



EUROPEAN CENTRAL BANK

HANDBOOK FOR THE COMPILATION OF FLOWS STATISTICS ON THE MFI BALANCE SHEET

FEBRUARY 2006

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EUROPEAN CENTRAL BANK



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**HANDBOOK FOR THE
COMPILATION OF FLOWS
STATISTICS ON THE
MONETARY FINANCIAL
INSTITUTIONS BALANCE SHEET
FEBRUARY 2006**

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Unless otherwise stated, the cut-off date for data in this Report is 16 September 2005.

ISBN 92-9181-866-6 (print)
ISBN 92-9181-867-4 (online)



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INTRODUCTION

A common framework was established in 1998 for the compilation of money and banking flows statistics covering the euro area, known as the Manual of Procedures (“the Manual”), which is included in the Money and Banking Statistics Guideline. This framework has been further developed by Regulation ECB/2001/13 as amended, and by several revisions of the Money and Banking Statistics Guideline, of which the latest version is Guideline ECB/2003/02 as amended, which contains the Manual as Annex X.

According to the Manual, the European Central Bank (ECB) first builds country-by-country flows statistics and then, in subsequent steps, compiles flows statistics for the consolidated balance sheet of the euro area-MFI sector (hence also including the ECB’s own balance sheet). This in turn provides the framework for presenting flows statistics for monetary aggregates and credit counterparts. In order to analyse the developments in monetary statistics, the ECB compiles flows statistics as changes in stocks adjusted for exchange rate changes, revaluations and other events that are not transactions.

Flows statistics are compiled by taking the difference between balance sheet levels for two periods and then making adjustments that remove the effect of changes from other events than transactions. Regulation ECB/2001/13 requires reporting agents in the euro area to submit monthly data to participant Member States’ national central banks (NCBs) on write-offs/write-downs of loans and price revaluations of securities¹, both included in the category ‘Revaluation adjustments’. The NCBs in turn complete these data where necessary and transmit them to the ECB. This is done in accordance with Guideline ECB/2003/02 as amended, which additionally requires NCBs to submit to the ECB data for ‘Reclassifications and other adjustments’. The ECB is responsible for producing the exchange rate adjustment. All adjustments must cover separately the

NCBs and other monetary financial institutions (MFIs).

In order to provide details on the compilation of flows statistics by the ECB, the first edition of the Handbook for the compilation of flows statistics (“the Handbook”) was published in December 1999. Changes in the statistical requirements have now led to a thorough revision of this Handbook. The current version is consistent with both the new requirements and the operational changes implemented by the ECB based on several years of experience in compiling flows statistics.

The Handbook has three more sections plus some annexes. The first section sets out the procedure for the derivation of flows¹. The second section outlines the procedure that the ECB follows in order to calculate the exchange rate adjustment. The third section shows the derivation of an index of notional stocks and subsequently of the growth rates used in the monetary analysis. The annexes provide more details on the exchange rate adjustment, on the link between the exchange rate adjustment and the price revaluation adjustment, on the calculation of flows and growth rates when Greece entered the euro area, and on the quality checks applied to data on flows.

¹ For the latter it is allowed under certain conditions to submit quarterly data

I. PROCEDURE FOR COMPILING MONETARY UNION FLOWS STATISTICS FROM THE NATIONAL DATA

I.1 STEP-BY-STEP APPROACH

This sub-section outlines the subsequent steps when moving from national monthly balance sheet adjustments for the NCB and other MFIs (Step A) via a summary calculation (Steps B to D) to the derivation of flows statistics for the Monetary Union as a whole (Step E). The procedure for compiling flows statistics is consistent with the process, that leads to the calculation of the euro area Consolidated Balance Sheet on the basis of flows.

Step 0 Compilation of the exchange rate adjustments at the national level and for each balance sheet item (NCBs, other MFIs and the ECB)

The ECB's Directorate General Statistics Monetary, Financial Institutions and Markets Statistics Division [MFMD] compiles the exchange rate adjustments for national series and for each balance sheet item, as described in Annex 1 of this Handbook. This constitutes

the first step of the process to compile flows statistics.

Step A Reception of statistics on balance sheet items and adjustments as referred to in Regulation ECB/2001/13 Annex 1, Table 1 (NCBs, other MFIs and the ECB)

On the 15th working day after the end of the calendar month to which the data relate, each NCB participating in the euro area submits to the MFMD, together with the ECB, the monthly balance sheet for the Central Bank, computed on a gross basis, and the aggregated balance sheet of the other MFIs resident in its respective country. The format of the NCB/ECB balance sheets is identical to that of the other MFIs with the exception of three additional balance sheet items that are specific to central banking activity ('Gold', 'Receivables from the IMF' and 'Counterparts of special drawing rights (SDR)').

In addition, the NCBs report data on monetary assets and liabilities by the central government together with data on the geographical breakdown of the holders of negotiable instruments.

LAUNCH OF THE EURO AREA (1999)

Prior to January 1999, the data for each country participating in the euro area from the start (Belgium, Germany, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal and Finland) were submitted in national currencies and had to be converted into euro in order to obtain backward series and to allow for the subsequent euro area aggregation. For the conversion of these data into euro, the ECB has used the irrevocable bilateral conversion rate fixed on 31 December 1998.

ENTRY OF GREECE (2001)

The euro area statistics in the statistical section of the ECB Monthly Bulletin, cover the Member States that comprise the euro area at the time in question. This means that stock data referring to periods up to and including December 2000 cover a euro area of 11 participating countries, while data from January 2001 onwards include Greece. (See Annex 3 for further information.)

Monthly stock data are also obtained from international securities settlement systems (SSSs) in order to estimate the holdings by non-euro area residents of securities up to two years issued by MFIs².

With the same timeliness, each NCB and the ECB's Directorate Internal Finance submit to the MFMD the required time series on 'Reclassifications and other adjustments' and 'Revaluation adjustments' referring to all the items above (except for data provided by SSSs), when applicable.

Step B Definition of the "flows statistics" for each item, type of institution and Member State participating in the euro area

Starting with the monthly stock data supplied by NCBs, the adjustments are used to compile so-called flows statistics for each item and each type of institution (ECB, NCB, other MFIs). For each country this step consists of a simple arithmetic operation: taking the difference between two subsequent end-month stocks for each item of Table 1 in ECB/2001/13 and removing those changes that are not caused by transactions, as follows:

$$F_t = (L_t - L_{t-1}) - C_t - V_t - E_t$$

where for period t,

F_t = Flow

L_t = Stock at the end of the period

L_{t-1} = Stock at the end of the previous period

C_t = Reclassification adjustment

V_t = Revaluation adjustment

E_t = Exchange rate adjustment

Step C Intermediate euro area summary balance sheet: the flows

This step consists in aggregating the flows of all euro area Member States by balance sheet item, together with the ECB's own flows statistics, into a single euro area summary balance sheet.

$$\begin{aligned} & \text{Flows for each balance sheet item of} \\ & \text{country 1 (NCB/OMFIs)} \\ & + \\ & \dots\dots\dots \\ & + \\ & \text{Flows for each balance sheet item of} \\ & \text{country 12 (NCB/OMFIs)} \\ & + \\ & \text{Flows for each balance sheet item of the} \\ & \text{ECB} \\ & = \\ & \text{Aggregated flows for each balance sheet} \\ & \text{item of the euro area MFI sector} \end{aligned}$$

Step D Euro area aggregated flows for each balance sheet item

Step D aggregates the flows for which the counterpart is a domestic unit and the flows for which the counterpart is resident in another euro area country:

$$F_t^{EA} = F_t^D + F_t^{OM}$$

where for period t

F^{EA} = Flows for euro area counterparts

F^D = Flows for domestic counterparts.

F^{OM} = Flows for other participating Member States counterparts

2 See ECB Monthly Bulletin, November 2001, 'Economic developments in the euro area', Box 1 entitled 'Adjustment of M3 for holdings of negotiable instruments by non-residents of the euro area'.

The euro area aggregated flows provide the basis for the derivation of the consolidated flows as described in the next paragraph. The external assets and liabilities are recorded on a gross basis.

Step E The euro area consolidated flows statistics

The ECB consolidates the flows of the euro area MFI sector. The consolidated balance sheet of the euro area MFI sector vis-à-vis the non-MFI sector is compiled by netting out inter-MFI positions. In turn, the position of euro area MFIs versus the money-holding sector serves as the basis for compiling flows for monetary aggregates (and their counterparts).

The calculation is performed by using so-called memorandum items where appropriate.³ Data on the residency of the holders of negotiable instruments included in the monetary aggregates (debt securities issued up to two years and money market fund (MMF) shares/units) are obtained from different sources. The residency of the holders of debt securities is obtained from information either reported by European SSSs or by NCBs as memorandum items. Data on the holders of MMFs are collected from reporting agents as from May 2003. Only the reclassification adjustment is reported for MMF shares/units.

3 "Memorandum items" are additional pieces of information defined in Guideline ECB/2003/2, as amended. It must be noted that adjustments and flows on high-priority memorandum items are required for all relevant items as from January 2003.

Step F Calculation of monetary aggregates

Finally, for the calculation of monetary aggregates, consolidated data are used together with data on the deposits held by other euro area resident sectors with the central government. Reclassification adjustments are also reported in respect of these liabilities, and the process of calculation of flows follow the same steps as described above for the balance sheet items.

