, including the various channels of the monetary transmission.

Furthermore, all economic models require an explicit accounting framework. That is to say, they must fashion the data around a structure which has economic meaning. Obviously, this also requires categorising and classifying the data according to various types: e.g. factors of production (labour and capital), institutions (households, corporations and the government), and types of transactions (between residents or between residents and non-residents). Providing such an accounting framework also has implications for the type of data that must be collected and their degree of disaggregation. The accounting framework then provides the basis for the subsequent modelling assumptions, including the choice which variables are considered as exogenous (e.g. tax rates, certain cross-border capital transactions) and which as endogenous.

This, in turn, illustrates one of the key benefits of the accounting matrix framework for modelling purposes. The EAAM, notably in view of its from-whom-to-whom circulatory construction of transactions, can provide a consistent statistical skeleton for macro-economic forecasting or computable general equilibrium (CGE) models that incorporate both the financial and the non-financial side of the economy, and their interrelationships. By contrast, it is not uncommon for macro-econometric models to imperfectly model flows between different agents – this can be expressed in trade volumes not adding up, incomplete circular flows of incomes between private agents and the government sector, etc (see the discussion in e.g. Whitely, 1994).

Another aspect is that accounting matrices are often used to calibrate both the baseline and certain parameter values of CGE models. Examples of such calibrated parameters include marginal propensities to consume various goods, tax elasticities, and share and technology parameters of the production process. Notably, this presupposes that the baseline values of the accounting matrix represent a “normal” year. Whereas CGE- or macro-models additionally embody a number of behavioural and other model specifications (e.g., uncovered interest parity, households and firms’ optimisation, adjustment costs and other frictions, policy rules, etc.) as well as more dynamic features, the underlying accounting matrix fixes the various channels of interest in the economy and the related taxonomies. Such factors – e.g., accounting structure and calibration – are discussed in Thorbecke (1985, 2000).

Of course, all tools involve trade-offs. Possible disadvantages of EAAMs are that they may require additional data collection on the counterparts of transactions, some (limited) additional data compilation efforts and some calibration to achieve consistency.<sup>8</sup> For the time being, euro

---

<sup>6</sup> See ECB (2003).

<sup>7</sup> These various explanations and their associated literature are extensively discussed in McAdam and Morgan (2003).

<sup>8</sup> More actual data are available on the counterparts of transactions than is commonly assumed. For instance, the counterpart sector of government transactions can often be inferred from the nature of the transaction (e.g. the type of tax) and the same applies to many financial and concomitant property income transactions (e.g. conducting mortgage loans and paying interest on them). On the other hand, some degree of estimation based on assumptions may be indispensable for smaller items, like ‘other transfers’.

area countries do not compile NAMs on a regular basis, let alone every quarter.<sup>9</sup> A direct compilation at the euro area level may be more efficient, but would still require sufficient basic data, particularly for the most important Member States. Moreover, compiling a multi-country accounting matrix entails some particular methodological complexities. These are spelled out in the next section.

## 2.2 *Specific Methodological Issues when Compiling a Multi-country Accounting Matrix*

In principle a NAM incorporates several semi-integrated accounting systems at the national level<sup>10</sup>. These are: the Supply and Use Table (SUT), the non-financial sector accounts, the financial accounts or a flow-of-funds matrix, and the balance sheets. The latter three parts together are also labelled the Integrated Economic Accounts (IEA)<sup>11</sup>. A SUT provides a detailed presentation of the supply and use of goods and services **by production activities**. The supply of goods and services consists of the output by domestic production activities and imports, and the use of goods and services consists of the intermediate consumption by production activities and the final use categories: final consumption, capital formation and exports. The IEA on the other hand provides an overview of all economic transactions **by institutional sector**, as well as other changes and opening and closing balance sheets for non-financial and financial assets and liabilities.<sup>12</sup> In the NAM groups of transactions are shown by institutional sector of origin (outgoings) and by institutional sector of destination (incomings). The challenge in the construction of a NAM for a single country is the development of a series of transaction matrices that are consistent with the data contained in the IEA. Conceptually, this adds a full dimension (that of **the counterpart institutional sector**) to the IEA integration framework. At present, only a few countries already compile transaction matrices as an integral part of the compilation of the IEA. The construction of an accounting matrix for a multi-country area such as the euro area poses additional methodological challenges. A multi-country area must be described as a single economy, with a single economic boundary distinguishing between domestic transactions and those with the rest of the world. As a consequence, when building up an EAAM from NAMs for the Member States, all transactions occurring between economic agents of the different Member States should no longer be treated as transactions between a national sector with an unspecified Rest of the World, but as domestic transactions between specific counterpart sectors in the multi-country area. A multi-country accounting matrix is therefore not equal to the sum of the NAMs of the constituent countries.

The first step when deriving an EAAM from a set of national accounts for Member States is that the national ROW accounts must be subdivided into cross-border transactions within the euro area (the so-called intra transactions) and cross-border transactions outside the euro area (the so-called extra transactions). As said before, the intra euro area transactions should then be reflected as transactions between residents in the various transaction matrices of the EAAM.

To date, the compilation of the euro area ROW is a challenge because national SUT and IEA statistics do not always provide a geographical breakdown between intra- and extra-euro area

---

<sup>9</sup> The Netherlands is the main exception, with an annual compilation frequency. See Leadership group SAM (2002) for national pilot studies for Belgium, Finland, Greece, Italy, the Netherlands, Portugal and the United Kingdom.

<sup>10</sup> For a description of the relationship between SNA93 and the NAM, see SNA93 Chapter XX, or Keuning (1991).

<sup>11</sup> For a description of Supply and Use Tables see SNA 93, Chapter 15, Table 15.1. For a detailed description of the Integrated Economic Accounts (IEA), refer SNA93 chapters 6 through to 14, and Annex V, Part 2. In ESA95 the corresponding references with regards to Supply and Use tables are chapter 9, tables 9.5 and 9.6. The Integrated Economic Accounts are discussed in ESA95 chapters 3 to 5, and the detailed IEA tables are presented in Annex IV, Accounts.

<sup>12</sup> Conceptually the non-financial (flow) accounts and the financial flow accounts yield identical balances by institutional sector (net lending). In practice, though, this is not achieved in all (euro area) countries.

transactions. Additional data (e.g. the balance of payments) need to be integrated to obtain the desired geographical split. Unfortunately, the ROW account and the balance of payments do not always match at the national level.

However, even if the required intra- and extra- euro area breakdowns were readily available in all national data sets, their summation at the level of the euro area as a whole would reveal that total uses of certain intra-euro area flows do not equal the corresponding intra euro area resources. Such ‘asymmetries’ on the intra-euro area ROW account arise because of different recording of transactions by Member States.<sup>13</sup> The elimination of these asymmetries implies that adjustments are made at the level of the euro area, either to the domestic flows or to the extra euro area flows. In any case, these asymmetries must be eliminated before the intra flows can be removed from the ROW account and before they can be reflected as flows between domestic institutions in the relevant transaction matrices. For that reason, it would be ideal to dispose of intra euro area transaction data classified by **country of origin** and **country of destination**. Data at this level of detail conceptually allows for a matrix presentation that distinguishes between Member Countries as well as institutional sectors in relevant parts of the EAAM. It would enable a distinction of transactions between the different institutional sectors located in different Member States.

In practice this level of detail is not available in source data and estimation methods must be used to compute transaction matrices that describe both the domestic flows between institutions as well as the intra-euro area flows between institutional sectors. The compilation of an EAAM is further complicated because integrated SUT and IEA are not yet available in all euro area member countries. At present, ten (out of twelve) Member States produce annual non-financial sector accounts, while nine countries produce annual financial accounts. Likewise, only eight Member States produce SUT tables. Only one Member State currently produces transaction matrices as part of its regular statistical output. The timeliness of the production of these accounts is another concern. For instance the transmission deadline for annual SUT tables is three years, whereas the annual non-financial institutional accounts are made available after one year, and the annual financial accounts are available after nine months.

Another issue is that international organisations that are located in a given country are not considered to be resident in that country (SNA 1993). However, if the multi-country area includes all Member States of the international organisation concerned, corresponding international organisations should arguably be treated as resident in the multi-country area. In the case of the euro area, this concerns the ECB, whereas in the case of the European Union (EU) this extends to all other EU institutions. Therefore a complete set of accounts must be compiled for such international organisations, to be aggregated with the sets of accounts describing the Member States.

The production of high frequency EAAMs will depend on the availability of quarterly non-financial and financial sector accounts as well as on the ‘quarterisation’ of euro area annual SUT frameworks using available quarterly indicators. Currently much work is ongoing in the development of quarterly non-financial sector accounts for the euro area, in accordance with the priorities for EMU statistics as set by the Ecofin Council. A sub-set of financial accounts for the euro area, the Table on Financing and Investment (TFI), is already published by the ECB in its Monthly Bulletin<sup>14</sup>. Work is in progress to extend the coverage of the TFI to all sectors and financial instruments.

### 3 An EAAM for 1999

This section presents a rather aggregate EAAM for 1999. It incorporates annual data for transactions as shown in the SUT and in the production, income and accumulation (capital and

---

<sup>13</sup> Important asymmetries occur in the intra euro area trade statistics (Intrastat). Intra-EU exports (‘dispatches’) have consistently grown faster than intra-EU imports (‘arrivals’).

<sup>14</sup> See ECB (2001) for an initial description of the TFI.

financial transaction) accounts by institutional sector. As a pilot exercise it brings together different statistical data sources available at the ECB. They are described in Annex 2. Due to an as yet limited data availability it was decided to opt for a rather straightforward EAAM layout, corresponding to Table 20.4 of the 1993 SNA. To specifically accommodate the potential use of the EAAM in the MTM analysis, the allocation of primary income account has been split into two accounts: the ‘allocation of interest income’ account and the ‘allocation of other primary income’ account.<sup>15</sup>

This section is divided in two parts. Part one describes the overall structure of the EAAM in terms of the sequence of accounts and of some selected balancing items.<sup>16</sup> Part two provides more details on the individual accounts. It also deals with specific features that are relevant to the monetary policy framework.

### 3.1 Overall structure of the EAAM

The aggregate EAAM is presented in Table 1 below. It contains 13 accounts describing the processes of production, income generation and use, and accumulation of assets and liabilities, for resident sectors and the rest of the world. This aggregate EAAM can be seen as a roadmap for the more detailed tables shown in the following section. The amounts in each submatrix of the detailed EAAM add up to a single number in a cell of Table 1.

The EAAM presents *incoming transactions* in the rows and *outgoing transactions* in the columns. For instance the cell in row 1 and column 8 represents final consumption expenditure, which is an *incoming transactions* or a *resource* in the goods and services account, and an *outgoing transactions* or a *use* with respect to the institutional sectors in the use of income account.

Row 1 and column 1 contain the *Goods and Services Account*, and row 2 and column 2 contain the *Production Account*. Together they show (in the more detailed EAAM) the production structure of the euro area. Column 1 reveals that the total supply of goods and services is composed of euro area production (EUR 11,151 billions; cf. row 2) and euro area imports (996 billions; cf. row 11), both recorded at basic prices. In order to adjust for the difference between the basic prices valuation of supply and the purchasers’ prices (i.e. ‘market prices’) valuation of demand, column 1 also contains two sets of adjustments: the adjustment for trade and transport margins (0 in the aggregate matrix, but not in the more detailed tables; see below) as recorded in row 1, and the adjustment for taxes on products less subsidies on products (EUR 674 billions) in row 3. Row 1 presents the uses of goods and services: intermediate consumption (5,567) as a cost to production activities in column 2, final consumption expenditure by households and governments (4,846) in column 7, changes in stocks and net acquisition of valuables (19) in column 8, gross fixed capital formation (1,318) in column 9 and exports of goods and services (1,071) to the rest of the world (ROW) in column 11. Of course, total demand equals total supply (EUR 12,821 billions).

Column 2 shows that the production costs of all industries equal intermediate consumption (EUR 5,567 billions), net value added (4,714; cf. row 3) and consumption of fixed capital (870; cf. row 9). The euro area GDP (EUR 6,258 billions) can be calculated by adding taxes on products less subsidies on products (674 billions; cf. cell [3,1]) and consumption of fixed capital (870 billions; cf. cell [10,2]) to net value added.

The *Generation of Income Account* in row and column 3 describes how production factors (e.g. employees) generate income and hand it over to their institutional sectors (e.g. households). First, in row 3 net value added generated by domestic activities is augmented by income earned outside

---

<sup>15</sup> See ECB (2000a) for an overview of the data that are collected by the ECB.

<sup>16</sup> See Keuning and De Ruijter (1988) and Leadership Group SAM (2002) for a more general discussion on the structure and classifications to be used in such accounting matrices.



the euro area (EUR 8 billions; cf. column 11). Then, in column 3 these incomes are paid out to euro area institutional sectors (5,387; cf. row 4) and to the rest of the world (10 billions; cf. row 11).