Monetary aggregates are calculated and published for both stocks and flows. Based on conceptual considerations and empirical studies, and in line with international practice, the Eurosystem has defined a narrow aggregate (M1), an "intermediate" aggregate (M2) and a broad aggregate (M3). These aggregates differ with regard to the degree of moneyness of the assets included. Table 1 shows the definitions of the euro area monetary aggregates using the definition of liabilities issued by the MFI sector, as well as by entities belonging to the central government sector (Post Offices, Treasuries) of the euro area. As noted above, these aggregates include only positions of residents in the euro area which are held with MFIs located in the euro area. Holdings by euro area residents of liquid assets denominated in foreign currency can be close substitutes for euro-denominated assets. Therefore, the monetary aggregates include such assets if they are held with MFIs located in the euro area.

Table 1 Definitions of euro area monetary aggregates

Liabilities (1)	M1	M2	M3
(1) Liabilities of the money-issuing sector and central government liabilities with a monetary character held by the money-holding sector.			
Currency in circulation	X	X	X
Overnight deposits	X	X	X
Deposits with an agreed maturity up to 2 years		X	X
Deposits redeemable at a period of notice up to 3 months		X	X
Repurchase agreements			X
Money market fund (MMF) shares/units			X
Debt securities up to 2 years			X

1.2 DERIVATION OF FLOWS – BY ITEM (AS PUBLISHED IN THE ECB MONTHLY BULLETIN)

The process described above is performed for each item in Table 1 of the Regulation ECB/2001/13 (see Annex V), as follows:

1.2.1 LIABILITIES

a. Currency in circulation (excluding MFIs'cash)

'Notes and coins in circulation' is netted against euro cash held by MFIs. Before the introduction of euro banknotes, 'Notes and coins in circulation' referred to national currencies of euro area countries. During 2002 it then referred to banknotes and coins both in euro and in previous national currencies, while as from January 2003, it only denotes euro banknotes and coins. A reclassification adjustment was reported by all NCBs for the reference month January 2003, when national banknotes and coins were removed from 'Currency in circulation' and either classified as 'Remaining liabilities' or removed from the balance sheet.

Euro banknotes are legally issued by the whole Eurosystem. The ECB issues 8% of the total value of total euro banknotes, with the remaining 92% issued by the participating NCBs, according to their paid-up share in the ECB's capital.

b. Deposits of Other general government and Other euro area residents (net)

'Deposits' and the specific instrument breakdown refer to 'Deposits held by euro area non-MFIs' (excluding the central government, which is in the money-neutral sector). They are calculated by simply adding the position with the NCBs, the other MFIs of the euro area and the ECB. They are identical to the deposits vis-à-vis euro area non-MFIs recorded in the euro area aggregated balance sheet (Step D).

c. Money market fund shares (net)

The amounts held by non-residents are deducted and allocated to 'External liabilities'⁴. As from January 2003, holdings of MMF shares/units are reported separately from other instruments, which facilitates their consolidation. Moreover, the item 'Money market paper' has been included in securities other than shares up to one year (previously memo items were provided). No currency breakdown is reported for this instrument.

d. Debt securities issued (net)

Debt securities issued by reporting MFIs are netted against the MFI holdings of 'Securities other than shares' issued by MFIs, for the three maturity bands in euro and non-euro.

This allows the ECB to identify those debt securities issued by MFIs that are not held by non-euro area MFIs. Holdings by the Rest of the World of debt securities up to two years issued by MFIs are excluded by using memo items and SSS information, and allocated to 'External liabilities'. Holdings by the central government, reported according to Guideline ECB/2003/2, are also deducted.

As from January 2003 the concept of 'Money market paper' has been integrated within 'Debt securities up to 1 year', with back series revised accordingly.⁵

e. Capital and reserves (net)

'Capital and reserves/not allocated' are netted against 'Shares and other equity' held by euro area MFIs. As in the case of 'Currency in circulation (net)', 'Capital and reserves (net)' indistinguishably covers both the 'euro area non-MFI' and the 'Rest of the World' counterparts.

4 See ECB Monthly Bulletin, April 2001, 'Economic developments in the euro area', Box I entitled 'Measurement issues related to the inclusion of negotiable instruments in euro area M3'.

5 An exception in this regard is ES; indeed, some money market paper was issued with an original maturity of over one year.

f. External liabilities

This item is calculated as Item 9 (vis-à-vis the Rest of the World) of Table 1 of Regulation ECB/2001/13 plus the holdings of MMF shares/units by the Rest of the World (obtained through Regulation ECB/2002/8 as from May 2003, and as memo items previously), plus the holding by the Rest of the World of 'Debt securities issued up to 2 years' obtained through memo items from SSSs, plus counterparts of SDRs.⁶

g. Remaining liabilities

The item 'Remaining liabilities' is simply Item 13 of Regulation ECB/2001/13, Table 1 ('Remaining liabilities'), which is not net of remaining assets.

h. Excess of inter-MFI liabilities

The excess of inter-MFI liabilities or assets shows the difference between the amounts owed to euro area MFIs by reporting euro area MFIs and the funds lent by reporting euro area MFIs to euro area MFIs. Although inter-MFI deposits and loans should theoretically balance, this generally does not happen in practice, and this item usually shows small amounts as a consequence.

1.2.2 ASSETS

i. Loans to euro area residents

Loans to euro area residents are the result of a simple aggregation of loans by NCBs, plus other MFI loans (to non-MFIs and non-government in euro area countries) and the ECB's related items.

Loans in the consolidated balance sheet only refer to the funds lent by reporting MFIs to euro area non-MFI borrowers, and are the result of simply adding positions of the NCBs, other MFIs of euro area countries, plus the ECB. They are thus identical to the loans granted to

Monetary Union (MU) non-MFIs in the MU aggregated balance sheet.

It should be noted that some asymmetries exist between the counterparts on the assets and liability sides.

j. Holdings of securities other than shares issued by euro area residents

Holdings of securities other than shares issued by euro area residents are the result of a simple aggregation of the holdings of NCBs, plus holdings of securities of other MFIs located in MU countries, and the ECB's related items, after deducting the amounts of securities issued by MFIs, which are netted in the consolidation process (see para. d)

As from January 2003, the concept of 'Money market paper' has been integrated within 'Debt securities other than shares up to 1 year'⁷, whereas an individual item was created for MMF shares/units. Back series were revised accordingly.

k. Holdings of shares and other equity issued by other euro area residents

Holdings of shares and other equity issued by other euro area residents are the result of a simple aggregation of holdings of NCBs, plus other MFIs located in MU countries, and the ECB's related items, except for the amounts of shares issued by MFIs, which are netted in the consolidation process (see para. e). The holdings of MMF shares/units are not reflected in this item but are instead also netted in the consolidation process (see para. c).

In the consolidated balance sheet, the counterpart for this item is MU 'Other residents'. These positions are obtained by simply adding holdings of NCBs and other MFIs of MU countries, and the ECB positions. They are thus identical to the 'Shares and other equity' issued by MU

⁶ See Guideline ECB/2003/02, Annex X, Table 5.

⁷ An exception in this regard is ES; indeed, some money market paper were issued with an original maturity of over 1 year.

‘Other residents’ recorded in the MU aggregated balance sheet.

l. External assets

This item brings together ‘Cash net of euro’, ‘Loans’ granted by MU MFIs to the Rest of the World, Rest of the World ‘Securities other than shares’, ‘MMF shares/units’ and ‘Shares and other equity’ held by MU MFIs plus the ‘Gold and gold receivables’ and ‘Receivables from the IMF’ (specific NCB and ECB balance sheet items).

m. Fixed assets

‘Fixed assets’ are non-financial assets, tangible or intangible, which are intended to be used repeatedly for more than one year for MFIs. In the consolidated balance sheet, they are calculated by simply adding holdings of NCBs and other MFIs of MU countries, and the ECB positions. They are thus identical to the ‘Fixed assets’ recorded in the MU aggregated balance sheet.

n. Remaining assets

‘Remaining assets’ is a residual item on the asset side of the balance sheet, defined as ‘assets not included’ elsewhere. In the consolidated balance sheet, they are calculated by simply adding holdings of NCBs and other MFIs of MU countries, and the ECB positions. They are thus identical to the ‘Remaining assets’ recorded in the MU aggregated balance sheet.

2. EXCHANGE RATE ADJUSTMENT

2.1. INTRODUCTION

As set up in Guideline ECB/2003/2, Annex X, the ECB removes the effect of exchange rate movements using a standard adjustment. The ECB calculates this monthly on balances denominated in DKK, SEK, GBP, USD, JPY and CHF.

The adjustment in respect of GBP, USD, JPY and CHF is in place as from reference month September 1997. The adjustment regarding DKK and SEK was implemented as from reference month January 2003 upon the receipt of first quarterly data (ref. March 2003). The exchange rate adjustment is calculated independently per item, sector and country. All exchange rate variations are calculated against the euro.

Liabilities denominated in foreign currency are included in the definition of monetary aggregates. However, they only represent a small part of the aggregates, e.g. only about 3% of M3 is denominated in foreign currency. As a result, the impact on the monetary aggregates and other intra-euro area items is limited, although not negligible. The adjustment has a stronger impact on external assets and liabilities, where the proportion of non-euro-denominated positions is much higher.