Table 1. Aggregate EAAM for 1999

EAAM 1999	0	1	II.1.1	II.2.1.a	II.2.1.b	II.2.2.	II.3	III.1.a	III.1.c	III.2.	V		Totals
EUR Billions	Goods and Services (Product Groups)	Production (Industries)	Generation of Income Account (Value Added Categories)	Allocation of Interest Income Account (Institutional Sectors)	Allocation of Other Primary Income Account (Institutional Sectors)	Secondary Distribution of Income Account (Institutional Sectors)	Use of Income Account (Institutional Sectors)	Capital Account (Institutional Sectors)	Fixed Capital Formation (Industries)	Financial Account (Instrument Categories)	Rest of the World Account	Capital Account	
	1	2	3	4	5	6	7	8	9	10	11	12	
0	Goods and Services	Trade and Transport margins	Intermediate Consumption				Final Consumption expenditure	Changes in Inventories	Gross fixed capital formation	Exports of goods and services			
1	Product Groups	Output					4,846	19	1,318		1,071		12,821
Industries		11,151											11,151
II.1.1	Generation of Income	Taxes less subsidies on products	Net value added in basic prices								Comp. of Empl. and Taxes less Subsidies		5,396
II.2.1.a	Allocation Interest	674	4,714								8		5,396
II.2.1.b	Allocation Other Primary										Interest		6,896
II.2.2.	Secondary Distribution										144		6,166
II.3	Use of Income										Other Property Income		9,520
III.1.a	Capital Account										Transfers		5,365
III.1.c	Fixed Capital Formation										Adj. For change in net equity on pension funds		4,560
III.2.	Financial										Capital Transfers		1,318
Instrument Categories													4,529
S2.a	ROW current account	Imports of goods and services											1,295
S2.b	ROW capital account												643
Statistical Discrepancy													
Totals		12,821	11,151	5,396	6,166	9,520	5,365	4,560	1,318	4,529	1,295	643	

Accounts 4 and 5 present the allocation of primary incomes to the institutional sectors. In the EAAM, the *Allocation of Interest Income Account* (#4) and the *Allocation of Other Primary Income Account* (#5) are separated to emphasise the special role of interest in the transmission mechanism of monetary policy. The allocation of interest income account precedes the allocation of other primary income account. Because interest payments are typically contractual, accrue at a high frequency and are often established before the other property incomes are known, it may indeed be assumed that institutions first assess the income after interest flows before deciding/establishing the allocation of major other property incomes in the euro area, such as dividends. Concerning rents, it may be noted that rents of dwellings, other buildings, machinery, etc. are already settled in the production account, so that the rents as a part of ‘other property income’ only cover land rent. Assuming that land rent is settled after interest payments may not always be appropriate, but this will thus not have a large impact in macroeconomic terms.

In row 4, the euro area institutional sectors receive the income generated by euro area production factors (EUR 5,387 billions; cf. column 3) and the interest (1,365 billions; cf. column 4) from other euro area sectors and from the ROW (144; cf. column 11). In column 4, these sectors hand over the interest payable to other euro area sectors (in total: 1,365; cf. row 4) and to the ROW (154; cf. row 11). The balance of net nationally generated income and interest (5,376) is then put on the next account, that is, on row 5.

In row 5, the allocation of primary income is completed with the allocation of the other property incomes. The income transferred from column 4 is augmented with other property income receivable from other euro area sectors (EUR 751 billions; cf. column 5) and from the ROW (39 billions; cf. column 11). Likewise, in column 5 other property incomes payable are handed over to other euro area sectors (751 billions; cf. row 5) and to abroad (61; cf. row 11). The balance equals net ‘national’ income of the euro area (EUR 5,355 billions), which is put on the secondary distribution of income account in row 6.

The *Secondary Distribution of Income Account* (row and column 6) contains all transfer payments between institutional sectors. These transfer payments include taxes on income and wealth, social security contributions and benefits, and miscellaneous current transfers. To a large extent, these flows occur within the euro area (EUR 4,125 billions; cf. cell [6,6]), although some transfers are obtained from the ROW (41 billions; cf. column 11) and some transfers are made to the ROW (74; cf. row 11). As usual, the balance of the secondary distribution of income account, net ‘national’ disposable income of the euro area (EUR 5,321 billions), is allocated to the next, *Use of Income Account* (cf. row 7).

From disposable income, final consumption expenditure (EUR 4,846 billions) by institutional sectors is financed in row 1. In order to allow for changes in the net equity of private pension funds (43 billions) that are shown as a transfer between the corporations and the household sector in the more detailed EAAM, they are also included here, in row 7. The final balance of the current accounts, net euro area saving (EUR 475 billions), is allocated to the capital account (cf. row 8).

On the *Capital Account* (#8), net saving is augmented with capital transfers receivable from other euro area sectors (EUR 198 billions; cf. row 8) and from the ROW (18 billions; cf. column 12) and with liabilities incurred net, (3,885; cf. column 10). These funds are used, in the corresponding column, to finance changes in inventories (EUR 19 billions; cf. row 1), net fixed capital formation<sup>17</sup> (448 billions; cf. row 9), inter-sectoral capital transfers payable to euro area sectors (198; cf. row 8) and to the ROW (8 billions; cf. row 12) and the net acquisition of financial assets (‘lending’) (EUR 3,870 billions; cf. row 10). However, this still leaves a discrepancy of EUR 32 billions between financing and investment, which is shown, for the time being, in an additional, so-called *Discrepancy Row* at the bottom of the table.

The next, *Fixed Capital Formation Account* (#9) serves to show in the detailed EAAM which institutional sector allocates net investment to what industry (here aggregated to cell [8,9]), which together with the consumption of fixed capital (cell [9,2]) is then used to purchase capital goods (here aggregated to cell [1,9]).

The *Financial Transactions Account* (#10) shows in the row the net acquisition of financial assets by euro area sectors (EUR 3,870 billions; cf. column 8) and by the ROW (662 billions; cf. column 12). Column 10 then records the net incurrence of liabilities by euro area sectors (3,885; cf. row 8) and by the ROW

---

<sup>17</sup> In this EAAM, this item includes the acquisition of net non-produced non-financial assets.



(643; cf. row 12). At the aggregate level, the statistical discrepancy in this account rounds to EUR 3 billions; cf. the bottom row of the table.

The accounts 11 and 12 are the *Current and Capital Accounts for the Rest of the World*. The transactions on these accounts are presented from the viewpoint of the ROW. Thus the euro area receivables are now shown in the columns and the payables in the rows. All entries on these accounts have been described above, except for the euro area current account balance (EUR 7 billions), which is here shown as a negative balancing item of the ROW current account (cell [12,11]) that is put on its capital account. Similarly, net lending of the euro area can be computed as borrowing by the ROW (EUR 643 billions, cell [12,10]) minus lending by the ROW (662 billions, cf. cell [10,12]), that is, EUR –19 billions. However, it should be borne in mind that in this pilot EAAM the statistical discrepancy on the ROW capital account (analogous to the so-called errors and omissions of the balance of payments) still equals EUR –37 billions (cf. the bottom row of the table).

The bottom row shows that the statistical discrepancies in the capital account (EUR 33 billions; cf. column 8), the financial account (3, cf. column 10) and the ROW capital account (–37, cf. column 12) cancel out (except for rounding errors), as must be the case by definition. Therefore, there is no need for an additional column with statistical discrepancies.

### 3.2 Detailed EAAM

This section describes some key components of the detailed EAAM and also intends to follow some transactions related to a specific sector throughout the system of accounts. The EAAM in its full detail is shown in Table A1 annexed to this paper.

#### 3.2.1 Supply and use of goods and services

The detailed submatrices in the first two accounts, the Goods and Services Account, and the Production Account, correspond to the SUT matrix for the euro area. Table 2 contains the supply table, shown in the traditional way, that is, by transposing the columns of the EAAM Goods and Services Account. It describes in rows 1 to 6 the euro area supply (at basic prices) of six product groups, by six euro area industries (columns 2 through 8) and from imports (column 10). In addition, column 1 presents the trade and transport margins, with a compensating, negative entry in the row for the trade, hotels, restaurants and transport industry, and taxes less subsidies are added in column 9. A salient fact of the euro area, in comparison to most of its Member States, is the relatively small share of imports (less than 15% for all product groups and less than 8% overall) in total supply.

**Table 2 Supply Table**

Supply Table		Act 0	Act 1								Act II.1.1	Act V.a	Total	
		Goods and Services	Production Account								Generation of Income	Current ROW	Total	
		G4	AN	A1	A2	A3	A4	A5	A6					
		Trade, Hotels and Restaurants, Transport	Not specified activity, nominal sector	Agriculture	Agriculture, hunting and forestry, fishing and aquaculture	Industry, including energy	Construction	Trade, Hotels and Restaurants, Transport	Financial, real-estate, renting and business activities	Other service activities	Taxes less Subsidies on Products	Imports	Total Supply at Purchasers Prices	
		1	2	3	4	5	6	7	8	9	10	11		
G1	Agriculture, forestry, fisheries and aquaculture	1	85	-	252	0	-	1	0	-	15	41	365	
G2	Mining and quarrying, manufactured products	2	974	-	15	3,755	4	14	1	5	440	771	5,979	
G3	Construction work	3	-	-	1	7	758	4	1	4	64	2	842	
G4	Trade, Hotels, Restaurants, Transport	4	1,068	-	1	48	3	2,127	2	5	44	54	1,215	
G5	Finance, Rent, Business Services	5	2	-	0	39	2	21	2,303	32	107	70	2,576	
G6	Other services	6	6	-	1	3	0	3	1	1,737	34	16	1,803	
G7	Cif-FOB Adjustment	7	-	-	-	-	-	-	-	-	-	1	-	
G8	Expenditures abroad	8	-	-	-	-	-	-	-	-	-	-	-	
G9	Expenditures by non-residents	9	-	-	-	-	-	-	-	-	-	42	42	
Total	Total Cost of Production = Output	10	-	0	-	270	3,852	767	2,170	2,309	1,785	674	996	12,821

Euro Billion

Table 3 below contains the use table, again presented in its traditional format. For example, reading along row 2 it is possible to identify the various uses of mining and manufacturing products. From columns 1 through 7, it appears that a large share of these products (EUR 1,823 billions) is used as intermediate inputs in the mining and manufacturing industry itself. General government consumes EUR 59 billions and households (including non-profit institutions serving households) consume EUR 1,761 billions of these products. An amount equal to EUR 526 billions is used for gross fixed capital formation (cf. column 11). Finally, column 12 shows that exports of manufactured goods equal EUR 827 billions.

The Use Table also describes the cost structure of the various activities, for example in column 3 that of manufacturing. Rows 1 through 9 of this column demonstrate that the main intermediate inputs into manufacturing are manufactured products. Value added is shown by category in rows 10 through 12 of

**Table 3 Use Table**

Use Table		Act I.1 Production Account							Act II.3 Use of Income		Act III.1 Capital		Act V.a ROW	Total
		AN	A1	A2	A3	A4	A5	A6	S13	S14, S15	P52+P53, P51	P.6		
		Not specified activity, nominal sector	Agriculture, hunting and forestry, fishing and aquaculture	Industry, including energy	Construction	Trade, Hotels and Restaurants, Transport	Financial, real-estate, renting and business activities	Other service activities	Final Consumption of General Government	Final Consumption of Households and NPISH	Changes in inventories and net acq. Of Valuables	Gross Fixed Capital Formation	Exports of Goods and Services	Total Use in purchasers prices
		1	2	3	4	5	6	7	8	9	10	11	12	13
G1	Agriculture, forestry, fisheries and aquaculture	1	0	30	171	1	11	1	5	0	116	3	8	365
G2	Mining and quarrying, manufactured products and	2	0	73	1,823	269	330	95	205	59	1,761	11	526	5,979
G3	Construction work	3	0	2	25	71	18	60	28	2	19	0	618	842
G4	Trade, Hotels, Restaurants, Transport	4	0	4	114	11	279	63	53	7	596	2	3	1,215
G5	Finance, Rent, Business Services	5	205	12	374	94	274	499	150	40	719	2	154	2,576
G6	Other services	6	0	3	39	4	27	44	102	1,138	427	0	9	1,803
G7	Cif-FOB Adjustment	7	-	-	-	-	-	-	-	-	-	1	-	1
G8	Expenditures abroad	8	-	-	-	-	-	-	-	-	-	-	81	-
G9	Expenditures by non-residents	9	-	-	-	-	-	-	-	-	-	-	-	42
D1	Compensation of Employees	10	-	34	794	192	653	488	944					
D29-D38	Taxes less Subsidies on Production	11	-	5	22	4	24	44	7					
B2+B3	Operating Surplus and Mixed Income	12	-	205	77	274	99	394	726					
Total	Total Cost of Production = Output	13	-	229	3,634	745	2,012	2,020	1,642	1,247	3,600	19	1,318	12,821

Euro, Billion

this table and consists of compensation of employees (row 10), other taxes less subsidies on production (row 11) and (in this case: gross) operating surplus and mixed income. In the euro area mining and manufacturing industry, the latter category amounted to 25% of gross value added and 7.5% of total production costs in 1999.

### 3.2.2 Allocation of primary income account

In the EAAM, the allocation of primary income account is split in two sub-accounts: the allocation of interest income account and the allocation of other primary income account. The details of these accounts are presented in Table 4

**Table 4 Allocation of Primary Income**

Allocation of Primary Income Accounts		Act II.1.1		Act II.2.1.a				Act II.2.1.b				Act V.a Cur.	ROW	Total	
		Generation of Income		Allocation of Interest Income				Allocation of other primary income							
		D1	D2-D3	B2+B3	S11	S12	S13	S14_15	S11	S12	S13	S14_15	S2		
		Compensation of Employees	Taxes less Subsidies on Production	Operating Surplus and Mixed Income	Non Financial Corp.	Financial Corp.	Government	Households and NPISH	Non Financial Corp.	Financial Corp.	Government	Households and NPISH			
		1	2	3	4	5	6	7	8	9	10	11	12	13	
S1N	S1N	1	-	207	-	207	-	-	-	-	-	-	-	-	
S11	Non Financial Corp.	2	-	779	1	41	24	-	-	-	-	-	8	853	
S12	Financial Corp.	3	-	100	160	323	187	195	-	-	-	-	115	1,081	
S13	Government	4	768	-	0	16	9	-	-	-	-	-	3	794	
S14_15	Households and NPISH	5	3,106	843	3	143	54	-	-	-	-	-	18	4,167	
S11	Non Financial Corp.	6	-	-	633	-	-	-	75	4	0	1	26	739	
S12	Financial Corp.	7	-	-	-	252	-	-	51	46	-	0	6	355	
S13	Government	8	-	-	-	-	519	-	26	6	0	2	0	553	
S14_15	Households and NPISH	9	-	-	-	-	-	3,972	347	188	0	4	7	4,519	
S11	Non Financial Corp.	10	-	-	-	-	-	-	197	-	-	-	-	-	
S12	Financial Corp.	11	-	-	-	-	-	-	-	93	-	-	-	-	
S13	Government	12	-	-	-	-	-	-	-	-	553	-	-	-	
S14_15	Households and NPISH	13	-	-	-	-	-	-	-	-	-	4,511	-	-	
S2	Rest of the World	14	6	4	56	98	-	-	43	18	-	0	-	225	
Total	Total	15	3,112	771,853	1512,43	853	1,081	794	4,167	739	365	553	4,519	183	

Euro, Billion

As a first step, the income generated in production is allocated to the institutional sectors (incl. an unspecified sector in row 1) and to the rest of the world in columns 1 through 3. Almost all compensation of employees (3,106 billions) is earned by euro area households, while the taxes on production predominantly accrue to its governments (768 billions). Corporations only receive operating surplus (879 billions). The financial intermediation services indirectly measured (FISIM) are the main component of the negative entry (−205 billions) in cell [1,3] of this table.

In rows 1 through 5 and columns 4 through 7 the interest matrix is shown. It is clear that financial corporations are the major recipients of interest income (EUR 866 billions), followed by households (EUR 200 billions). Financial corporations also pay the major part of interest (EUR 524 billions), followed by government (EUR 274 billions), households (EUR 195 billions) and non-financial corporations (EUR 164 billions). More than a quarter of households' interest income (54 billions) is obtained from the governments. It is also remarkable that households are net receivers of interest income.

In rows and columns 6 through 9, the allocation of other primary income is dealt with. This largely concerns the distribution of dividends from corporations to their (mainly household) owners and the distribution of property income earned by life insurance corporations and pension funds to their policyholders. Rows 10 through to 14 then show the primary income balances, which add up to (euro area) net euro-area Income. Clearly, the primary distribution of income leads to an increase of household income as generated directly in production, mainly through the households' receipts of non-interest income.

### 3.2.3 *Secondary distribution of income and use of income*

The secondary distribution of income, as shown in the first part of Table 5, mostly affects governments and households, through taxation, social security contributions and benefits and other current transfers. In row 12, government receives EUR 1,677 billions from households, EUR 529 billions from other (layers of) government and EUR 180 billions from corporations. Most of these revenues are also paid out as transfers, to households (1,111 billions) and other governments (529 billions). Part of the secondary distribution of income is also carried out through the financial corporations, notably through insurance companies and pension funds. This is shown in row 11, where financial corporations receive 208 billions from households, and in column 3 where households receive 185 billions from financial corporations.

The diagonal matrix composed of rows 14 through 17 and columns 2 through 5 then shows net disposable income by institutional sector. The secondary income is lower than the primary income for all sectors except for government.

Subsequently, consumption expenditure of euro area government and households is shown as part of their use of income in rows 1 through 9 and columns 6 through 9 of Table 5. In row 17 and columns 6 and 7, an adjustment is made to reflect the increase in the value of the pension reserves of households with corporations. This adjustment is necessary in order to match an increase in the claims of households on private pension funds.

**Table 5 Secondary Distribution of Income and Use of Income**

EAAM 1999		Act II.2.1	Act II.2.1.a					Act II.2.1.a				Act V.a	Total
Secondary Distribution and Use of Income		Net National Income 1	Secondary distribution of Income					Use of Income				S2 10	11
			S11 Non Financial Corp. 2	S12 Financial Corp. 3	S13 Governm ent 4	S14_15 Househol ds and NPISH 5	S11 Non Financial Corp. 6	S12 Financial Corp. 7	S13 Governm ent 8	S14_15 Househol ds and NPISH 9			
G1	Agriculture, forestry, fisheries and aquaculture	1						0	116				
G2	Mining and quarrying, manufactured products	2						59	1,761				
G3	Construction work	3						2	19				
G4	Trade, Hotels, Restaurants, Transport	4						7	596				
G5	Finance, Rent, Business Services	5						40	719				
G6	Other services	6						1,138	427				
G7	Cif-FOB Adjustment	7						-	-				
G8	Expenditures abroad	8						-	-	81			
G9	Expenditures by non-residents	9						-	42				
S11	Non Financial Corp.	10	197	-	25	7	62				1	291	
S12	Financial Corp.	11	93	30	4	6,25109	208				4	346	
S13	Government	12	553	138	42	529	1,677				22	2,962	
S14_15	Households and NPISH	13	4,511	55	185	1,111	47				13	5,921	
S11	Non Financial Corp.	14		68	-	-	-					68	
S12	Financial Corp.	15		-	84	-	-					84	
S13	Government	16		-	-	1,266	-					1,266	
S14_15	Households and NPISH	17		-	-	-	3,904	12	31			3,946	
B8N	Net Savings	18						56	53	19	347		
S2	Rest of the World	19		1	6	43	24						
Total	Total	20		291	346	2,962	5,921	68	84	1,266	3,946		

The use of income account is closed by means of net saving<sup>18</sup> in row 18 (for ease of presentation not shown as a diagonal matrix here). Euro area households saved EUR 384 billions in 1999, corporations around 109 billions and governments only 19 billions. This amounts to a household savings ratio of 8.9% and a government savings ratio of 1.5%.

### 3.2.4 The accumulation account due to transactions

Table 6 contains the accumulation account due to transactions in the traditional T-accounts presentation. Saving, net capital transfers and net incurrence of liabilities (financing) are used to acquire non-financial and financial assets (investment). This means that the EAAM capital and financial accounts have been combined and that changes in assets are shown on the left-hand side and changes in liabilities on the right-hand side. This facilitates an extension with the other flow accounts (revaluation and other changes in the volume of asset account) and the balance sheets in a future extension of the EAAM. For the rest, the numbers add up to the aggregates presented in Table 1 above. Net lending / net borrowing is also shown as the balancing item of the capital account and of the financial transactions account.

Financial transactions are presented with a breakdown by financial instrument and original maturity. Financial corporations in the euro area acquired more than half of the financial assets and incurred a similar amount of liabilities (EUR 2,631 of EUR 4,530 billions), leading to a rather balanced financial transaction account for this sector.

Non-financial corporations incurred liabilities amounting to EUR 853 billions. This mainly consisted of loans (EUR 414 billions) and shares and other equity (EUR 241 billions). The issuance of debt securities was a less important source of financing for euro area non-financial corporations (EUR 51 billions). Non-financial corporations invested considerably in debt securities and in shares and other equity (EUR 96 and

<sup>18</sup> This presentation of the EAAM emphasises the computation of balancing items net of consumption of fixed capital as the appropriate analytical concept. Gross savings items by institution are not presented. Because consumption of fixed capital is classified in terms of activities, not institutional sectors, gross savings by institutional sector cannot be derived directly from the EAAM.

296 billions, respectively). They granted EUR 169 billions of loans to other institutional units (incl. inter-company loans).

**Table 6 Accumulation account due to transactions by sector**

EUR billions, 1999  
Investment  
Changes in assets

Net saving, capital transfers and financing  
Changes in liabilities and net worth

Total	S.1	S.11	S.12	S.13	S.13/ S.14	S.2	ESA95 code	Transaction	Discre- pancy	Total	S.1	S.11	S.12	S.13	S.13/ S.14	S.2
							B8.n	Saving, net		475	475	56	53	19	347	
							B12	External balance								-7
223	206	6	23	152	25		D.9	Capital transfers		223	216	61	4	103	49	8
1337	1337	718	38	160	421		P.5	Gross capital formation								
1318	1318	704	38	159	417		P.51	Gross fixed capital formation								
16	16	14	0	1			P.52	Changes in inventories								
4	4	0	0	0	3		P.53	Valuables								
-870	-870	-497	-30	-107	-236		K.1	Consumption of fixed capital								
0	0	4	0	-1	-3		K.2	Net acquisition of non-produced non-financial assets								
0	17	-115	26	-82	189	-17	B.9	Net lending (+) / net borrowing (-)								
691	673	232	31	203	206	18		Total	-7	698	690	117	57	122	395	1
							B.9F	Net lending (+) / net borrowing (-)		2	-14	-126	-76	-83	271	20
0	-1		-1				1.F.1	Monetary gold and SDRs								
775	608	22	441	29	116	167	F.2	Currency and deposits	1	774	860	5	836	18		-86
1,138	963	96	878	10	-22	175	F.3	Securities other than shares	6	1,131	993	51	832	110	0	139
676	501	87	426	10	-22	175	F.33	Securities other than shares, excluding FD	0	676	534	45	379	109	0	142
106	48	33	40	1	-26	58	F.331	Short-term	7	99	103	22	125	-44	0	-4
570	453	54	385	9	5	117	F.332	Long-term	-7	576	430	23	254	153	0	146
462	462	9	453	0	0		F.34	Financial derivatives (FD)	7	455	459	6	452	0	0	-3
875	810	169	627	11	2	65	F.4	Loans	-8	883	719	414	76	-21	250	164
264	234	76	155	4	0	30	F.41	Short-term		279	209	142	48	9	10	71
611	576	94	472	7	3	35	F.42	Long-term		604	511	272	28	-30	241	93
1,230	993	296	539	-36	193	237	F.5	Shares and other equity	9	1,220	825	241	583	0	0	396
898	663	270	401	-42	35	235	F.51	Shares and other equity, excluding MFS		777	409	241	168	0	0	368
332	329	26	138	7	159	2	F.52	Mutual funds shares (MFS)		443	415		415			28
260	260	6	8	0	246	0	F.6	Insurance technical reserves	-3	263	263	9	252	0	1	0
								Net equity of households in life insurance and pension fund reserves	1	227	228	9	217	0	1	0
31	31	6	8	0	18	0	F.62	Prepayments of insurance premiums	-4	35	35		35			0
255	238	138	64	22	15	17	F.7	Other accounts receivable/payable	-4	259	226	132	52	13	28	30
4,532	3,870	727	2,555	37	551	662	F	Total	2	4,530	3,885	853	2,631	120	280	643

Net borrowing of general government was of a similar magnitude as that of the non-financial corporations (EUR 83 billions), and was mainly catered for by a large issuance of debt securities (EUR 110 billions), while governments paid back loans worth EUR 21 billions. Financial investment of euro area governments was rather small (EUR 37 billions).

Households acquired EUR 551 billions of financial assets, which mainly consisted of insurance technical reserves (EUR 246 billions), shares and other equity (EUR 193 billions) and currency and deposits (EUR 116 billions), compensating a net sale of debt securities (EUR 22 billions). In parallel, they incurred loans, trade credits and other advances for a total amount of EUR 280 billions. As a result, their net lending equalled EUR 271 billions.

When translating the euro area balance of payments into an EAAM financial account for the rest of the world, broken down by the instruments listed in Table 6, it appears that most of the investment of the rest of the world was in shares and other equity (EUR 237 billions), securities other than shares (EUR 175 billions) and currency and deposits (EUR 167 billions). The main financing instruments were shares and other equity (EUR 396 billions), loans (EUR 164 billions) and debt securities (EUR 139 billions), while the amount of currency and deposits held as liabilities was reduced by EUR 86 billions. All in all, net lending of the rest of the world, and thus net borrowing of the euro area, amounted to EUR 20 billions.

### 3.2.5 Discrepancies

When compiling the pilot EAAM, one had to face the existing discrepancies between the net lending/net borrowing compiled in the capital account and the same balancing item in the financial transactions account. Other discrepancies were caused by the asymmetries in the intra-euro area trade estimates, errors and omissions on the balance of payments and approximations that had to be made because of missing

countries and an incomplete coverage of transactions. As the pilot EAAM is directly or indirectly based on national data, existing national discrepancies between the various data sets translate into euro area discrepancies. Fortunately, sometimes these national discrepancies also cancel out.

All in all, the 1999 discrepancies are still rather substantial for households and for non-financial corporations. While the discrepancies for financial corporations and for the rest of the world are also quite (too) high, this item is relatively small for the government sector.

It is obvious that this pilot EAAM required many assumptions that can hopefully be replaced by more comprehensive actual data in the future. The compilation methodology is elaborated in the Annex 4 to this paper. The next section draws some preliminary conclusions.

#### 4. CONCLUSIONS

This paper has set out a euro area accounting matrix (EAAM) and considered possible applications and issues arising. The main advantage of an EAAM, in comparison to the traditional national accounting framework, is its presentation of inter-sectoral linkages, not taking into account national borders with monetary union and focusing on the matrix format presentation that shows the counterpart sectors to all types of transactions. In turn, revealing these linkages assists in detecting the interrelationships between portfolio shifts and restructuring of their liabilities of various sectors as a consequence of, or in anticipation of, monetary policy decisions. In addition, this feature potentially enables tracing the impacts of a monetary policy decision from the financial to the non-financial side of the economy and back.<sup>19</sup> Finally, the EAAM can provide a consistent statistical skeleton for macro-economic forecasting models that incorporate both the financial and the non-financial side of the economy.

As to date neither annual euro area supply and use tables nor institutional sector accounts were completely available, the process of compiling the non-financial account components for the EAAM has been lengthy, with many intermediate steps. In itself, these intermediate steps, such as the first ever compilation of non-financial institutional sector accounts for the euro area and the first ever attempt to construct a euro area Supply and Use framework, were already a valuable experience. In addition, the integration of this work with the ongoing and much more advanced compilation process of quarterly euro area financial accounts (ECB, 2000c, 2001, 2002a; Mink, 1999, 2002) has provided useful new insights.