The exchange rate adjustment is obtained in Step 0 and then used to calculate the flows in Step B, as described in Section 1. The procedure is also applied in respect of the legacy currencies, once the series had been translated into euro.⁸

2.2 TABLE 1 – MONTHLY ADJUSTMENT

2.2.1 PROCEDURE

The procedure set out in Guideline ECB/2003/02 removes the effect of exchange rate movements in respect of non-euro balances by first calculating the real flow in terms of the currency of denomination, and then translating this flow into euro using the assumption that

the transaction took place at the average exchange rate during the month.⁹ In order to implement this adjustment, it is useful to make an arithmetical transformation of this method. The adjustment therefore reads as follows:

$$\text{ERA} = \sum_c [(e_t^{\text{euro}/C} - e_{t(a)}^{\text{euro}/C})/e_t^{\text{euro}/C}] \\ * \text{Stock}_t^C + [(e_{t(a)}^{\text{euro}/C} - e_{t-1}^{\text{euro}/C})/ \\ e_{t-1}^{\text{euro}/C}] * \text{Stock}_{t-1}^C$$

where

ERA = Exchange rate adjustment

The subscript indicates whether the data refer to the beginning of the period (t-1), the end of the present period (t), or the average of the present period (t(a)).

The superscript indicates the currency denomination for the stocks and the relation euro/C for the exchange rate.

C = Currency = DKK, SEK, GBP, USD, CHF, and JPY

$e_t^{\text{euro}/C}$ = Exchange rate euro/C (end of the present period)

$e_{t-1}^{\text{euro}/C}$ = Exchange rate euro/C (beginning of period, which normally coincides with the end of the previous period)

$e_{t(a)}^{\text{euro}/C}$ = Exchange rate euro/C (average of present period)

Stock_t^C = Stock of foreign currency C in euro (current period)

Stock_{t-1}^C = Stock of foreign currency C in euro (previous period)

⁸ Legacy currency series were translated into euro using the fixed conversion rate of 31 December 1998.

⁹ As from June 2001 stock data of all NCBS are revalued on a monthly basis. In relation to the previous data, the procedure takes into account the fact that stocks are revalued on a quarterly basis in some NCBS. Exchange rate adjustments related to ECB data are not estimated, but are instead provided directly by the accounting area of the ECB.

2.2.2 EXCHANGE RATE SERIES

The exchange rates used are taken from the regular daily “concertation” procedure between central banks, which normally takes place at 2.15 p.m. (C.E.T.)¹⁰, as they are compiled by the Bank for International Settlements (BIS). The information needed and how it can be obtained from the BIS databank is presented below. DKK, SEK and GBP are used as from 2003.

Taking into account that $e^{\text{euro}/C} = 1/e_{C/\text{euro}}$, the exchange rates series needed are as follows:

BIS databank code

$e^{\text{USD}/\text{euro}} = \text{MQKBAUS0X}$	$e^{\text{DKK}/\text{euro}} = \text{MQKBADK0X}$
$e^{\text{JPY}/\text{euro}} = \text{MQKBAJPOX}$	$e^{\text{SEK}/\text{euro}} = \text{MQKBASK0X}$
$e^{\text{CHF}/\text{euro}} = \text{MQKBACH0X}$	$e^{\text{GBP}/\text{euro}} = \text{MQKBAGP0X}$

where X = 1 for end-of-month exchange rate ($e_1^{C/\text{euro}}$) and 2 for monthly average ($e_a^{C/\text{euro}}$).

For data before January 1999, the series used refer to each participating country currency in relation to USD, JPY, CHF and GBP. Taking DE as an example, these are:

Information needed	BIS databank code
$e^{\text{DEM}/\text{USD}}$	$e^{\text{DEM}/\text{USD}} = \text{MQBCADE0X}$
$e^{\text{DEM}/\text{JPY}} = e^{\text{DEM}/\text{USD}} / e^{\text{JPY}/\text{USD}}$	$e^{\text{JPY}/\text{USD}} = \text{MQBCAJPOX}$
$e^{\text{DEM}/\text{CHF}} = e^{\text{DEM}/\text{USD}} / e^{\text{CHF}/\text{USD}}$	$e^{\text{CHF}/\text{USD}} = \text{MQBCACH0X}$

where X = 1 for end-of-month exchange rate ($e_t^{C/\text{USD}}$) and 2 for monthly average ($e_{t(a)}^{C/\text{USD}}$).

2.2.3 STOCKS

Identifying the stocks on a currency-by-currency basis is a more complex task for several reasons. In Table 1 of Regulation ECB/2001/13, the only breakdown by currency is between euro/other currencies. A breakdown by currencies is made in Table 4 of Regulation ECB/2001/13, but here the breakdown by instruments is less detailed than in Table 1; moreover, Table 4 is quarterly and is submitted with a delay of 13 working days compared with the same month in Table 1.

To resolve these problems it is necessary to make some assumptions:

First assumption: The relative weights in terms of euro (or national currency) of assets and liabilities denominated in DKK, SEK, GBP, USD, JPY and CHF are stable intra-quarter. As a consequence, the quarterly data are carried forward for the purpose of the monthly adjustments, until a new quarter’s data are available. The formula of the percentage to be applied to each item and month C_t from Table 1 is as follows:

$$\text{Stock}_t^C = \text{Stock}_t^{\Sigma \text{FC}} (\text{Table 1}) * \text{Stock}_q^C (\text{Table 4}) / \text{Stock}_q^{\Sigma \text{FC}} (\text{Table 4})$$

where

Subscript t = q, q+1, q+2, q+3 refers to the end of the month starting with the end of the quarter (q)

The superscript indicates the currency denomination for the stocks and relation euro/C for the exchange rate

C = DKK, SEK, GBP, USD, CHF and JPY

ΣFC = Total denominated in foreign currency (sum of all currencies included in C plus others except EUR)

Stock_t^C = money stock expressed in millions of euro of instrument denominated in C

¹⁰ As set up by the ECB Council on 7 July 1998 (Press release entitled ‘Setting up common market standards’).

Second assumption: In each kind of instrument, the distribution by non-MU currencies is the same for all sub-classes within that instrument. The following percentage is therefore applied to these items:

Table	
Percentage of DKK, SEK, GBP, USD, JPY and CHF, over total foreign currency in Regulation ECB/2001/13, Table 4	Applied separately to this item in Regulation ECB/2001/13, Table 1
$\text{Stock}_q^C / \text{Stock}_q^{\Sigma FC}$ (Table 4)	$\text{Stock}_t^{\Sigma FC}$ (Table 1)
9. A. b. Deposits to domestic non-MFIs	<p>9x. Foreign currency – A. Domestic:</p> <ul style="list-style-type: none"> • Overnight deposits vis-à-vis Other general government/ Other resident sector • Deposits with agreed maturity up to one year vis-à-vis Other general government/Other resident sector • Deposits with agreed maturity over one and up to two years vis-à-vis Other general government/Other resident sector • Deposits with agreed maturity over two years vis-à-vis Other general government/Other resident sector • Deposits redeemable at notice up to three months vis-à-vis Other general government/Other resident sector • Deposits redeemable at notice over three months vis-à-vis Other general government/Other resident sector • Repos vis-à-vis Other general government/Other resident sector <p>1. Cash – 1e of which euro</p> <ul style="list-style-type: none"> • Total cash minus euro notes and coins
9. B. b. Deposits to non-MFIs in other participating Member States	<p>9x. Foreign currency – B. Other participating Member States:</p> <ul style="list-style-type: none"> • Overnight deposits vis-à-vis Other general government/ Other resident sectors • Deposits with agreed maturity up to one year vis-à-vis Other general government/Other resident sectors • Deposits with agreed maturity over one and up to two years vis-à-vis Other general government/Other resident sectors • Deposits with agreed maturity over two years vis-à-vis Other general government/Other resident sectors • Deposits redeemable at notice up to three months vis-à-vis Other general government/Other resident sectors

Table continued

	<ul style="list-style-type: none"> • Deposits redeemable at notice over three months vis-à-vis Other general government/Other resident sectors • Repos vis-à-vis Other general government/Other resident sectors
11. Debt securities issued	<p>11x Debt securities issued in non-MU currencies</p> <ul style="list-style-type: none"> • Up to one year • Over one and up to two years • Over two years
2. A. b. Loans to domestic non-MFIs	<p>2. A Total domestic loans (minus 2e 'Domestic loans denominated in euro') granted to</p> <ul style="list-style-type: none"> • General government • Other resident sectors
2. B. b. Loans to non-MFIs in other participating Member States	<p>2. B Total loans to residents in other participating Member States (minus 2e 'Loans denominated in euro to residents in other participating Member States') granted to</p> <ul style="list-style-type: none"> • General government • Other resident sectors
3. A. a. Securities other than shares issued by domestic MFIs	<p>3x A Securities other than shares denominated in foreign currency issued by domestic MFIs</p> <ul style="list-style-type: none"> • Up to one year • Over one and up to two years • Over two years
3. A. b. Securities other than shares issued by domestic non MFIs	<p>3x A Securities other than shares denominated in foreign currency</p> <ul style="list-style-type: none"> • Issued by domestic General government • Issued by domestic Other resident sectors
3. B. a. Securities other than shares issued by MFIs in other participating Member States	<p>3x B Securities other than shares denominated in foreign currency issued by MFIs resident in other participating Member States</p> <ul style="list-style-type: none"> • Up to one year • Over one up to two years • Over two years
3. B. b. Securities other than shares issued by domestic non-MFIs	<p>3x B Securities other than shares denominated in foreign currency</p> <ul style="list-style-type: none"> • Issued by general government in other participating Member States • Issued by Other resident sectors (ORS) in other participating Member States

In order to extend the exchange rate adjustment to the breakdown of loans and deposits by sectors and purpose within ORS (domestic/ other participating Member States), a third set of assumptions is needed.

Firstly, in respect of the deposits, amounts of foreign currency are available in Table 1 in full detail by sector, instrument and maturity. Therefore the exchange rate adjustment calculated above for the ORS in respect of each instrument and maturity is divided and allocated to each sector in proportion to their weight in the foreign currency of each instrument and maturity of the total ORS:

$$ERA_t(I; S) = ERA_t(I; ORS) * \text{Stock}_t^{\Sigma FC}(I; S) / \text{Stock}_t^{\Sigma FC}(I; ORS)$$

[all data from Table 1]

where

$ERA_t(I; S)$ is the exchange rate adjustment allocated to instrument I and sector S

$ERA_t(I; ORS)$ is the exchange rate calculated for instrument I vis-à-vis the total ORS

I = Each instrument included within deposits in foreign currency, as follows: Overnight; With agreed maturity (with breakdown up to one year, over one and up to two years, over two years); Redeemable at notice (split up to three months; over three months); repos.

S = For each sector of ORS, as follows: Other financial intermediaries + financial auxiliaries (S.123+S.124), Insurance corporations and pension funds (S.125), Non-financial corporations (S.11), Households + non-profit institutions serving households (S.14+S.15).

The subscript refers to the end-month of the reference period

The superscript indicates the currency denomination for the stocks

C = DKK, SEK, GBP, USD, CHF and JPY

ΣFC = Total foreign currency (sum of all currencies included in C plus others except EUR)

$\text{Stock}_t^{\Sigma FC}(I; S)$ = Stock of total foreign currency expressed in euro vis-à-vis sector S in instrument I

$\text{Stock}_t^{\Sigma FC}(I; ORS)$ = Stock of total foreign currency expressed in euro vis-à-vis total ORS in instrument I.

In addition, for the loans, the amount of foreign currency is not available in respect of all the breakdowns. For the resident sectors Other financial intermediaries + Financial auxiliaries (S.123+S.124), Insurance corporations and pension funds (S.125) and Non-financial corporations (S.11), part of the total exchange rate adjustment calculated for the loans to the ORS is allocated to these sectors in proportion to their weight in foreign currency. In turn, foreign currency by maturity is estimated as a proportion of total loans.

$$ERA_t(M; S) = ERA_t(ORS) * \text{Stock}_t^{FC}(M; S) / \text{Stock}_t^{FC}(ORS)$$

[all data from Table 1]

and

$$\text{Stock}_t^{\Sigma FC}(M; S) = \text{Stock}_t^{\Sigma FC + \text{euro}}(M; S) * (\sum_M \text{Stock}_t^{\Sigma FC}(M; S)) / (\sum_M \text{Stock}_t^{\Sigma FC + \text{euro}}(M; S));$$

$$\sum_M \text{Stock}_t^{\Sigma FC}(M; S) = \sum_M \text{Stock}_t^{\Sigma FC + \text{euro}}(M; S) - \sum_M \text{Stock}_t^{\text{euro}}(M; S)$$

[all data from Table 1]

where

$ERA_t(M; S)$ = Exchange rate adjustment allocated to loans with maturity M vis-à-vis sector S

$ERA_t(ORS)$ = Exchange rate adjustment calculated for total loans vis-à-vis ORS

M = Maturity – up to one year, over one year and up to five years, over five years

S = Other financial intermediaries + Financial auxiliaries (S.123+S.124), Insurance corporations and pension funds (S.125), Non-financial corporations (S.11)

$Stock_t^{\sum FC}(M; S)$ = Stock of total foreign currency loans with maturity M, vis-à-vis sector S expressed in euro

$Stock_t^{\sum FC}(ORS)$ = Stock of total foreign currency loans expressed in euro vis-à-vis total ORS

$\sum_M Stock_t^{\sum FC}(M; S)$ = Stock of total foreign currency loans (all maturities aggregated) with sector S

$\sum_M Stock_t^{\sum FC + euro}(M; S)$ = Stock of total loans (euro + foreign currency, all maturities aggregated) with sector S

$\sum_M Stock_t^{euro}(M; S)$ = Stock of total loans in euro with sector S.

For the sector ‘Households + Non-profit institutions serving households’ (S.14+S.15), it is also necessary to calculate the adjustment according to the breakdown by the purpose of the loan. However, the only currency breakdown refers to the total loans to this sector denominated in euro. Therefore a further assumption is necessary, which is that all loans in foreign currency relate to the “other” purpose. After that, the same procedure as for the other sectors is applied:

$$ERA_t(M; h-o) = ERA_t(ORS) * Stock_t^{\sum FC}(M; h-o) / Stock_t^{\sum FC}(ORS)$$

[all data from Table 1]

and

$$Stock_t^{\sum FC}(M; h-o) = (\sum_M \sum_P Stock_t^{\sum FC}(M; P)) * (Stock_t^{\sum FC + euro}(M; h-o)) / (\sum_M Stock_t^{\sum FC + euro}(M; h-o));$$

$$\sum_M \sum_P Stock_t^{\sum FC}(M; P) = \sum_M \sum_P Stock_t^{\sum FC + euro}(M; P) - \sum_M \sum_P Stock_t^{euro}(M; P)$$

[all data from Table 1]

where

$ERA_t(M; h-o)$ = Exchange rate adjustment allocated to loans granted to households for other purposes, with maturity M

$ERA_t(ORS)$ = Exchange rate adjustment calculated for total loans vis-à-vis ORS

M = Maturity – up to one year, over one year and up to five years, over five years

$Stock_t^{\sum FC}(M; h-o)$ = Stock of total foreign currency loans granted to households, with maturity M. It is assumed that all foreign currency loans granted to households are for other purposes.

$Stock_t^{\sum FC}(ORS)$ = Stock of total foreign currency loans expressed in euro vis-à-vis total ORS

$\sum_M \sum_P Stock_t^{\sum FC}(M; P)$ = Stock of total foreign currency loans to households (all maturities aggregated, all purposes aggregated)

$Stock_t^{\sum FC + euro}(M; h-o)$ = Stock of total loans (euro + foreign currency) granted to households for other purposes, with maturity M

$\sum_M \sum_P Stock_t^{\sum FC + euro}(M; P)$ = Stock of total loans to households (euro + foreign currency, all maturities aggregated, all purposes aggregated)

$\sum_M \sum_P Stock_t^{euro}(M; P)$ = Stock of total loans to households in euro.

Fourth assumption. In the case of items in Table 1 ‘Deposits vis-à-vis the Rest of the World’ (total and breakdown by maturity), ‘Loans to the Rest of the World’ (total and maturity breakdown), ‘Securities other than shares issued by the Rest of the World’, there is no split in Table 1 between

euro and other currencies. Therefore, in order to obtain the exchange rate adjustment, it will be necessary to estimate the missing parts in the general formula described in Step 1.

In other words, in this formula

$$\text{Stock}_t^C = \text{Stock}_t^{\Sigma FC} (\text{Table 1}) * \text{Stock}_q^C (\text{Table 4}) / \text{Stock}_q^{\Sigma FC} (\text{Table 4})$$

$\text{Stock}_t^{\Sigma FC}$ (Table 1) is not directly available and has to be substituted by

$$\text{Stock}_t^{\Sigma FC + \text{euro}} (\text{Table 1}) * \text{Stock}_q^{\Sigma FC} (\text{Table 4}) / \text{Stock}_q^{\Sigma FC + \text{euro}} (\text{Table 4})$$

resulting in

$$\text{Stock}_t^C = (\text{Stock}_t^{\Sigma FC + \text{euro}} (\text{Table 1}) * \text{Stock}_q^{\Sigma FC} (\text{Table 4}) / \text{Stock}_q^{\Sigma FC + \text{euro}} (\text{Table 4})) * \text{Stock}_q^C (\text{Table 4}) / \text{Stock}_q^{\Sigma FC} (\text{Table 4})$$

Subsequently, the general formula is applied to the following items:

Table	
Percentage of DKK, SEK, GBP, USD, JPY and CHF, over total foreign currency in Regulation ECB/2001/13, Table 4	Applied separately to this item in Regulation ECB/2001/13, Table 1
$(\text{Stk}.C_0 / \text{Stk}.\text{Total foreign currency}_0) * (\text{Stk}.\text{Total foreign currency}_0) / (\text{Stk}.\text{All currencies}_0)$	Stk. All currencies _t
9. C. a.+b. Deposits vis-à-vis the Rest of the World (banks and non-banks)	9.C Deposits from the Rest of the World <ul style="list-style-type: none"> • Total deposits • Deposits up to one year • Deposits over one year
2. C. i+ii Loans to the Rest of the World (all maturities)	2.C Total loans to the Rest of the World
2.C.i Loans to the Rest of the World up to one year	2.C Loans to the Rest of the World up to one year
2.C.i Loans to the Rest of the World over one year	2.C Loans to the Rest of the World over one year
3.C.a.+b. Securities other than shares issued by the Rest of the World (banks and non-banks)	3.C Securities other than shares issued by the Rest of the World

2.2.4 AD HOC ADJUSTMENT

An ad hoc adjustment to the exchange rate adjustment may take place when there is additional information on the effects of exchange rate changes regarding DKK, SEK, GBP, USD, JPY and CHF, and when the results on financial transactions are significantly different from the standard adjustment outcome. The NCBs are encouraged to inform the ECB about any significant deviation caused by the standard adjustment.