The three guiding principles behind the compilation of the sectoral accounts in the EAAM have been the following:

- *Completion*, that is, supplementary estimates have been made for Member States that do not provide the full national accounts as outlined in the ESA95 transmission programme.
- *Transformation*, that is, the euro area has been transformed into a 'national' economy. Specifically, the rest of the world accounts in the EAAM only reflect transactions of the euro area with countries and institutions outside the euro area. For this purpose, cross-border transactions within the euro area have been transformed into 'domestic' transactions between specific counterpart sectors.
- *Consistency*, that is, accounting relationships have been used together with additional information and assumptions to yield internally consistent, EAAM accounts, apart from relatively small, remaining discrepancies that could not yet be eliminated at this stage.

Yet, the results shown in this paper should be seen as a pilot version that serves as a basis for a further elaboration, both concerning its compilation assumptions and the plausibility of the outcomes. Besides, eliminating the statistical differences between the non-financial and the financial accounts, especially for the private sectors and the ROW, remains high on the agenda.

The assembly of the EAAM would have been much easier if the different components such as euro area supply and use tables and institutional sector accounts, had been readily and regularly (at least annually)

---

<sup>19</sup> See e.g. Defourny and Thorbecke (1984) for a method to trace 'policy impact paths' on the basis of a framework as laid out in this paper.

available. These components are anyhow in high demand by the ECB and other users. This should then be step-by-step supplemented by sufficient and timely quarterly data. In that regard, existing EC Regulations on quarterly government data, the forthcoming EC Regulation<sup>20</sup> on quarterly euro area accounts for institutional sectors and the ECB MUFA guideline are of great importance.

As regards the longer-term future, the ultimate objective is to take the framework to a quarterly frequency. Indeed, in that regard, the present work on an annual EAAM should be seen as a first step and as a diagnostic tool. A time-series of quarterly EAAMs would of course be more suited to timely and relevant policy analysis. The key to reaching this stage is data availability. For example, whilst data for financial transactions and balance sheets are mostly available at quarterly frequency, supply and use tables are less well developed at that frequency. Investigating the options for a quarterly representation of the EAAM is therefore an ongoing concern.

---

<sup>20</sup> Proposal for Parliament and Council Regulation 2003/0296 (COD)



## References

- Bacharach, M., (1970) "Bi-proportional matrices and input-output change", Cambridge University Press.
- Defourny, J. and Thorbecke, E. (1984). "Structural Path Analysis and Multiplier Decomposition within a Social Accounting Matrix Framework", *Economic Journal*, 94, 373, 111-136.
- European Central Bank (2000a). "Statistical information collected and compiled by the ESCB," *ECB Monthly Bulletin*, May.
- European Central Bank (2001). "Financing and financial investment of the non-financial sectors in the euro area", *ECB Monthly Bulletin*, May, 75-82.
- European Central Bank (2002). "Saving, financing and investment in the euro area", *ECB Monthly Bulletin*, August, 65-76.
- European Central Bank (2003). "The outcome of the ECB's evaluation of its monetary policy strategy", *ECB Monthly Bulletin*, June, 79-92.
- Eurostat (1996). European System of Accounts (ESA 1995), Eurostat, Luxembourg.
- Keuning, S. J. and W. de Ruijter (1988). "Guidelines to the Construction of a Social Accounting Matrix", *The Review of Income and Wealth*, 34, 1, March.
- Keuning, S. (1991) "Proposal for a Social Accounting Matrix which fits into the next system of national accounts", *Economic Systems Research*, 3, 3.
- Keuning, S. J. (1996). *Accounting for Economic Development and Social Change*, IOS Press, Amsterdam.
- Keuning, S. J. (1997). "SESAME: an Integrated Economic and Social Accounting System", *International Statistical Review*, 65, 1, 111-121.
- Leadership Group SAM (2002). *Handbook on Social Accounting Matrices and Labour Accounts*, Populations and social conditions 3/2003/E/N 23, Eurostat, Luxembourg.
- McAdam, Peter and J. Morgan (2004) "The Effects of Euro Area Interest Rate Changes: Evidence from Macroeconomic Models", *National Institute Review*, 187, January, 70-80.
- McIntosh, S. H., J. M. Scherschel and A. M. Teplin (1999). "Use Of Flow Of Funds Accounts For Policy Making At The Federal Reserve", presented at *Central Bank Uses of Financial Accounts*, European Central Bank, 22<sup>nd</sup> November.
- Mink, R. (1999). "Monetary Union Financial Accounts for ECB Monetary Policy Analysis", presented at *Central Bank Uses of Financial Accounts*, European Central Bank seminar, 22<sup>nd</sup> November.
- Mink, R. (2002). "Quarterly Monetary Union Financial Accounts for ECB Monetary Policy Analysis", *IFC Bulletin*, 12, October, 98-115.
- Stone, R., Meade, J. E., Champernowne, D. G. (1942). "The precision of National Accounts Estimates", *Review of Economic Studies*, 9 (2), 11-125.
- Stone, R. (1976). "The development of economic data systems". In *Social Accounting for Development Planning with special reference to Sri Lanka* (G. Pyatt et. al, eds.). Cambridge, Cambridge University Press.
- Teplin, A. M. (2001). "The U.S. Flow of Funds Accounts and Their Uses", *Federal Reserve Bulletin*, July, 431-441.
- Thorbecke, E., (1985). "The Social Accounting Matrix and Consistency-Type Planning Models", in G. Pyatt and J. I. Round (Eds.), *Social Accounting Matrix: A Basis for Planning*, World Bank Publications.
- Thorbecke, E. (2000). "The Use of Social Accounting Matrices in Modelling", paper presented at *the 26<sup>th</sup> General Conference of The International Association for Research in Income and Wealth*, Cracow, Poland, 27 August to 2 September.
- Thorbecke, E. and associates (1992). *Adjustment and Equity in Indonesia*, Organisation for Economic Cooperation and Development, Paris.
- Thorbecke, E., B. Kim, D. Roland-Holst and D. Berrian (1992). "A Computable General Equilibrium Model Integrating Real And Financial Transactions" in Thorbecke, E. and associates *Adjustment and Equity in Indonesia*, Organisation for Economic Cooperation and Development, Paris.
- United Nations, Eurostat, International Monetary Fund, Organisation for Economic Cooperation and Development and World Bank (1993). *System of National Accounts 1993*, Series F, No. 2, Rev. 4, United Nations, New York.
- Whitely, J. (1994) *A Course in Macro Economic Modelling and Forecasting*, Harvester.



Annex 1 Euro Area Accounting Matrix 1998 EUR Billions		Account II.1														Account II.2															
		Generation of Income Account						Allocation of Interest Income						Allocation of Other Primary Income						Secondary Distribution of Income						Use of Income					
		17 D1	18 D2	19 B2	20 S1N	21 S1I	22 S12	23 S13	24 S14_15	25 S11	26 S12	27 S13	28 S14_15	29 S11	30 S12	31 S13	32 S14_15	33 S11	34 S12	35 S13	36 S14_15										
0	Goods and Services Account	1G1																													
	Products of agriculture, forestry, fisheries and aquaculture	2G2																													
	Products from mining and quarrying, manufactured products and construction work	3G3																													
	Wholesale and retail trade, repair services, hotel and restaurant services	4G4																													
	Financial intermediation services, real estate, renting and business services	5G5																													
	Other services	6G6																													
	Transfer payments	7G7																													
	Current transfers to Non-Residents	8G8																													
	Current transfers from Non-Residents	9G9																													
	I	Production Account	10AN																												
Agriculture		11A1																													
Industry, including energy		12A2																													
Construction		13A3																													
Wholesale and retail trade, repair of motor vehicles and household goods, financial, real-estate, renting and business activities		14A4																													
Other service activities		15A5																													
Other service activities		16A6																													
Generation of Income Account		17D1																													
Compensation of employees		18D2-D3																													
Taxes less Subsidies on Production		19D2-H3																													
II.1	Operating Surplus and Mixed Income	20S1N																													
	Not allocated sector, nominal sector	21S11																													
	Financial Corporations	22S12																													
	General Government	23S13																													
	Households and Non-Profit Institutions Serving Households	24S14_15																													
	Non-Financial Corporations	25S11																													
II.2	Financial Corporations	26S12																													
	General Government	27S13																													
	Households and Non-Profit Institutions Serving Households	28S14_15																													
	Non-Financial Corporations	29S11																													
	Financial Corporations	30S12																													
	General Government	31S13																													
	Households and Non-Profit Institutions Serving Households	32S14_15																													
	Non-Financial Corporations	33S11																													
	Financial Corporations	34S12																													
	General Government	35S13																													
II.3	Households and Non-Profit Institutions Serving Households	36S14_15																													
	Non-Financial Corporations	37S11																													
	Financial Corporations	38S12																													
III.1.a	General Government	38S13																													
	Households and Non-Profit Institutions Serving Households	39S14_15																													
	Industries	40A																													
III.1.b	Monetary gold and special drawing rights (SDRs)	41F1																													
	Currency and deposits	42F2																													
	Securities other than shares, excluding financial derivatives	43F3																													
	Financial derivatives	44F34																													
	Short-term - Loans	45F41																													
	Long-term - Loans	46F42																													
	Shares and other equity, excluding mutual funds shares	47F5																													
	Net equity of households in life insurance reserves and in pension funds	48F61																													
	Prepayments of insurance premiums and reserves for outstanding claims	49F62																													
	Other accounts receivable/payable	50F7																													
V	Current ROW	51	6	4					56	98																					
	Capital ROW	52																													
SD	Statistical Discrepancy	53	0	-1	0																										
Outflows	Current ROW	54	3,112	771	1,513				853	1,081	794	4,167																			
	Capital ROW	55																													
	Total																														



## ANNEX 2

### EAAM CLASSIFICATIONS

The classifications of the EAAM are basically subsets of the classification system used in the ESA95 transmission programme.

#### 1. ACTIVITY CLASSIFICATION

The production activity classification used in the EAAM corresponds to the A6 grouping specified in the ESA95. It contains an additional level to allow for the specification of a nominal sector (FISIM) as well as to allow for the specification of product-specific taxes less subsidies that are not shown specified by activity.

**Table 1 Activity classification**

Code	Description	Reference NACE rev. 1
A.N	Nominal activity and not allocated activities	
A.1	Agriculture, hunting and forestry; fishing and operation of fish hatcheries and fish farms	A + B
A.2	Industry, including energy	C + D + E
A.3	Construction	F
A.4	Wholesale and retail trade, repair of motor vehicles and household goods, hotels and restaurants; transport and communications	G + H + I
A.5	Financial, real-estate, renting and business activities	J + K
A.6	Other service activities	L to P

This so-called A6 grouping of the European activity classification (NACE) is the required level of detail of the main aggregates tables in the ESA95 transmission programme. This information is therefore available for annual data for all Member States, and is available for quarterly data for the majority of the Member States.

#### 2. PRODUCT CLASSIFICATION

The product classification used in the EAAM corresponds to the P.6 grouping of the CPA classification specified in the ESA95. It has been amended to include three categories that are needed to make adjustments with regards to the valuation of imports and corrections to the final consumption estimates with regards to non-residents. These are reflected as codes G.7 through to G.9. Besides, an item is included, non-specified products, that is used to classify items that cannot be assigned to any of the other categories. CPA categories are closely compatible with the NACE classification, and the P6 CPA grouping formally corresponds to the A6 NACE grouping.

**Table 2 Product Classification in EAAM**

Code	Description	Reference CPA
G.N	Not Specified Products	
G.1	Products of agriculture, forestry, fisheries and aquaculture	A + B
G.2	Products from mining and quarrying, manufactured products and energy products	C + D + E
G.3	Construction work	F
G.4	Wholesale and retail trade, repair services, hotel and restaurant services, transport and communication services	G + H + I
G.5	Financial intermediation services, real estate, renting and business services	J + K
G.6	Other services	L to P
G.7	CIF-FOB Adjustment	
G.8	Expenditure by non-resident households	
G.9	Expenditures abroad by households	

### 3. SECTOR CLASSIFICATION

The classification of institutional sectors in the EAAM is an abbreviated version of the classification of institutional sectors specified in the ESA95. The classification contains the specification of the four main resident sectors, Non-financial Corporations, Financial Corporations, General Government and the combination of Households and Non-profit institutions serving households (NPISH). Aggregation of the latter two sectors follows from the requirements of the ESA95 transmission program.

Additional detail is available in source data for combined sub-sectors of the financial corporations sector, namely Monetary Financial Institutions (MFI), combining S.121 and S.122 from ESA95, Other Financial Institutions, combining S.123 and S.124, and S125, Insurance Corporations and Pension Funds. This detail is available in the ECB's financial accounts, but cannot be extended to the capital account at present and is also not included in the EAAM presented here.

**Table 3 Sector classification in EAAM**

Code	Description	Esa95 Code
S.1	Total Economy	
S.1N	Nominal Sector and Not specified sector	
S.11	Non-financial Corporations	
S.12	Financial Corporations	
S.121+S.122	Monetary Financial Institutions (MFI)	
S.123+S.124	Other Financial Institutions (OFI)	
S.125	Insurance corporations and pension funds	
S.13	General government	
S.14+15	Households and Non Profit Institutions Serving Households	
S.2	Rest of the World	
S.21*	Euro area	S2111
S.22*	Other rest of the world	S2112+S212+ S22

Additional detail is also available for the sub-sectors of general government. This additional detail is not reflected in the classification at the present stage.

With regards to the ROW, during the compilation of the EAAM a distinction is made into intra Euro area and extra Euro area transactions. This distinction is reflected in the codes S.21\* and S.22\*. S21\*

corresponds to ESA95 S2111 plus the ECB, and S22\* corresponds to ESA95 S2112+S212+S22 less the ECB.<sup>21</sup> The EAAM itself reflects extra Euro area flows, and therefore corresponds to S.22\*.