The ad hoc adjustment is in any case not a substitute for the standard adjustment. If an ad hoc adjustment is considered necessary, it will be included in a data series and then added to the series containing the standard adjustment. If applied, only one ad hoc adjustment series would be created for each item. Such series will be set up whenever is needed.

2.3 TABLE 2 – QUARTERLY ADJUSTMENT¹¹

2.3.1 INTRODUCTION

The calculation of exchange rate adjustments for the quarterly series creates more difficulties in comparison with the monthly adjustments, owing to the lack of a currency breakdown in Table 2 and the limited breakdown of the data contained in Table 4. As a result, the adjustment cannot be calculated directly using the data contained in this table, but must instead be obtained by applying certain additional assumptions to the adjustments already obtained for Table 1. Furthermore, even if complete information were available in respect of the quarterly tables, differences with the monthly adjustments would still arise if the quarterly adjustments are not based on the monthly adjustments because of the different frequency of data. The exchange rate adjustment will be calculated on a country-by-country basis.

2.3.2 PROCEDURE

The procedure for calculating the exchange rate changes in respect of Table 2 is based on the exchange rate adjustments for Table 1, the stocks

reported in Table 2, and some assumptions on the issuing and holding sectors of non-euro-denominated financial assets and liabilities. This means that in Table 2 the adjustments calculated for Table 1 are aggregated along the quarter and allocated to the corresponding cell. This approach can be made explicit in four steps:

First, the allocation of Table 1 adjustments to Table 2. Table 2 in Regulation ECB/2001/13 does not contain information on what are the sub-sectors of the counterparties issuing and holding foreign currency¹¹. Therefore, it is necessary to make an assumption as to which sectors are the main counterparties, in order to allocate the adjustment in Table 2 to sectors taking the foreign exchange adjustments calculated in the context of Table 1. This allocation is done at a second-step level, and only when there are non-euro-denominated assets/liabilities. For this purpose, is assumed that the main counterparties of the foreign exchange-denominated assets, if any, are the ‘Non-financial corporations’ within the ‘Other residents’, ‘Central government’ within ‘General government’, and ‘State government’ within ‘Other general government’. Within the Rest of the World, the non-bank adjustment is allocated to ‘Other resident sectors’. According to these general rules, the allocation of adjustments by sector is as follows (the foreign exchange adjustment is assumed to be zero for the other sub-sectors):

¹¹ When monthly historical series become available, the exchange rate adjustments will be derived automatically following the procedure as explained for Table 1 (monthly adjustment). The exchange rate adjustments for quarterly data will only be applicable to the historical quarterly data.

Table	
Sector in Table 2 of Regulation ECB/2001/13	Foreign exchange adjustments for sectors in Table 1
9. Deposits <ul style="list-style-type: none"> • Part of the adjustment allocated to Rest of World (RoW) 'Banks' (see calculation below) • Part of the adjustment allocated to RoW 'Other residents' (see calculation below) 	9. Deposits (all currencies) held by RoW
9.1 Overnight deposits <ul style="list-style-type: none"> • Full adjustment allocated to 'State government' 	9.1x Overnight deposits <ul style="list-style-type: none"> • Adjustment calculated for 'Other general government'
9.2 Deposits redeemable at notice <ul style="list-style-type: none"> • Full adjustment allocated to 'State government' 	Aggregate foreign exchange adjustments on deposits redeemable at notice (see below) <ul style="list-style-type: none"> • Adjustment calculated for 'Other general government'
9.3 Deposits with agreed maturity <ul style="list-style-type: none"> • Full adjustment allocated to 'State government' 	Aggregate foreign exchange adjustments on deposits with agreed maturity (see below) <ul style="list-style-type: none"> • Adjustment calculated for 'Other general government'
9.4 Repos <ul style="list-style-type: none"> • Full adjustment allocated to 'State government' 	9.4x Repos <ul style="list-style-type: none"> • Adjustment calculated for 'General government'
2. Loans <ul style="list-style-type: none"> • Full adjustment allocated to 'Central government' • Part of the adjustment allocated to RoW 'Banks' and part allocated to 'Other residents' (see calculation below) 	2. Loans <ul style="list-style-type: none"> • Adjustment calculated for 'General government' • Adjustment calculated for RoW 'Loans'
3. Securities other than shares <ul style="list-style-type: none"> • Full adjustment allocated to 'Central government' and 'State government' • Full adjustment allocated to 'Non-financial corporations' (enterprises), dividing it between up to one year and over one year on the respective proportions of stocks • Part of the adjustment allocated to RoW 'Banks' and part allocated to 'Other residents' (see calculation below) 	3x Securities other than shares in non-MU currencies (domestic and other MUMS) <ul style="list-style-type: none"> • Adjustment calculated for 'General government' • Adjustment calculated for 'Other residents' 3x Securities other than shares issued by RoW <ul style="list-style-type: none"> • Adjustment calculated for RoW 'Securities'

Second, aggregation of the foreign exchange adjustment in Table 1. Data on the foreign exchange adjustment in respect of Table 1 are aggregated for the sectors 'Other general government' and 'Other residents' (domestic and other MUMS separately), for the foreign exchange adjustments on deposits with agreed maturity, and for the foreign exchange adjustments on deposits redeemable at notice.

where

Sub-index t refers to the end of the month of the months within the quarter

t = q, q-1, q-2

The super-index indicates the currency denomination for the stocks

Table	
Aggregate adjustments by instrument	Foreign exchange adjustments in Table 1 (each sector)
Aggregate foreign exchange adjustments on deposits with agreed maturity	9.2x Deposits in foreign currency with agreed maturity <ul style="list-style-type: none"> • Up to one year • Over one up to two years • Over two years
Aggregate foreign exchange adjustments on deposits redeemable at notice	9.3x Deposits in foreign currency redeemable at notice <ul style="list-style-type: none"> • Up to three months • Over three months

Third, calculation of the adjustment for the 'Rest of the World' items. Only total amounts are reported in Table 1 for the Rest of the World. In this case it is possible to use Table 4 data to split the adjustment between 'Banks' and 'Non-banks' (the latter category is allocated to RoW 'Other residents').

$$ERA = \sum_t \sum_c [(e_t^{\text{euro}/C} - e_{t(a)}^{\text{euro}/C}) / e_t^{\text{euro}/C}] * \text{Stock}_t^C(s) + [(e_{t(a)}^{\text{euro}/C} - e_{t-1}^{\text{euro}/C}) / e_{t-1}^{\text{euro}/C}] * \text{Stock}_{t-1}^C(s)$$

and

$$\text{Stock}_t^C(s) = \text{Stock}_t^{\sum FC + \text{euro}}(\text{Table 1}) * \text{Stock}_q^C(s) (\text{Table 4}) / \sum_s \text{Stock}_q^{\sum FC + \text{euro}}(s) (\text{Table 4})$$

C = DKK, SEK, GBP, USD, CHF, and JPY

$\sum FC$ = Total foreign currency (sum of all currencies included in C plus others except EUR)

S = Sub-sectors within the Rest of the World: Banks, Non-banks

$\text{Stock}_t^{\sum FC + \text{euro}}$ = Stock of position vis-à-vis the Rest of the World at the end of the month

$\text{Stock}_q^C(s)$ = Stock in currency C for sectors Banks/Non-banks at the end of the quarter

$\Sigma_s \text{Stock}_q^{\Sigma \text{FC}+\text{euro}(s)}$ = Sum of total currency for Rest of the World at the end of the quarter.

This calculation is repeated for the Rest of the World items 'Deposits', 'Loans' and 'Securities'. This procedure is consistent with the monthly exchange rate adjustment for these items.

Fourth, distribution of the adjustment by maturity. Foreign exchange adjustments on the 'Loans' and 'Securities other than shares' allocated to 'Non-financial corporations' (enterprises) are also distributed by maturity. Allocation to the different maturity ranges is made by weighting the adjustment by the stocks reported in each maturity band.

In principle, the exchange rate adjustment in respect of quarterly series not mentioned above is assumed to be zero.

2.3.3 AD HOC ADJUSTMENT

The standard adjustment is calculated using several assumptions and estimates. As a consequence, the amounts calculated might deviate from what would be obtained should additional information become available to some NCBs. Ad hoc adjustments should be reported if NCBs detect any relevant deviations as a result.

3. CALCULATION OF GROWTH RATES AND THE INDEX OF NOTIONAL STOCKS

As already explained in Step B, monthly flows are calculated from the monthly differences in levels adjusted for reclassifications, other revaluations, exchange rate variations and any other changes which do not arise from transactions.

Basically, if L_t represents the level outstanding at the end of the month t , C_t^M the reclassification adjustment in month t , E_t^M the exchange rate adjustment and V_t^M the other revaluation adjustments, the flow F_t^M in month t is defined as:

$$a) \quad F_t^M = (L_t - L_{t-1}) - C_t^M - E_t^M - V_t^M$$

Similarly, the quarterly flow F_t^Q for the quarter ending in month t is defined as:

$$b) \quad F_t^Q = (L_t - L_{t-3}) - C_t^Q - E_t^Q - V_t^Q$$

where L_{t-3} is the level outstanding at the end of month $t-3$ (the end of the previous quarter) and, for example, C_t^Q is the reclassification adjustment in the quarter ending in month t .

For monetary analysis, the evolution of the growth rates is a key issue within all the monetary statistics available for monetary policy makers, for users and for the general public at large. The derivation of the index and growth rates is presented below.

3.1 CALCULATION OF GROWTH RATES FOR MONTHLY DATA

Growth rates may be calculated from flows or from the index of adjusted stocks. If F_t^M and L_t are defined as above, the index I_t of adjusted stocks in month t is defined as:

$$c) \quad I_t = I_{t-1} \times \left(1 + \frac{F_t^M}{L_{t-1}} \right)$$

As a base, the index (of the non-seasonally adjusted series) is set equal to 100 on December 2001. The annual percentage change at for month t – i.e. the change in the 12 months ending in month t – may be calculated using either of the following two formulae:

$$d) \quad a_t = \left[\prod_{i=0}^{11} \left(1 + \frac{F_{t-i}^M}{L_{t-1-i}} \right) - 1 \right] \times 100$$

$$e) \quad a_t = \left(\frac{I_t}{I_{t-12}} - 1 \right) \times 100$$

Similarly, the month-on-month percentage change a_t^M for month t may be calculated as:

$$f) \quad a_t^M = \left(\frac{F_t^M}{L_{t-1}} \right) \times 100$$

$$g) \quad a_t^M = \left(\frac{I_t}{I_{t-1}} - 1 \right) \times 100$$

Finally, the three-month moving average for M3 is obtained as $(a_t + a_{t-1} + a_{t-2})/3$.

3.2 CALCULATION OF GROWTH RATES FOR QUARTERLY DATA

Growth rates for quarterly data may be calculated from flows or from the index of adjusted stocks. If F_t^Q and L_{t-3} are defined as above, the index I_t of adjusted stocks for the quarter ending in month t is defined as:

$$h) \quad I_t = I_{t-3} \times \left(1 + \frac{F_t^Q}{L_{t-3}} \right)$$

As a base, the index is set equal to 100 on December 2001. The annual percentage change in the four quarters ending in month t , i.e. a_t , may be calculated using either of the following two formulae:

$$i) \quad a_t = \left[\prod_{i=0}^3 \left(1 + \frac{F_{t-3i}^Q}{L_{t-3(i+1)}} \right) - 1 \right] \times 100$$

$$j) \quad a_t = \left(\frac{I_t}{I_{t-12}} - 1 \right) \times 100$$

Similarly, the quarter-on-quarter percentage change a_t^Q for the quarter ending in month t may be calculated as:

$$k) \quad a_t^Q = \left(\frac{F_t^Q}{L_{t-3}} \right) \times 100$$

$$l) \quad a_t^Q = \left(\frac{I_t}{I_{t-3}} - 1 \right) \times 100$$

ANNEX I: THE DESIGN OF THE EXCHANGE RATE ADJUSTMENT

INTRODUCTION

The problem of calculating the exchange rate adjustment shares a common background with other changes in nominal value. For the sake of clarity, the explanation is organised into three main parts. Firstly, this annex describes how the problem of lack of information about the transaction value is solved. Secondly, four ways of estimating the exchange rate adjustment are introduced. Thirdly, the relationship between exchange rate adjustments and other adjustments is explored.

NOMINAL VALUE CHANGES: A GENERAL APPROACH

Financial transactions should be measured at the transaction value, which is the value at which assets are acquired/disposed of and/or liabilities are created, liquidated or exchanged. In an ideal situation, information would be available transaction by transaction. In such a perfect world, we could simply add transactions and thereby obtain the total final transactions. However, this is usually not the case. More frequently, only stocks and prices at the beginning and end of a period are available, sometimes with information about prices during the period, but not linked to transactions. As a result, the amount of information ordinarily available is as follows:

P_{t-1} Price at the beginning of the period

Q_{t-1} Quantity (number of securities) at the beginning of the period

P_t Price at the end of the period

Q_t Quantity (number of securities) at the end of the period

$Stock_{t-1} = P_{t-1} * Q_{t-1}$ Balance sheet figure at the beginning of the period

$Stock_t = P_t * Q_t$ Balance sheet figure at the end of the period.

In addition, information on prices (but not on quantities or transactions) is sometimes also available along the whole period:

P_1, P_2, \dots, P_n Prices during the period

Now, from the point of view of transactions, what ideally would be required is:

$$T_1 = P_1 * (Q_1 - Q_0)$$

$$T_2 = P_2 * (Q_2 - Q_1)$$

:

:

$$T_n = P_n * (Q_n - Q_{n-1})$$

where T_1, T_2, \dots, T_n are individual transactions.

Since this information is not available in money and banking statistics (MBS), it is necessary to simplify in order to obtain a proxy of the real flows. This unavoidable simplification involves reducing the different prices at which transactions occur during the period to just one price.

With this simplification, estimated transactions are:

$$T_1 = P * (Q_1 - Q_0)$$

$$T_2 = P * (Q_2 - Q_1)$$

:

:

$$T_n = P * (Q_n - Q_{n-1})$$

Adding this obtains:

$$F \text{ (total flows)} = T_1 + T_2 \dots + T_n = \\ = P * (Q_n - Q_0)$$

Expressed in terms of balance sheet
 $F = P * (\text{Stock}_t / P_t - \text{Stock}_{t-1} / P_{t-1})$

The balance sheet figures are expressed in terms of quantity (or foreign currency) by dividing each by its price (or exchange rate). The 'real' amount at the beginning of the period is subtracted from the 'real' amount quantity at the end of the period. This result is the net 'real' variation during the period. However, this does not show at what prices transactions took place. In fact, it is only possible to apply one price to the net variation of quantities to obtain a proxy of transactions.

With some calculations,

$$F = P * (\text{Stock}_t / P_t - \text{Stock}_{t-1} / P_{t-1})$$

$$F = \text{Stock}_t - \text{Stock}_{t-1} - [(P - P_{t-1}) / P_{t-1}] * \\ \text{Stock}_{t-1} + [(P_t - P) / P_t] * \text{Stock}_t$$

Therefore the flow is the difference in stocks minus the adjustment, being the adjustment

$$A = [(P - P_{t-1}) / P_{t-1}] * \text{Stock}_{t-1} \\ + [(P_t - P) / P_t] * \text{Stock}_t; \text{ and the flows}$$

$$F = \text{Stock}_t - \text{Stock}_{t-1} - A$$

Comparison of the exchange rate adjustment with alternative methods

The general method outlined above can be directly used to calculate flows and exchange rate adjustments purely by substituting prices with exchange rates. In terms of the exchange rate (i.e. against USD), this can be expressed as follows:¹³

Flows $F = e^{\text{euro/USD}} * [\text{stock}_t^{\text{USD}} - \text{stock}_{t-1}^{\text{USD}}]$

Adjustment $\text{ERA} = \text{stock}_t^{\text{euro}} * [e_t^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}] / e_t^{\text{euro/USD}} + \\ + \text{stock}_{t-1}^{\text{euro}} * [e_t^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}] / e_{t-1}^{\text{euro/USD}}$

$$F = \text{stock}_t^{\text{euro}} - \text{stock}_{t-1}^{\text{euro}} - \text{ERA}$$

The question here is to decide what exchange rate to use or, in other words, at which price the operations are considered to have taken place. Four alternatives are presented, as follows:

a) $e^{\text{euro/USD}} = e_t^{\text{euro/USD}}$. This implicitly means that all transactions took place at the end-period price or at the price prevailing at the end of the period:

Flows $F = e_t^{\text{euro/USD}} * (\text{stock}_t^{\text{USD}} - \text{stock}_{t-1}^{\text{USD}})$

Adjustment $\text{ERA} = \text{stock}_{t-1}^{\text{USD}} * (e_t^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}) = \\ \text{stock}_t^{\text{euro}} * (e_t^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}) / e_{t-1}^{\text{euro/USD}}$

In this case, other changes are defined as initial stock multiplied by the percentage of devaluation of domestic currency in the period. This is a very common way of calculating this adjustment, and is for example the one used by the BIS.

b) $e^{\text{euro/USD}} = e_{t-1}^{\text{euro/USD}}$. This implicitly means that all transactions took place at the beginning-period price or at the price prevailing at the beginning of the period:

Flows $F = e_{t-1}^{\text{euro/USD}} * (\text{stock}_t^{\text{USD}} - \text{stock}_{t-1}^{\text{USD}})$

Adjustment $\text{ERA} = \text{stock}_t^{\text{USD}} * (e_t^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}) = \text{stock}_t^{\text{euro}} * (e_t^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}) / e_t^{\text{euro/USD}}$

In this case, other changes are defined as the final stock multiplied by the percentage of devaluation in terms of the end-period exchange rate. This procedure was labelled the 'indirect method' by the Working Group on Statistics in November 1994.