The institutional classification above also contains S.N, the not specified sector. This sector serves as the 'nominal sector' in the recording of the Financial Intermediation Services Indirectly Measured (FISIM), and it also serves to explicitly record the taxes on products less subsidies on products (D21-D31) that are generated in the production process.

#### **4. CLASSIFICATION OF NON-FINANCIAL TRANSACTIONS AND BALANCING ITEMS**

The EAAM distinguishes quite a large number of transactions in the various sub-tables. Here we provide the transaction classification that has been used and maintained during the compilation phase of the EAAM. A separate column indicates whether these transactions are individually visible in the EAAM.

The transaction classification shown in Table 4 follows the concepts defined in the ESA95. It is also extensively used in the ESA'95 transmission programme. The classification contains five series of codes, each labelled with a starting character. The 'P' series deals with transactions in goods and services, the 'D' series deals with income transactions, the 'K' series deals with accumulation entries, the 'F' series presents transactions in financial assets and liabilities. Finally the 'B' series presents analytical concepts presented as balancing items of accounts in the IEA.

---

<sup>21</sup> Note that the accounts for the ECB, as a multinational euro area institution, must be added to the Member States accounts to arrive at euro area totals. All other European institutions are viewed as outside the euro area for the time being.

**Table 4 Non-financial transaction classification used in EAAM**

ESA95 Code	Description	EAAM Submatrix Or Remark
P.1	Total Economy	
P.2	Nominal Sector and Not specified sector	
P.3	Final Consumption	
P.5	Capital Formation	
P.51	Gross Fixed Capital Formation	
P.52+P.53	Changes in Inventories and net acquisition of valuables	
P.6	Exports of Goods and Services	
P.7	Imports of Goods and Services	
K.1	Consumption of Fixed Capital	
K.2	Acquisition less Disposals of Non-financial Non-produced Assets	
D.1	Compensation of Employees	
D.11	Wages and Salaries	Not supported
D.12	Social Security Contributions	Not supported
D.2	Taxes on Production	
D.21	Taxes on Products	
D.29	Other Taxes on Production	
D.3	Subsidies on production	
D.31	Subsidies on products	
D.39	Other subsidies on production	
D21-D31	Taxes on Products less Subsidies on Products	
D.4	Property Income	
D.41	Interest	Interest
D.42	Distributed Income of Enterprises	Other property inc.
D.43	Reinvested Earnings from Direct Foreign Investments	Other property inc.
D.44	Property Income Attributable to Policy Holders	Other property inc.
D.45	Rent	Other property inc.
P.119	Correction to FISIM	Interest
D.5	Taxes on Income and Wealth	Transfers
D.61	Social Security Contributions	Transfers
D.62	Social Security Benefits	Transfers
D.7	Other current transfers	Transfers
D.8	Adjustment for the change in net equity of households in pension funds reserves	
D.9	Capital Transfers	Capital Transfers
B.1N	Net value added	
B.2	Operating Surplus	Not supported
B.3	Mixed Income	Not supported
B.2N+B3N	Operating surplus and mixed income	
	Net income after interest	
B.5	Net National Income	
B.6	Net Disposable Income	
B.8	Net Savings	
B.9	Net lending/ Net Borrowing	Implied, not explicit
B.12	Current Account Balance	

The level of detail specified in the transaction classification is supported by the source data obtained from the ESA95 transmission programme. The exceptions are: the breakdown of compensation of employees into wages & salaries and employers' contributions (D.11 and D.12), and the distinction between operating surplus (B.2) and mixed income (B.3). Both of these distinctions are voluntary in the ESA95 transmission programme and insufficient Member States provide these data for the time being.



## 5. CLASSIFICATION OF TRANSACTIONS IN FINANCIAL INSTRUMENTS

The classification of transactions in financial instruments is presented in Table 5. It lists the level of transaction detail currently available from the ECB's Monetary Union Financial Accounts. Some of these transaction categories are not supported by the balance of payments (BoP) statistics and thus the associated classification detail had to be suppressed in the EAAM.

**Table 5** Financial transaction classification used in EAAM

ESA95 Code	Description	Supported in EAAM
F.1	Monetary Gold and SDR	Yes
F.2	Currency and deposits	Yes
F.21	Currency	No
F.22	Transferable deposits	No
F.29	Other deposits	No
F.3	Securities other than shares	Yes
F.31	Securities other than shares, excluding financial derivatives	Yes
F.34	Financial derivatives	Yes
F.4	Loans	Yes
F.41	Short-term - Loans	Yes
F.42	Long-term - Loans	Yes
F.5	Shares and other equity, excluding mutual funds shares	Yes
F.51	Shares and other equity, excluding mutual funds shares	No
F.52	Mutual funds shares	No
F.6	Insurance technical reserves	Yes
F.61	Net equity of households in life insurance reserves and in pension funds reserves	Yes
F.62	Prepayments of insurance premiums and reserves for outstanding claims	Yes
F.7	Other accounts receivable/payable	Yes

## ANNEX 3

### STATISTICAL SOURCES TO COMPILE THE EAAM

The EAAM has been compiled for the year 1999. As this is not a very recent year, this pilot EAAM can have only limited relevance to the analysis of monetary policy transmission in the euro area. Yet, it can provide a useful perspective if an EAAM for a more recent year is compiled at a later stage. The choice of the reference year depends on the data availability that increases considerably for years further (but not too far) away in the past. Likewise, the choice for an annual instead of a quarterly EAAM has only been made due to the limited scope and coverage of the existing quarterly data sources in the euro area.

It should also be borne in mind that although many Member States have been compiling sector accounts and Supply and Use tables, these data have only recently been transmitted to Eurostat.

This Annex lists the main data sources used for the compilation of the EAAM. Conceptually, the compilation ought to start from a full set of Supply and Use tables and Integrated Economic Accounts (Non Financial and Financial Sector Accounts) for all Member States. These are indeed the main sources used for the compilation of the EAAM and they are discussed below. Subsequently, data sources are described that were needed in addition, in order to complete the accounts or to provide additional detail that was not available from the main data sources.

A final section in this annex explores the possibility that quarterly data sources currently under development in the EU and the euro area may lead to the possible compilation of quarterly EAAMs, overcoming the current timeliness problem.

#### **1. ANNUAL NATIONAL SUPPLY AND USE TABLES**

The ESA 95 transmission programme contains a provision for the transmission of Supply and Use tables at a high level of detail (NACE and CPA division level, i.e. A60, P60 grouping). These tables are to be provided annually, from 1995 onwards. The first transmission of Supply and Use tables was scheduled for 2002, and initial results became available to users in the second quarter of 2003.

The transmission delay specified for Supply and Use tables is 36 months, which corresponds with the final GDP estimates for the Member States. It follows that the most recent Supply and Use tables to date are the 1999 tables. Member states and Eurostat are currently gaining experience in the transmission of SUT data and the timeliness of the SUT data may improve in the future.

The current availability of Supply and Use tables is summarised in Table 6 below.

**Table 6. Availability of Supply and Use Tables**

Country	Available	Remarks
AT	No	
BE	No	The Belgian 99 SUT was expected later this year
DE	97	97 SUT was updated with respect to 99 reference totals. The 99 SUT was expected later this year.
ES	97	97 SUT was updated with respect to 99 reference totals. Consumption of Fixed Capital is not reported, hence B2+B3 is B2G+B3G
FI	99	
FR	99	Consumption of Fixed Capital is not reported, hence B2+B3 is B2G+B3G
GR	No	
IE	No	
IT	99	Details of Value Added components by activity not reported
NL	99/No	Tables reported are not according to Table 15/16 conventions, not used. Tables reported ex-VAT.
LU	No	
PT	No	

## 2. ANNUAL NATIONAL INTEGRATED ECONOMIC ACCOUNTS.

The ESA 95 transmission programme foresees the provision of various tables which cover a full set of annual national Integrated Economic Accounts. National financial balance sheet accounts by sector are also included. The annual data have to be provided for the period from 1995 onwards. Greece, Ireland and Luxemburg are expected to provide these data only by 2005..

Member States are also obliged to transmit annual national financial and non-financial accounts by sector with data starting in 1995. Table 8 of the ESA95 transmission programme provides non-financial accounts with a breakdown by sector and by government sub-sector. The rest of the world sector is broken down into the member countries and the institutions of the EU, as well as into other countries and international organisations. This Table 8 also supports a breakdown in euro area and non-euro area EU Member States. The breakdown in transaction categories is given for the complete set of non-financial accounts: the production account, the generation, allocation, distribution and use of income account and the capital account. A large problem with the non-financial sector accounts questionnaire is that many of the detailed categories are voluntary. Although a geographical breakdown is specified that singles out the euro area, only one member state reports this breakdown. Likewise, the subsectors of general government or the separate specification of the household and NPISH sectors are not reported by all Member States.

Tables 6 and 7 of the transmission programme provide annual data on financial accounts (financial transactions and balance sheets) broken down by sector. The rest of the world sector is also broken down, analogous to Table 8. Similar coverage problems are faced as for the non-financial accounts because here again some of the sector and instrument breakdowns are only voluntary.

The annual financial and non-financial sector accounts only provide very limited information on counterpart sectors. For some transactions, in Table 8, a distinction is made with regards to transactions with the general government and with other sectors. Ireland and Luxemburg do not yet provide annual l sector accounts at all.

More timely annual national data are provided for the government sector. The underlying data on government revenue and expenditure are specified in Table 2 of the ESA 95 transmission programme. This data set has to be provided by the Member States with a time lag of three months. In addition, NCBs of the Member States send a comprehensive set of data on government revenue and expenditure and government debt to the ECB before 15 April of the subsequent year. This data set covers annual data, including the series of the previous year. Such government data are published in Chapter 7 of the euro area statistics section of the ECB Monthly Bulletin.

The additional data sources needed for the compilation of the EAAM due to the above-mentioned lack of coverage and geographical breakdown are described in the following two sections. First, the additional data sources for the compilation of the non-financial accounts are presented, and then the additional data sources for the financial accounts. The use of these additional data sources is further elaborated in Annex 4, which describes the EAAM compilation methodology.

### **3. ADDITIONAL SOURCES FOR THE NON FINANCIAL ACCOUNTS IN THE EAAM**

For the non-financial accounts, various additional data sources had to be used, as described in the following sub-sections.

#### *3.1 Macro Economic Aggregates*

In the ESA 95 transmission programme, an extensive set of tables relating to macro-economic aggregates is specified. These tables, collectively referred to as 'Table 1' of the ESA 95 transmission programme, contain annual and quarterly data, and are by and large mandatory for all Member States. These tables provide the different breakdowns of GDP (income and expenditure), employment data, and the calculation of gross national income. The information in these tables provides reference totals that assist in coverage adjustments for missing countries in the annual non-financial sector accounts.

#### *3.2 Tables by industry*

In the ESA 95 transmission schedule, a set of tables is specified that provide a breakdown by economic activity (Table 3). This set of tables provides information on output, intermediate consumption, value added components, etc. They provide data at the level of the A31 breakdown. The information in these tables has been used for the completion of the Non-Financial Sector Accounts and for the updating of Supply and Use tables from 1997 to 1999.

#### *3.3 Balance of Payments Statistics*

Because of the lack of geographical detail in the ROW account of the non-financial sector accounts, additional information was obtained from quarterly national Balance of Payments (BoP) statistics. Published data by Eurostat on annual national BoP statistics (for services and re-invested earnings) also assisted in the compilation of the EAAM ROW account.

#### *3.4 SAMLEG*

Recently, an important initiative on the compilation of EU Social Accounting Matrices came to a close, namely the SAM Leadership Group (2002). This has led to the publication of a SAM compilation manual by Eurostat. Members of this group have produced a number of Social Accounting Matrices for the year 1997. Although data for the two largest euro area Member States are not included, the transaction matrices obtained from members of the SAM-LEG were used to assist in the compilation of EAAM transaction matrices by sector and counterpart sector.

### 3.5 ECB Annual Report

The ECB annual report for 2000 was used for the compilation of the ECB non-financial sector accounts.

## 4. ADDITIONAL SOURCES FOR THE FINANCIAL ACCOUNTS OF THE EAAM

The statistical sources to compile the financial part of the EAAM are monthly, quarterly and annual financial data available at the ECB. Integrating these data sets into an accounting framework for the euro area also enabled quality checks in terms of plausibility and consistency.

### 4.1 Financial institutions statistics

#### 4.1.1 Euro area MFI balance sheet statistics

As shown in the ECB Monthly Bulletin (euro area statistics, Chapters 1 and 2), timely and high-frequency balance sheet and transaction data are available for the Eurosystem (ESA 95 sector S.121), other euro area monetary financial institutions (other MFIs, S.122), and euro area MFIs on a consolidated basis (S.121/122). MFI statistics cover monthly and quarterly stocks and transactions as originally specified in the Regulation (ECB/1998/16)<sup>22</sup> concerning the compilation of the consolidated balance sheet of the MFI sector. The data - available from 1997Q3 onwards - are broken down by financial instrument, original maturity, institutional sector, currency, and residency. These balance sheet data are the basis for the compilation of the euro area monetary aggregates.

In general, transaction data are not directly collected but derived from changes in stocks with adjustments made to remove the impact of other flows like reclassifications and revaluations<sup>23</sup>. While euro area Member States supply monthly adjustments on 'reclassifications' and revaluations other than exchange rate changes, they have only recently started to report quarterly adjustments for more detailed sectoral breakdowns necessary for quarterly Monetary Union Financial accounts (MUFA).