¹³ Even though the ECB quotes exchange rates using the direct method ($e^{\text{USD/euro}}$), in this theoretical exercise it is clearer to use the indirect method ($e^{\text{euro/USD}} = 1/(e^{\text{USD/euro}})$).

c) $e^{\text{euro/USD}} = (e_{t-1}^{\text{euro/USD}} + e_t^{\text{euro/USD}})/2$. This implicitly means that all transactions took place at the average of beginning and end-period prices:

Flows
$$F = (e_{t-1}^{\text{euro/USD}} + e_t^{\text{euro/USD}}) / 2 * (\text{stock}_t^{\text{USD}} - \text{stock}_{t-1}^{\text{USD}})$$

Adjustment
$$\text{ERA} = (e_t^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}) * (\text{stock}_t^{\text{USD}} + \text{stock}_{t-1}^{\text{USD}}) / 2 = (e_t^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}) * (\text{stock}_t^{\text{euro}} / e_t^{\text{euro/USD}} + \text{stock}_{t-1}^{\text{euro}} / e_{t-1}^{\text{euro/USD}}) / 2$$

d) $e^{\text{euro/USD}} = e_{a(t)}^{\text{euro/USD}}$ average of the period. This implicitly means that all transactions took place at the period-average exchange rate:

Flows
$$F = (e_{a(t)}^{\text{euro/USD}}) * (\text{stock}_t^{\text{USD}} - \text{stock}_{t-1}^{\text{USD}})$$

Adjustment
$$A = (e_t^{\text{euro/USD}} - e_{a(t)}^{\text{euro/USD}}) * (\text{stock}_t^{\text{USD}}) + (e_{a(t)}^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}) * (\text{stock}_{t-1}^{\text{USD}}) = (e_1^{\text{euro/USD}} - e_{a(t)}^{\text{euro/USD}}) * \text{stock}_1^{\text{euro}} / e_1^{\text{euro/USD}} + (e_{a(t)}^{\text{euro/USD}} - e_{t-1}^{\text{euro/USD}}) * \text{stock}_{t-1}^{\text{euro}} / e_{t-1}^{\text{euro/USD}}$$

Without any other information about the exchange rate of transactions, the average exchange rate of the period is the most accurate method, and is the one actually applied in MFM statistics.

Exchange rate adjustments in relation to other adjustments

When there are other adjustments, then these must also be considered in order to obtain flows. Using once more the scheme in the first part, we have now a number of transactions in a period and one example of other changes (different from changes in prices or exchange rates):

$$T_1 = P_1 * (Q_1 - Q_0)$$

$$T_2 = P_2 * (Q_2 - Q_1)$$

:

$$\text{OA} = P_r * (Q_r - Q_{r-1}) \text{ Other adjustments, e.g. a reclassification}$$

:

$$T_n = P_n * (Q_n - Q_{n-1})$$

Using the same simplification as above, except for the reclassification, yields the following:

$$T = P * (Q_n - Q_h) + P * (Q_{h-1} - Q_0) = P * (Q_n - Q_0) - P * (Q_r - Q_{r-1}) = P * (\text{Stock}_t / P_t - \text{Stock}_{t-1} / P_{t-1}) - \text{OA} - (P - P_r) * (Q_h - Q_{h-1})$$

And if the standard adjustment is applied

$$A = ([(P - P_{t-1}) / P_{t-1}] * \text{Stock}_{t-1} + [(P_t - P) / P_t] * \text{Stock}_t)$$

$$\text{the flow is obtained as } F = \text{Stock}_t - \text{Stock}_{t-1} - A - \text{OA}$$

$$F = \text{Stock}_t - \text{Stock}_{t-1} - ([(P - P_{t-1}) / P_{t-1}] * \text{Stock}_{t-1} + [(P_t - P) / P_t] * \text{Stock}_t - P_h * (Q_h - Q_{h-1})) = P * (\text{Stock}_t / P_t - \text{Stock}_{t-1} / P_{t-1}) - \text{OA}$$

The difference between the transactions as they should be calculated and the flow as effectively calculated through the standard exchange rate is $(P - P_r) * (Q_h - Q_{h-1})$. This is because in the other adjustments the implicit price differs from the standard price applied to calculate the transactions. In principle the magnitude of the error is small, as long as the difference in prices $(P - P_r)$ is not very large.

Therefore, for the sake of simplicity, it can be considered that $(P - P_r) * (Q_h - Q_{h-1})$ is zero if the differences between the two prices are not very relevant. Thus,

$$T = P * (Q_1 - Q_0) - \text{OA}$$

There is moreover no need to modify the adjustment method of either the exchange rates or the others.

The same idea can be applied in the case of changes in prices that occur at the same time as changes in exchange rates. If there are large differences between prices, what the NCB should do is to compile other changes at the exchange rate that the ECB plans to use to calculate transactions (one of the four above).

ANNEX II: EXCHANGE RATE ADJUSTMENT AND PRICE REVALUATION

According to the share of responsibilities defined in Guideline ECB/2003/2, Annex X, the price revaluation adjustment is reported by reporting agents to the NCB and then submitted to the ECB, whereas the exchange rate adjustment is directly estimated by the ECB. Some questions may arise on the interaction between these two adjustments, most notably what exchange rate should be applied to the adjustments, and what the error would be if deviations from the optimum are in place. A further complication comes from the fact that flexibility is provided for the calculation of the price revaluation, in that the use of two different methods is permitted, the balance sheet method and the transaction method.¹⁴

For the purpose of this analysis, a simple portfolio of securities denominated in foreign currency (USD) is defined, consisting of four securities (or groups of securities), A, B, C and D. Security A is held both at the beginning and end of the period, i.e. is not traded during the period. Security B is held at the beginning of the period and sold during the period. Security C is bought during the period and held at the end of the period. Finally, Security D is bought and sold during the period and therefore neither held

at the beginning nor at the end of the period. These four cases cover all possible situations in respect of the price revaluation and its different calculation methods. The portfolio is also represented in the table below.

The value of each security in euro is obtained by multiplying the number of securities by the price and the exchange rate. For example, the value of Security A as reflected on balance sheet at the end of the previous period is $A P_t e_t$. (multiplication sign eliminated for convenience).

where $e_{t-1} = e_{t-1}^{\text{euro/USD}}$ is the euro/USD exchange rate at the end of the previous period, and P_0 the price at which the securities are recorded on balance sheet.

The exchange rate adjustment applied by the ECB follows the general formula

$$\text{ERA} = [(e_t - e_{a(t)}) / e_t] \text{stock}_t^{\text{euro}} + [(e_{a(t)} - e_{t-1}) / e_{t-1}] \text{stock}_{t-1}^{\text{euro}},$$

which, in terms of the example, is reflected in the following formula:

¹⁴ For a definition of both methods, see the Guidance Notes to Regulation ECB/2001/13, published by the ECB in November 2002.

Table

	Holdings end of previous period	Period				Holdings end of present period
Price in USD	P_{t-1}	P_c^p	P_d^p	P_d^s	P_b^s	P_t
Exchange rate	E_{t-1}	e_c^p	e_d^p	e_d^s	e_b^s	e_t
Sec. A	A	-----				A
Sec. B	B	-----Sale B				
Sec. C		Purchase C-----				C
Sec. D		Purchase D --- Sale D				

$$ERA = [(e_t - e_{a(t)}) / e_t] (A+C) P_t e_t + [(e_{a(t)} - e_{t-1}) / e_{t-1}] (A+B) P_{t-1} e_{t-1}$$

Adjustments reported using the average exchange rate

In order to obtain perfect consistency and avoid any overlapping between the revaluation adjustment and the exchange rate adjustment, the revaluation adjustment in respect of the securities denominated in foreign currency has to be transformed into euro using the average exchange rate of the period ($e_{a(t)}$).

Balance sheet method

When the balance sheet method is applied to calculate the price revaluation, only the holdings at the beginning and the end of the period are considered. Therefore the price revaluation to be reported, applying the average exchange rate of the month, is as follows:

$$RA = A (P_t - P_{t-1}) e_{a(t)}$$

The resulting transactions would in turn be

$$T = (A+C) P_t e_t - (A+B) P_{t-1} e_{t-1} - [(e_t - e_{a(t)}) / e_t] (A+C) P_t e_t + [(e_{a(t)} - e_{t-1}) / e_{t-1}] (A+B) P_{t-1} e_{t-1} - A (P_t - P_{t-1}) e_{a(t)} = (A+C) P_t e_{a(t)} - (A+B) P_{t-1} e_{a(t)} - A (P_t - P_{t-1}) e_{a(t)} = C P_t e_{a(t)} - B P_{t-1} e_{a(t)}$$

$$T = (C P_t - B P_{t-1}) e_{a(t)}$$

In other words, the calculated transaction, when applying the balance sheet method to obtain the revaluation adjustment, and using the average exchange rate, produces a coherent result. Only the transactions affecting those securities reflected both at the beginning and the end of the period (B and C) are taken into account. The transactions are reflected at balance sheet value in terms of USD (P_t, P_{t-1}) and expressed in euro at the average exchange rate ($e_{a(t)}$).

Transaction method

According to the transaction method, all revaluations affecting all securities held or traded during the period should be reported. Therefore the price revaluation is as follows:

$$RA = A (P_t - P_{t-1}) e_{a(t)} + B (P_b^s - P_{a(t)}) e_{a(t)} + C (P_1 - P_c^p) e_{a(t)} + D (P_d^s - P_d^p) e_{a(t)}$$

The resulting transactions would be

$$T = (A+C) P_t e_t - (A+B) P_{t-1} e_{t-1} - [(e_t - e_{a(t)}) / e_t] (A+C) P_t e_t + [(e_{a(t)} - e_{t-1}) / e_{t-1}] (A+B) P_{t-1} e_{t-1} - A (P_t - P_{t-1}) e_{a(t)} + B (P_b^s - P_{t-1}) e_{a(t)} + C (P_t - P_c^p) e_{a(t)} + D (P_d^s - P_d^p) e_{a(t)} = (A+C) P_t e_{a(t)} - (A+B) P_{t-1} e_{a(t)} - A (P_t - P_{t-1}) e_{a(t)} - B (P_b^s - P_{t-1}) e_{a(t)} - C (P_t - P_c^p) e_{a(t)} - D (P_d^s - P_d^p) e_{a(t)}$$

$$T = C P_c^p e_{a(t)} - B P_b^s e_{a(t)} - D P_d^p e_{a(t)} - D P_d^s e_{a(t)}$$

The calculated transaction, when applying the transaction method to obtain the revaluation adjustment, and using the average exchange rate, produces the expected results. All transactions are covered (B, C and D), including intra-period purchases and sales, and are collected at the price at which the transaction took place ($P_{cp}, P_{bs}, P_{dp}, P_{ds}$), expressed in euro at the average exchange rate ($e_{a(t)}$).