For the compilation of quarterly MUFA, stock and transaction data on currency, deposits and loans are taken from MFI balance sheet statistics. These time series only see liabilities incurred or granted by euro area MFIs to the non-monetary euro area sectors.

#### 4.1.2 Statistics on other financial intermediaries and financial auxiliaries

Data on other financial intermediaries, except insurance corporations and pension funds (OFIs), are needed to monitor their role in financial intermediation, and – together with the MFI and insurance corporations and pension funds statistics – to provide a comprehensive picture of financial intermediation in the euro area. Since January 2003, stock data for OFIs are published in the ECB Monthly Bulletin referring to stock data for investment funds starting in the last quarter of 1999.

---

<sup>22</sup> From January 2003 replaced by Regulation ECB/2001/13 of 22 November 2001.

<sup>23</sup> For financial transactions, the term 'true flows' or 'flows' is used in MFI statistics.

## 4.2 Balance of payments and international investment statistics

Euro area balance of payments and international investment position statistics are based on a functional approach, which distinguishes direct investment, portfolio investment, financial derivatives, other investment and reserve assets. Direct investment data are broken down into equity capital, reinvested earnings and other capital, which mostly refers to inter-company loans. Both categories are further split by counterpart sector (MFIs and non-MFIs). Portfolio investment data distinguish between equity and debt instruments (bonds and notes as well as money market instruments). The breakdown by counterpart sector covers data for the Eurosystem, MFIs, general government and other sectors. Other investment data provide figures for loans or currency and deposits, for trade credits and for other assets or liabilities with the same breakdown by counterpart sector as for the portfolio investment data.

To achieve a complete and consistent integration of balance of payments and international investment position data into the euro area rest of the world account, recommendations have been outlined in Annex II of the SNA 93 and in Appendix I of the IMF Balance of Payments Manual, 5th Edition (BPM5) on the “Relationship between the SNA rest of the world account to the balance of payments accounts and the international investment position.”

For the euro area, the requirements of the SNA 93 and the BPM5 have not yet been fully implemented and a full ‘translation’ of the euro area balance of payments and international investment position data into the euro area rest of the world accounts is not yet available. The ECB’s Working Groups on MUFA and on Balance of Payments have already started work to achieve this.

Specific problems are related to the available instrument breakdowns of data covered by the direct, portfolio and other investment categories. While some financial instruments can easily be translated into the euro area rest of the world accounts, others cannot. In particular, a further breakdown of direct, portfolio and other investment by instrument and original maturity would help to improve the translation process. For example, transactions in and stocks of shares and other equity by subcategory are included in direct and portfolio investment as well as in reserve assets, but not separately specified. The same applies to the transactions in and stocks of insurance technical reserves and to loans and deposits as part of other investment.

## 4.3 Capital market statistics

### 4.3.1 *Statistics on securities issues*

Securities issues statistics comprise statistics on securities issued by residents of the euro area in both euro and other currencies, and by non-euro area residents in euro. The database contains time series at different levels of aggregation according to the residency of the issuer, the issuing currency and the issuing sector. In relation to the maturity, sector and instrument breakdown, securities issues statistics conform to ESA 95. The issues of securities other than shares are, however, recorded at nominal value.

At present, the published data see securities other than shares (debt securities) for which a breakdown by original maturity (short and long-term), institutional sector (NCBs and ECB, other MFIs, other financial intermediaries, insurance corporations and pension funds, non-financial corporations, central government, state and local government, social security funds, and international institutions) and security type (fixed, floating and zero-coupon) is available. Moreover, stock data on quoted shares are published with the same sector breakdown.

## ANNEX 4 EAAM COMPILATION

### 1. INTRODUCTION

The Euro area Accounting Matrix (EAAM) captures the production structure, the institutional flows and the financial flows of the euro area. Its structure has been described above. In this Annex, the construction of the EAAM is described.

The construction of the EAAM is particularly challenging in a number of aspects. In the case of the National Accounting Matrices (NAM) the point of departure is that the compiling institution already has elaborated the two component NA frameworks namely the Supply and Use table (SUT) and the Integrated Economic Accounts (IEA) including the financial accounts. The main challenge of the national compilers is therefore the elaboration of whom-to-whom or transaction matrices to enable a NAM presentation.

With respect to the EAAM, the point of departure is much less satisfactory than at the national level. First of all, with respect to the euro area there is at present no complete set of data. With respect to both SUT and non-financial and financial accounts, coverage of the euro area is incomplete. Not all Member States provide the relevant data. Therefore the component systems of the EAAM, the SUT, the Non-Financial Accounts and the Financial Accounts all need to be completed for coverage. These coverage adjustments are quite large in some respects; for instance the SUT block in the EAAM is presently based on the data obtained from 5 Member States out of the 12. With respect to the IEA the coverage is much better; only 3 smaller Member States do not compile either the non-financial accounts by institutional sector or the financial accounts by institutional sector.

Secondly, as the source data for the compilation of the EAAM are obtained through the ESA95 transmission programme, certain desirable components of the EAAM could not be fully elaborated, because the level of transaction detail is not synchronised between the various tables in the transmission programme. Therefore, particular transaction breakdowns could not be elaborated, notably labour related income flows in the generation of income account.

Another complication in the compilation of the EAAM is that the euro area needs to be represented as a single entity, and that SNA93 residency rules need to be re-interpreted with respect to the euro area. This implies inter-alia that trade, income and financial transactions between the Member States should not be reflected in the ROW Accounts of the EAAM. It is therefore necessary to subdivide the ROW account into transactions between MS, the intra euro area transactions, and transactions of MS with countries that do not belong to the euro area, the extra euro area transactions. In order to remove the intra-euro area transactions, an additional set of constraints is enforced on the EAAM, namely that the intra-euro area outgoing flows are equal to the corresponding intra – euro area incoming flows. The allocation of flows between intra - euro area and extra – euro area flows is in itself already a challenging task.

A final complication for the EAAM is that the ECB, which is regarded as an international organisation from a national perspective, is a national organisation from a euro area perspective; it should now be incorporated as a resident institution.

The compilation of the EAAM therefore includes the work normally done for the compilation of a NAM, but by necessity it is preceded by the work required to complete the euro area SUT and IEA, and the compilation of the geographical split.

As yet no regular compilation of euro area SUT or euro area non-financial accounts by institutional sector has been established and therefore the work on the EAAM reported here is of a highly experimental nature. Especially this refers to the compilation of transaction matrices, because to date no detailed transaction matrices are available for the largest Member States.

## 2. COMPILATION OF THE NON-FINANCIAL IEA BLOCK

The non-financial accounts by institutional sector, or non-financial IEA are the central component in the EAAM. They connect to the production block (the SUT) as well as to the Financial Accounts. Also these IEA provide the reference totals for the transaction matrices that capture the *from whom to whom* flows required in the EAAM. From the compiled IEA it will be possible to make a confrontation with the other components in the system, notably the financial accounts, and to come to an assessment of the statistical discrepancies that arise between the component data systems.

The source data for the non-financial IEA have been obtained through the ESA95 transmission programme for 10 out of 12 Member States. Because of the central role of the non-financial IEA to connect the various components in the EAAM, it is necessary to first compile the non-financial IEA. Particular problems that were addressed in this process are:

- The IEA data transmitted to Eurostat were subject to consistency and comparability problems. Adjustments are required to Member States data to make them conform to a common set of conventions as well as to correct for data transmission errors;
- Although the two missing countries do not have a large impact on euro area GDP (around 1.5%), they seem to have a larger effect on the income transactions that are captured in the IEA, and therefore on the EAAM. It was necessary to compile synthetic IEA datasets for each of the two countries that are consistent with the national accounts aggregates and BoP data published by these Member States
- The ECB is included as part of the MFI sector. It was therefore necessary to compile a set of integrated non-financial accounts for the ECB.
- Virtually no Member State makes a distinction between intra and extra euro area flows. Such detail is available from balance of payments statistics, but direct use of the euro area BoP leads to conceptual and consistency problems. The BoP cannot provide the required detail in the IEA transaction classification and the use of the euro area BoP data would immediately introduce discrepancies that are as yet difficult to analyse and correct. It was therefore necessary to compile an intra-extra euro area split in the ROW accounts of the Member States using BoP data and a series of assumptions.

### 2.1 Completion of the Accounts

The compilation of the IEA for the euro area involves the estimation of the impact of two missing countries, Luxembourg and Ireland. Because of the atypical economic structure of these countries, it was decided to estimate the IEA for each of these countries separately, and then to aggregate the results together with the available data on the remaining 10 Member States.

The estimation of the IEA for each of these countries took into account the following available data

- GDP and its components
- The (highly) aggregated ROW account used for the GNI calculation
- The fully elaborated government sector account
- The Balance of Payments (BOP) data, quarterly and annual.
- The economic structure by institution of a 'comparable' country

The estimation was performed in such a way that the resulting estimation is consistent with the macro economic aggregates and the government sector accounts. As structurally comparable



countries for Luxembourg and Ireland were selected: Belgium and the United Kingdom, respectively.

## 2.2 Compilation of the IEA for the ECB

Lacking detailed primary data, a rough approximation for the ECB was made on the basis of the profit and loss statement published in the ECB annual report.

## 2.3 Imputation of the Intra-Extra Euro Area breakdown

For many, although not all, European countries, the Balance of Payments is not identical to the Rest of the World Account. This can be explained by a variety of reasons. The most important is however that in many countries the IEA are compiled annually, and the BoP are compiled quarterly or even monthly. As a result the BoP data tend to be seen as basic data in the compilation of the ROW account, to be complemented with additional information obtained from, for instance, counterpart sectors. The BoP also tends to have much less transaction detail than the ROW account. On the other hand, it is unfortunate that the ROW accounts do not provide the intra-extra euro area geographical breakdown that is required to produce a euro area IEA. To a large extent, this breakdown is however available from the BoP, albeit at a more aggregate level.

### 2.3.1 Imputing a intra-extra euro area breakdown

In order to compile the intra-extra euro area breakdown, the national ROW data need to be broken down in the intra-extra euro area components first before the euro area ROW is calculated by aggregation. This is achieved by using national BoP data broken down by intra – extra transactions. The geographical breakdown was refined as much as possible by using additional data on direct foreign investment and by pre-assigning data to either intra or extra euro area. For instance, taxes and subsidies on production on the ROW are typically transfers involving the European Union and the MS, and are therefore classified as extra euro area.

After making the most detailed presentation possible for intra and extra transactions, the national ROW are aggregated to the euro area ROW. At this stage, the euro area asymmetry problem can be assessed, although not solved. The aggregate results of this exercise are shown in Table 7 below.

**Table 7 Imputed intra-extra euro area breakdown.**

Code	Description	Assym- metries 1= 6-3	Uses			Resources		
			ROW	Intra Euro	Extra Euro	ROW	Intra Euro	Extra Euro
			2	3	4	5	6	7
P6/P7	Exports/Imports of Goods and Services	- 17.4	2,075.1	1,005.4	1,070.9	1,982.4	988.0	995.5
D1	Compensation of Smployees	- 0.5	16.1	8.7	7.9	13.6	8.2	5.8
D2-D3	Taxes less Subsidies on Production	-	34.9	-	35.0	38.8	-	38.8
D4	Property Incomes	- 17.0	363.5	179.0	182.6	385.5	162.0	221.6
D5	Taxes on Income and Wealth	- 3.3	8.1	4.1	4.0	2.4	0.8	1.6
D61	Social Insurance Contributions	- 0.3	4.9	2.6	2.3	3.8	2.3	1.5
D62	Social Insurance Benefits	2.1	4.0	1.5	2.5	12.0	3.6	8.4
D7	Current transfers	2.1	49.0	18.3	30.6	81.0	20.3	60.6
D9	Capital Transfers	0.7	22.9	2.8	19.9	11.2	3.5	7.8
		- 33.7	2,578.5	1,222.4	1,355.7	2,530.6	1,188.7	1,341.6

### 2.3.2 *Reconciling the euro area integrated economic accounts (EA-IEA)*

After obtaining the intra-extra split, the EA-IEA are still consistent with the underlying national and institutional data sets. However at the level of the euro area, the debit and credit flows (uses and resources) on the intra euro ROW account do not cancel out, creating the so-called asymmetry problem. There are many reasons for this problem and there are two possible approaches for resolving it. The first approach is called the ‘bottom-up’ approach, which requires countries to compile and assess mirror statistics, and to resolve such problems bilaterally. The second approach is called the ‘top down’ approach and relies on the use of reconciliation techniques to remove the asymmetries.

The solution of the asymmetry problem by means of a top-down approach, which is the only practical short-term solution, can only be applied at the euro area level, and it will have an effect throughout the EA-IEA. Therefore, the direct link between Member States data sets and the euro area estimates is broken. Euro area accounts are not equal to the sum of Member States IEA.

In the context of the (non financial) IEA compilation, a top-down method was chosen to reconcile the asymmetries. The advantage of using a top-down method for the whole of the IEA rather than its application to BoP data only is evident. Implications of the removal of asymmetries are immediately reflected in certain types of transactions with certain national sectors and the plausibility of the allocation of the asymmetries can be assessed immediately.

In the formulation of the balancing procedure, much attention needs to be paid to the construction of the constraints as well as to the assignment of relative reliabilities. In the context of the EAAM compilation, it was decided to allow asymmetries to spill over to the euro area extra ROW account, as well as to the national sectors, except the government sector (in view of its more extensive and more reliable data coverage in the euro area). A further constraint in the system was that (given the importance and relative reliability of the GDP/GNI estimates) value added estimates were fixed. Such additional constraints obviously translate into larger adjustments of final demand, notably household consumption and capital formation. These adjustments lead to a larger effect on the household savings rate. The outcome of this ‘top down’ approach is a consistent set of accounts, but a sensitivity analysis is still required to fully understand and assess the different outcomes.

**Table 8** Effect of removal of asymmetries by means of a ‘top-down’ method

Code	Description	Before application of 'down' method	After application of 'top-down' reconciliation	% Difference
P1	Production	11,158	11,151	- 0.06
P2	Intermediate Use	5,566	5,567	0.02
B1G	Value Added	5,592	5,584	- 0.14
P3	Final Consumption	4,836	4,847	0.22
P51	Gross Fixed Capital Formation	1,318	1,318	0.02
P52+P53	Changes in Stocks and net acq. Of valuables	31	31	- 0.00
P6/S2	Exports	2,075	2,065	- 0.49
P7/S2	Imports	1,982	1,990	0.40
P6/S22	Extra EA exports	1,071	1,071	- 0.02
P7/S22	Extra EA Imports	996	996	0.05
D1	Compensation of Employees	3,108	3,104	- 0.10
D21-D31	Taxes less subsidies on production	674	674	0.02
B2+B3	Operating Surplus and Mixed Income	1,517	1,512	- 0.28
B6/S14	Household Disposable Income	3,914.6	3,903.8	- 0.28
B8/S14	Household Savings	368.0	346.5	- 5.83
S/R	Savings Rate	9.40	8.88	- 5.57

## 2.4 Construction of transaction matrices

In order to compile the EAAM, there is a need for 3 transaction matrices. The first matrix is the Interest Matrix, which is crucial in the context of the analysis of the transmission of monetary policy. The second transaction matrix summarises all remaining property incomes (D42, Distributed Income, D43 Re-invested Earnings, D44 Property Income Due to Policy Holders, D45 Rents). The third matrix combines the entire process of secondary income distribution, D5, Income and Wealth Taxes, D61, D62 Social Insurance Contributions and Benefits, and D7 Current Transfers.

Transaction matrices are not part of the ESA95 transmission programme. Only a few Member States compile some transaction matrices on a regular basis. The transaction matrices that have been derived for the EAAM are therefore tentative. They must be considered an area for further research.

### 2.4.1 Construction of the euro area Interest Matrix

Much work has gone into the estimation of interest flows between institutional sectors, based on interest rates and stock and transaction data, mainly taken from the Table on Financing and Investment (TFI)<sup>24</sup>. The compilation of an interest matrix on the basis of this work is ongoing.

**Table 9 Unbalanced estimate of euro area interest matrix, consistently aggregated**

	S1	S11	S12	S13	S14	S2	Total
S1	1,050,760	223,528	464,315	186,452	176,465	110,601	<b>1,161,361</b>
S11	22,986	558	15,619	6,809	-	2,328	<b>25,314</b>
S12	910,891	220,880	359,430	154,116	176,465	99,545	<b>1,010,436</b>
S13	8,767	195	6,189	2,383	-	815	<b>9,582</b>
S14	108,116	1,895	83,077	23,144	-	7,913	<b>116,029</b>
S2	106,336	44,432	61,904	-	-	-	<b>106,336</b>
Total	<b>1,157,096</b>	<b>267,960</b>	<b>526,219</b>	<b>186,452</b>	<b>176,465</b>	<b>110,601</b>	<b>1,267,697</b>

Millions of Euro

In order to arrive at an estimate for the interest matrix that is consistent with the Table 9 data, the interior needed to be re-estimated making use of the RAS method<sup>25</sup>. This method is expedient to adjusting an interior distribution to known row and column totals.

The resulting transaction matrix is already consistent with the euro area concept (euro area BoP data was used to obtain the totals for the RoW). In other words, the adjustments described above to solve asymmetries are not necessary in this case.

<sup>24</sup> See ECB (2001) for a description of the TFI.

<sup>25</sup> See for instance Bacharach (1970) for a full description of this method. This simple iterative method is best known for its application in updating the interiors of input-output tables.

**Table 10 Euro area interest matrix, consistent with euro area integrated economic accounts**

	S1	S11	S12	S13	S14	S2	Total
S1	1,158	164	524	274	195	144	1,302
S11	67	1	41	24	-	8	75
S12	866	160	323	187	195	115	981
S13	25	0	16	9	-	3	28
S14	200	3	143	54	-	18	218
S2	154	56	98	-	-	-	154
Total	1,312	220	622	274	195	144	1,456

Billions of Euro

#### 2.4.2 Construction of the other euro area transaction matrices

Similar to the compilation of the euro area ROW account for non-financial transactions, it was decided to build up the euro area transaction matrices on the basis of the aggregation of national transaction matrices. National transaction matrices were estimated for all Member States for the following types of transactions: D42, D43, D44, D45, D5, D61, D62, D71, D72, D73, D74 and D75. The advantage of this approach is that when transaction matrices are already available, such as in the case of the Netherlands, these can easily be inserted.

Transaction matrices were first compiled without an intra-extra breakdown, to be consistent with the national IEA only. In the second phase, the intra-extra split was imputed.

Several transaction matrices were easy to compile because the counterpart sectors could be inferred from the types of transactions. This applies to transactions D43, D44, D5, D61, D62, D71, D72, D73, and D74 in so far as national flows are concerned. The transaction matrices for D42, Distributed Income of enterprises, and D75, other current transfers are the two transaction matrices that are harder to complete and require some assumptions.

With respect to Belgium, Finland, Netherlands and Portugal transaction matrices were directly obtained from the National Statistical Institute (NSI) concerned. As these transactions matrices were of a vintage that is different from the estimates in Table 8, these transaction matrices were adjusted to the estimates from the IEA.

With respect to countries that provide a breakdown of the counterpart sectors of transactions with the General Government (S13), the incomings and outgoings for General Government were recorded directly in the transaction matrix for D75. Subsequently, the transactions between the other sectors were calculated by a combination of row-wise and column-wise residual estimation.

#### 2.4.3 Imputation of intra/extra euro area breakdown in transaction matrices

The aggregation of the transaction matrices of the individual countries does not yet provide a transaction matrix for the euro area. This is due to the fact that the transactions within the euro area but across countries' national boundaries cannot be directly allocated to a counterpart sector. When the transaction matrices are elaborated to reflect the intra-extra euro area distinction, it is not sufficient to remove or balance out the row and column in the transaction matrix that refers to the intra euro area transactions. A second step is required in which the intra flows are allocated to euro-area counterpart sectors.

A small example serves to clarify this point. We present below a 5 by 5 transaction matrix based on 2 countries jointly forming a regional aggregate, and each of the countries has 2 national sectors. The fifth row/column in the transaction matrix is the ROW of the regional aggregate.

**Table 11 Within and between country transaction matrix**

		Country A		Country B		ROW	
		S1	S2	S1	S2		
Country A	S1	20	30	5	8	12	75
	S2	100	15	2	3	6	126
Country B	S1	2	6	15	65	22	110
	S2	6	1	45	25	5	82
ROW		3		5	3		11
		131	52	72	104	45	404

The intra flows are captured in the off-diagonal transaction matrices. For instance, sector S1 in country A receives 5 from sector S1 and 8 from sector S2 in country B. Likewise, Sector S1 in country A pays 2 to sector S1 and 6 to sector S2 in country B.

From the national accounts of these two countries, only the within country transaction matrices are known. These are depicted on the main diagonal. Within country A, sector S1 receives 20 from S1 and 30 from S2, and it pays 100 to S2.

The aggregation of the national transaction matrices is shown below. It is clear that the receipt of 95 by sector S1 from sector S2 only includes the 30 and the 65 recorded within each of the countries, but omits the 14 that are recorded between the countries.

**Table 12 Aggregation of national transaction matrices**

		Country A+B		ROW		
		S1	S2	Intra	Extra	
Country A+B	S1	35	95	21	34	185
	S2	145	40	12	11	208
ROW	Intra	15	18			33
	Extra	8	3			11
Total		203	156	33	45	437

In order to obtain the 'true' transaction matrix for the regional aggregate, the between country transaction matrices need to be added. In Table 13, the flows from S2 to S1 are now correctly reflected as  $109 = 95 + 14$ .

**Table 13 Transaction matrix for regional aggregate**

		Country A+B		ROW	
		S1	S2		
Country A+B	S1	42	109	34	185
	S2	153	44	11	208
ROW		8	3		11
Total		203	156	45	404

It is clear therefore that the transaction matrices for D42..D45 and D5..D7 used in the EAAM need to be adjusted to absorb the intra euro area flows as flows between national sectors. This adjustment is based on the following steps, logically at the level of the euro area transaction matrix estimates.

- The intra / extra euro breakdown for uses and resources of transactions at the most detailed level is obtained from the euro area IEA, after the asymmetries have been resolved by means of the balancing algorithm described above.
- The intra / extra euro area breakdown by counterpart sector is obtained by means of a proportional allocation and subsequent rebalancing of the transaction matrices.
- The intra flows that are now consistent are extracted from the transaction matrix and used as reference totals. The distribution of the intra flows across sectors and counterpart sectors is obtained on the basis of the assumption that the available distribution of the flows between national sectors is also representative for flows between sectors and counterpart sectors located in two different countries of the euro area. This allocation is made using the RAS method.

### 3. COMPILATION OF THE SUT BLOCK

The estimation of the SUT component for the EAAM uses two data sources. The first data source concerns the SUT tables obtained under the ESA95 transmission programme as tables 15 and 16. The second data source is the macroeconomic aggregates provided by all Member States under table 1 of the transmission programme.

Because of the conformity of the SUTs transmitted to Eurostat, it is possible to aggregate them to a partial European Aggregate. Currently, identically structured SUTs are available for AT, BE, DE, FI, FR, IT, PT. With respect to ES and DE, a SUT for 1999 was not available and the estimation was based on adjusted 1997 SUT's. Although NL produces SUTs annually, these are not in conformity with the requirements of Eurostat.

The estimation method itself consists of six steps and divides the work into the construction of two separate SUTs. The first SUT is the aggregation of the reported SUTs of MS belonging to the euro area, the second SUT is the estimated SUT for euro area MS for which no SUTs are available. The latter SUT is estimated based on the structural relationships contained in the former. After addition of the reported and estimated SUTs a final step is the calculation and eventual removal of foreign trade asymmetries and the removal of intra flows.

The steps are as follows:

1. Aggregation of available SUT tables. This implies the aggregation of SUT tables for 1999, as well as the aggregation of updated 1997 SUT tables for those MS for which 1999 tables are not available.
2. Calculation of grossing up factors on the basis of Table 1 data. These grossing up factors are specific for individual transactions and individual activities.
3. The grossing up of final consumption of households, export and imports requires that first an assumption is made with respect to the contribution to final consumption, imports and exports of the items 'expenditures abroad by residents' and 'consumption of non-residents in the domestic economy'. These adjustment items are separately grossed up on the basis of reference data available from Table 5 of the ESA95 transmission programme. The consumption, exports and imports columns are netted for these adjustment items, and subsequently the netted values are grossed up. Finally, the final consumption, export and import columns are recalculated by adding the appropriate adjustment columns. This

treatment is necessary because the missing countries are smaller and therefore the grossing up factors for imports and exports are much higher than those of final consumption.

4. Calculation of the SUT interiors for the aggregate of the missing countries, with the exception of the trade and transport margins.
5. Calculation of trade and transport margins for the missing countries. For the available countries, aggregate trade and transport margins by commodity are computed. These trade and transport margins are then scaled such that the calculated trade and transport margins are roughly consistent with total output of the trade and transport sector. The scaling factor arrived at is 75%. Again, this reflects the importance of external trade for the missing countries.
6. Reconciliation of Missing Countries SUT using a balancing algorithm.
7. Addition of the aggregated missing countries and aggregate available countries SUTs to a euro area SUT.

The reconciliation of the missing countries' SUTs in step 6 involves the application of the Stone method<sup>26</sup> to obtain commodity balances. The model is constructed in such a way that the known aggregates from table 1 are not altered.

A refinement of the method involves the introduction of additional data on the product composition of foreign trade and on the commodity composition of household final demand. Unfortunately, no detailed information on the product composition of output is available for some non-reporting countries.

### 3.1 Completion of the Accounts

#### 3.1.1 Estimation of 1999 SUT for DE and ES

The 1999 SUTs for DE and ES were not available yet at the time of writing this article. Because of the large impact on the euro area total of DE and ES combined, it was decided that the estimation of 1999 data sets for DE and ES is the preferable procedure.

The procedure for obtaining 1999 SUT estimates for DE and ES is essentially the same. All the flows in the SUT are related to a corresponding aggregate from ESA95, Table 1. Then the estimates for the SUT1999 are calculated using the adjustment factor derived from the national accounts aggregates (NAA) for 1997 and 1999 respectively, and the known data from the SUT1997:

$$\text{SUT1999} = \text{NAA1999}/\text{NAA1997} * \text{SUT1997}$$

The result will be a table that shows commodity imbalances. These are subsequently removed by means of an automated reconciliation algorithm, which maintains consistency with the known reference totals.

---

<sup>26</sup> The algorithm goes back to Stone *et al.* (1942). This is a well-known method to resolve discrepancies in national accounts data, based on a quadratic minimisation problem. Its application to a Social Accounting Matrix is described in Stone (1976)



### 3.1.2 Estimation of the 1999 euro area SUT.

The euro area SUT is estimated on the basis of the available SUTs, by assuming that the commodity distribution by transaction and activity of the available SUTs is representative for the commodity distribution by transaction and activity of the missing country SUTs. Obviously, this is a strong assumption and the method can certainly be improved upon by using wherever possible additional data broken down by commodity for 1999. This should in principle be possible for foreign trade (imports and exports of goods and services), private final consumption by households, etc. At this stage, this approach was not yet pursued.

Therefore, the estimation method for the 1999 euro area SUT roughly follows the same estimation scheme as the single country estimation for DE and ES. We chose to estimate first a SUT for the missing countries (ESSUT99), and subsequently to balance this SUT, before adding the available SUTs (AVSUT99) and obtaining the complete euro area SUT (EASUT). This allows a separate assessment of the statistical discrepancies and resolution of these errors in the context of the missing countries. Subsequent to the estimation of the estimated missing country SUT, the commodity balances need to be resolved whilst maintaining consistency with the euro area aggregates. This is done by means of the Stone reconciliation algorithm; while taking care that consistency is maintained with the reference aggregates.

The adjustment factors used to compute the estimated SUT for missing country estimates is given by:

$$\text{ESSUT1999} = \text{ESAGGR1999}/\text{AVAGGR1999} * \text{AVSUT1999}$$

$$\text{EASUT1999} = \text{AVSUT1999} + \text{ESSUT99}$$

Essentially, the estimate for a flow in the euro area SUT is equal to the corresponding flow for the SUT for the available countries times a grossing up factor, based on ESA Table 1 data.

## 3.2 Imputation of the Intra-Extra Euro Area breakdown of trade in goods and services

The intra-extra breakdown with respect to exports and imports by product is achieved making use of two additional data sources

- The Eurostat trade database (ComExt)
- Annual BoP published by Eurostat.

These data sources are used to obtain the proportions of intra and extra trade for each of the 6 products, as well as for the adjustment items. It is clear that the intra-extra breakdown thus arrived at contains asymmetries, which need to be removed at a later stage.

In a second phase, the euro area SUT needs to be made consistent with the euro area sector accounts using the euro area ROW (extra ROW). This implies adjustments to the SUT block to make it consistent with the macro economic totals from the sector accounts, while at the same time the asymmetries need to be removed from the import and export vectors. Because the discrepancies are relatively minor in comparison to the other flows, it was decided to remove these by means of a balancing algorithm.

## 4. COMPILATION OF THE FINANCIAL IEA BLOCK

The source data for the financial IEA have been obtained through the ESA95 transmission programme (table 6) for 9 out of 12 Member States. Only Greece, Luxembourg and Ireland do not transmit Table 6 data. On the basis of these data, euro area annual financial and capital accounts for the non-financial sectors are regularly compiled and published in the ECB Monthly Bulletin<sup>27</sup>.

The data however present the following short-comings that were addressed by using alternative data sources and making simplifying assumptions:

- Although the missing countries do not have a large impact on euro area GDP, they are relatively important for certain sectors and/or transactions. This is the case for the financial sector in Luxembourg or for direct investment in Irish non-financial corporations. Therefore, the accounts have been completed for the missing countries using alternative data sources, and only for those sectors/instruments that are particularly affected by the absence of corresponding country data.
- The ECB has been included using the aggregated MFI balance-sheet data.
- The aggregated rest of the world sector from Table 6 does not correspond to the euro area (9 countries) rest of the world account, as intra-euro area cross-border transactions are not excluded from the aggregate. Moreover, virtually no Member State makes a distinction between intra and extra euro area flows. Such detail is available from balance of payments statistics. However, the BoP cannot be directly used for compiling the rest of the world sector as the instrument breakdown follows the usual functional classification instead of the one used in national accounts. Therefore, some assumptions have been used to bridge these differences.

### 4.1 Completion of the Accounts

The sum of Table 6 data has been adjusted to account for the data shortcomings in the following way:

- Deposits held and incurred and loans granted by MFIs have been compiled from the MFIs balance sheet and transaction statistics. By doing so, the aggregate includes the important Luxembourg data and the ECB data.
- The flows related to investment funds for Ireland and Luxembourg have been estimated and added to the ESA Table 6 aggregate. The estimation method has been carried out in different ways depending on data availability:
  - For Ireland, the data on equity portfolio investment in the country from the national balance of payments has been added to mutual fund shares (F.52) as liabilities. The implicit assumption is that most of this inflow corresponds to investment funds liabilities. Conversely, the portfolio investment abroad has been added to the corresponding asset categories accounting for the investment of the resident investment funds abroad. It is therefore assumed that the domestic flows for the Irish mutual funds are not important.
  - For Luxembourg, the lack of national balance of payments and the availability of stock data by the end of the year lead to a different strategy. The weight of Luxembourg investment funds in the total euro area aggregate (according to euro area investment fund

---

<sup>27</sup> See ECB (2002) for a description and an analysis of these data.

statistics, which cover all 12 countries except Ireland) has been used to gross up the Table 6 data on OFIs. The weight mentioned is around 25% by the end of 1999. For grossing up the corresponding investment categories, the weight of investment funds in the OFI sector (according to a survey carried out by the ECB's Money and Banking Statistics Division) has also been used.

- Shares and other equity other than mutual fund shares (F.51) issued by Irish and Luxembourg companies have been estimated by using data on direct investment. Again, the internal transactions are considered as negligible. As a 1999 BoP for Luxembourg alone is not available, direct investment has been estimated by applying the weight of Luxembourg in the joint Belgium/Luxembourg national balance of payments in 2001 to the total 1999 direct investment in Belgium and Luxembourg. For Ireland, the estimate has been allocated to Non-financial corporations, whereas for Luxembourg it has been allocated to financial corporations.
- Securities other than shares issued by Irish and Luxembourg companies have been estimated from the debt portfolio investment in the corresponding country. For Luxembourg, an estimation of portfolio investment as described above has been carried out.

## 4.2 Estimation of the euro area rest of the world sector

The euro area BoP has been used to estimate the euro area rest of the world account. For many of the instrument categories as used in the EAAM (ESA 95 economic categories), a direct link from the BoP functional categories can be made. For instance, this is the case for equity portfolio investment that corresponds to shares and other equity (F.50).

However, in most of these cases, a reliable additional breakdown into sub-categories cannot be carried out. For example this concerns equity portfolio investment, in which the part corresponding to mutual fund shares cannot be singled out and therefore the split of F.50 into F.51 and F.52 cannot be done. This is the reason why such breakdown is not shown in the EAAM.

In the particular case of loans and deposits, the following assumptions have been made:

- Deposits of resident abroad: estimated as the reserve assets other than gold, SDRs and securities and the other investment in loans/deposits made by the monetary authority and other resident sectors. The deposits held abroad are taken from MFI balance sheets and transaction statistics.
- Loans granted by residents to non-residents: estimated as direct investment/other capital and other investment in loans/deposits made by the general government and the MFIs (except the deposits held abroad according to MFIs statistics).
- Deposits with residents held abroad: estimated as other investment in loans/deposits liabilities of MFIs.
- Loans granted by non-residents to residents: estimated as direct investment/other capital in the euro area and other investment in loans/deposits liabilities of the general government and the other resident sectors.

## European Central Bank working paper series

For a complete list of Working Papers published by the ECB, please visit the ECB's website (<http://www.ecb.int>).

- 302 “Deposit insurance, moral hazard and market monitoring” by R. Gropp and J. Vesala, February 2004.
- 303 “Fiscal policy events and interest rate swap spreads: evidence from the EU” by A. Afonso and R. Strauch, February 2004.
- 304 “Equilibrium unemployment, job flows and inflation dynamics” by A. Trigari, February 2004.
- 305 “A structural common factor approach to core inflation estimation and forecasting” by C. Morana, February 2004.
- 306 “A markup model of inflation for the euro area” by C. Bowdler and E. S. Jansen, February 2004.
- 307 “Budgetary forecasts in Europe - the track record of stability and convergence programmes” by R. Strauch, M. Hallerberg and J. von Hagen, February 2004.
- 308 “International risk-sharing and the transmission of productivity shocks” by G. Corsetti, L. Dedola and S. Leduc, February 2004.
- 309 “Monetary policy shocks in the euro area and global liquidity spillovers” by J. Sousa and A. Zaghini, February 2004.
- 310 “International equity flows and returns: A quantitative equilibrium approach” by R. Albuquerque, G. H. Bauer and M. Schneider, February 2004.
- 311 “Current account dynamics in OECD and EU acceding countries – an intertemporal approach” by M. Bussière, M. Fratzscher and G. Müller, February 2004.
- 312 “Similarities and convergence in G-7 cycles” by F. Canova, M. Ciccarelli and E. Ortega, February 2004.
- 313 “The high-yield segment of the corporate bond market: a diffusion modelling approach for the United States, the United Kingdom and the euro area” by G. de Bondt and D. Marqués, February 2004.
- 314 “Exchange rate risks and asset prices in a small open economy” by A. Derviz, March 2004.
- 315 “Option-implied asymmetries in bond market expectations around monetary policy actions of the ECB” by S. Vähämaa, March 2004.

- 316 “Cooperation in international banking supervision” by C. Holthausen and T. Rønde, March 2004.
- 317 “Fiscal policy and inflation volatility” by P. C. Rother, March 2004.
- 318 “Gross job flows and institutions in Europe” by R. Gómez-Salvador, J. Messina and G. Vallanti, March 2004.
- 319 “Risk sharing through financial markets with endogenous enforcement of trades” by T. V. Köppl, March 2004.
- 320 “Institutions and service employment: a panel study for OECD countries” by J. Messina, March 2004.
- 321 “Frequency domain principal components estimation of fractionally cointegrated processes”  
by C. Morana, March 2004.
- 322 “Modelling inflation in the euro area” by E. S. Jansen, March 2004.
- 323 “On the indeterminacy of New-Keynesian economics” by A. Beyer and R. E. A. Farmer, March 2004.
- 324 “Fundamentals and joint currency crises” by P. Hartmann, S. Straetmans and C. G. de Vries, March 2004.
- 325 “What are the spill-overs from fiscal shocks in Europe? An empirical analysis” by M. Giuliodori  
and R. Beetsma, March 2004.
- 326 “The great depression and the Friedman-Schwartz hypothesis” by L. Christiano, R. Motto and  
M. Rostagno, March 2004.
- 327 “Diversification in euro area stock markets: country versus industry” by G. A. Moerman, April 2004.
- 328 “Non-fundamental exchange rate volatility and welfare” by R. Straub and I. Tchakarov, April 2004.
- 329 “On the determinants of euro area FDI to the United States: the knowledge-capital-Tobin's Q framework,  
by R. A. De Santis, R. Anderton and A. Hijzen, April 2004.
- 330 “The demand for euro area currencies: past, present and future” by B. Fischer, P. Köhler and F. Seitz, April 2004.
- 331 “How frequently do prices change? evidence based on the micro data underlying the Belgian CPI” by  
L. Aucremanne and E. Dhyne, April 2004.
- 332 “Stylised features of price setting behaviour in Portugal: 1992-2001” by M. Dias, D. Dias  
and P. D. Neves, April 2004.
- 333 “The pricing behaviour of Italian firms: New survey evidence on price stickiness” by  
S. Fabiani, A. Gattulli and R. Sabbatini, April 2004.
- 334 “Is inflation persistence intrinsic in industrial economies?” by A. T. Levin and J. M. Piger, April 2004.
- 335 “Has eura-area inflation persistence changed over time?” by G. O'Reilly and K. Whelan, April 2004.
- 336 “The great inflation of the 1970s” by F. Collard and H. Dellas, April 2004.
- 337 “The decline of activist stabilization policy: Natural rate misperceptions, learning and expectations” by  
A. Orphanides and J. C. Williams, April 2004.

- 338 “The optimal degree of discretion in monetary policy” by S. Athey, A. Atkeson and P. J. Kehoe, April 2004.
- 339 “Understanding the effects of government spending on consumption” by J. Galí, J. D. López-Salido and J. Vallés, April 2004.
- 340 “Indeterminacy with inflation-forecast-based rules in a two-bloc model” by N. Batini, P. Levine and J. Pearlman, April 2004.
- 341 “Benefits and spillovers of greater competition in Europe: A macroeconomic assessment” by T. Bayoumi, D. Laxton and P. Pesenti, April 2004.
- 342 “Equal size, equal role? Interest rate interdependence between the euro area and the United States” by M. Ehrmann and M. Fratzscher, April 2004.
- 343 “Monetary discretion, pricing complementarity and dynamic multiple equilibria” by R. G. King and A. L. Wolman, April 2004.
- 344 “Ramsey monetary policy and international relative prices” by E. Faia and T. Monacelli, April 2004.
- 345 “Optimal monetary and fiscal policy: A linear-quadratic approach” by P. Benigno and M. Woodford, April 2004.
- 346 “Perpetual youth and endogenous labour supply: a problem and a possible solution” by G. Ascari and N. Rankin, April 2004.
- 347 “Firms’ investment decisions in response to demand and price uncertainty” by C. Fuss and P. Vermeulen, April 2004.
- 348 “Financial openness and growth: Short-run gain, long-run pain?” by M. Fratzscher and M. Bussiere, April 2004.
- 349 “Estimating the rank of the spectral density matrix” by G. Camba-Mendez and G. Kapetanios, April 2004.
- 350 “Exchange-rate policy and the zero bound on nominal interest rates” by G. Camba-Mendez and G. Kapetanios, April 2004.
- 351 “Interest rate determination in the interbank market” by V. Gaspar, G. P. Quirós and H. R. Mendizábal, April 2004.
- 352 “Forecasting inflation with thick models and neural networks” by P. McNelis and P. McAdam, April 2004.
- 353 “Towards the estimation of equilibrium exchange rates for CEE acceding countries: methodological issues and a panel cointegration perspective” by F. Maeso-Fernandez, C. Osbat and B. Schnatz, April 2004.
- 354 “Taking stock: monetary policy transmission to equity markets” by M. Ehrmann and M. Fratzscher, May 2004.
- 355 “Production interdependence and welfare” by K. X. D. Huang and Z. Liu, May 2004.

356 “Developing a euro area accounting matrix: issues and applications” by T. Jellema, S. Keuning, P. McAdam and R. Mink, May 2004.