Revaluation adjustment if the exchange rate effect were not excluded

Balance sheet method

When the balance sheet method is applied to calculate the price revaluation, only the holdings at the beginning and end of the period are considered. If the exchange rate effects were not excluded from the revaluation adjustment, the price revaluation reported would be as follows:

$$RA = A (P_t e_t - P_{t-1} e_{t-1})$$

The revaluation adjustment would reflect all changes in value, without separating the exchange rate effects, and the resulting transactions would be

$$T = (A+C) P_t e_t - (A+B) P_{t-1} e_{t-1} - [(e_t - e_{a(t)}) / e_t] (A+C) P_t e_t + [(e_{a(t)} - e_{t-1}) / e_{t-1}] (A+B) P_{t-1} e_{t-1}$$

$$P_{t-1} e_{t-1}) - A (P_t e_t - P_{t-1} e_{t-1}) = (A+C) P_t e_{a(t)} - (A+B) P_{t-1} e_{a(t)} - A (P_t e_t - P_{t-1} e_{t-1})$$

$$T = A P_t (e_{a(t)} - e_t) + A P_{t-1} (e_{t-1} - e_{a(t)}) + C P_t e_{a(t)} - B P_{t-1} e_{a(t)}$$

As a result, the transactions would be ‘over-adjusted’, because the exchange rate effects would be adjusted twice if not excluded from the revaluation adjustment, i.e. first as part of the price revaluation and again by the exchange rate adjustment. This is reflected in the terms $A P_t (e_{a(t)} - e_t) + A P_{t-1} (e_{t-1} - e_{a(t)})$, which should not appear in the equation, given that there is no transaction in Security A. Therefore, the exchange rate effects have to be excluded from the revaluation adjustment, and the **reporting of the revaluation adjustment including exchange rate effects is not permitted**.¹⁵

Transaction method

According to the transaction method, all revaluations affecting all securities held or traded during the period should be reported. In this case, if the exchange rate adjustment were not excluded from the revaluation adjustment, the revaluation adjustment would include all changes in euro. Therefore the price revaluation is as follows:

$$RA = A (P_t e_t - P_{t-1} e_{t-1}) + B (P_b^s e_b^s - P_{t-1} e_{t-1}) + C (P_t e_t - P_c^p e_c^p) + D (P_d^s e_d^s - P_d^p e_d^p)$$

The resulting transactions would therefore be:

$$T = (A+C) P_t e_t - (A+B) P_{t-1} e_{t-1} - [(e_t - e_{a(t)}) / e_t] (A+C) P_t e_t + [(e_{a(t)} - e_{t-1}) / e_{t-1}] (A+B) P_{t-1} e_{t-1} - A (P_t e_t - P_{t-1} e_{t-1}) + B (P_b^s e_b^s - P_{t-1} e_{t-1}) + C (P_t e_t - P_c^p e_c^p) + D (P_d^s e_d^s - P_d^p e_d^p) = (A+C) P_t e_{a(t)} - (A+B) P_{t-1} e_{a(t)} - [A (P_t e_t - P_{t-1} e_{t-1}) + B (P_b^s e_b^s - P_{t-1} e_{t-1}) + C (P_t e_t - P_c^p e_c^p) + D (P_d^s e_d^s - P_d^p e_d^p)]$$

$$T = C P_c^p e_{a(t)} - B P_b^s e_{a(t)} + D P_d^p e_{a(t)} - D P_d^s e_{a(t)} + C P_c^p (e_c^s - e_{a(t)}) - B P_b^s (e_b^s - e_{a(t)}) + D P_d^p (e_d^p - e_{a(t)}) - D P_d^s (e_d^s - e_{a(t)}) + A [(P_t e_{a(t)} - P_t e_t) + (P_{t-1} e_{t-1} - P_{t-1} e_{a(t)})] - C P_t (e_t - e_{a(t)}) + B P_{t-1} (e_{t-1} - e_{a(t)})$$

The calculated transaction, when applying the transaction method to obtain the revaluation adjustment without excluding exchange rate effects, results in a number of spurious factors that should not be considered as transactions. This is again due to overlaps between the two adjustments. In particular, Security A should not appear in the equation as no transaction is carried out for that security; furthermore, factors $C P_t (e_t - e_{a(t)}) + B P_{t-1} (e_{t-1} - e_{a(t)})$ are purely due to exchange rate effects and should also not appear as part of the transactions. As in the case of the balance sheet method, **reporting of the revaluation adjustment including exchange rate effects is not permitted**.¹⁶

Revaluation adjustment if an exchange rate different from the average is used

Balance sheet method

Where the balance sheet method is applied to calculate the price revaluation, only the holdings at the beginning and end of the period are considered. If an exchange rate that differs from the average of the period is applied to express the revaluation adjustment in euro, the adjustment would be as follows:

$$RA = A (P_t - P_{t-1}) e_x$$

The resulting transactions would therefore be:

$$T = (A+C) P_t e_t - (A+B) P_{t-1} e_{t-1} - [(e_t - e_{a(t)}) / e_t] (A+C) P_t e_t + [(e_{a(t)} - e_{t-1}) / e_{t-1}] (A+B) P_{t-1} e_{t-1} - A (P_t - P_{t-1}) e_x = (A+C) P_t e_{a(t)} - (A+B) P_{t-1} e_{a(t)} - A (P_t - P_{t-1}) e_x$$

15 Except for the holdings of shares and other equity, as the exchange rate adjustment is not calculated for this item.

16 Except for the exchange rate adjustment, as the exchange rate adjustment is not calculated for this item.

$$T = A P_t (e_{a(t)} - e_x) + A P_{t-1} (e_x - e_{a(t)}) + C P_t e_{a(t)} - B P_0 e_{a(t)} = A (P_t - P_{t-1}) (e_x - e_{a(t)}) + C P_t e_{a(t)} - B P_{t-1} e_{a(t)}$$

In this case there is also an over-adjustment as the term $A (P_t - P_{t-1}) (e_x - e_{a(t)})$ should not appear in the equation, i.e. should be equal to zero, which occurs if $e_x = e_{a(t)}$. However, this approach minimises the error in comparison to the scenario whereby the exchange rate effect is not removed from the adjustment. The use of a different exchange rate gives rise to an error in the range of the adjustment, while if the exchange rate is not removed from the revaluation adjustment, the error is in the range of the stock.

ANNEX III - ENTRY OF GREECE (2001) – CALCULATION OF FLOWS AND GROWTH RATES

The presentation of euro area statistics in the statistical section of the ECB Monthly Bulletin, reference statistical series relating to the euro area cover those Member States that comprise the euro area at the time in question. Stock data referring to periods up to and including December 2000 therefore cover the euro area of 11 participating countries (EU11), while data from January 2001 onwards cover the extended euro area of 12 participating countries (EU12 – i.e. the EU 11 plus Greece).

In order to comply with this principle, while at the same time avoiding breaks in the series in terms of flows and growth rates, a number of reporting requirements were established for NCBs, as follows:

- EU11 countries should transmit all positions with residents of Greece as part of ‘Other MUMS’ as well as positions in former Greek drachma as euro, according to the sector/currency breakdown required in the Regulation as from January 2001.
- Greece was required to report its MFI balance sheet position referring to December 2000 as part of ‘Reclassifications and other adjustments’. At the same time, the EU11 also reported adjustments to the changes in stocks due to the enlargement of the euro area, i.e. changes in the geographical allocation and currency denomination, as ‘Reclassifications and other adjustments’. In order to assess the effect of the enlargement as well as to calculate the flows for the EU12 between December 2000 and January 2001, a separate code was created for an “of which position” of the reclassifications, containing only the changes in stocks caused by the enlargement of the euro area. Greece submits data (stocks and adjustment data) just like any other euro area Member State as from the moment it joined the euro area, i.e. from the reference period of January 2001.

Flows in January 2001 for each balance sheet item (x)

$$F_{Jan01} = (L_{Jan01(EU12)} - L_{Dec00(EU11)}) - C_{Jan01} - V_{Jan01} - E_{Jan01}$$

where for period t,

$$F_{Jan01} = \text{Flow}$$

$$L_{Jan01(EU12)} = \text{Stock at the end of January, including Greece}$$

$$L_{Dec00(EU11)} = \text{Stock at the end of the previous period, excluding Greece}$$

C_{Jan01} = Reclassification adjustment. This includes the whole balance sheet of Greek MFIs in December 2000 plus reclassification by sector: the positions of the EU11 vis-à-vis Greece moved from RoW to ‘Other participating Member States’

Reclassification by currency: positions of the EU11 denominated in Greek drachma and moved from foreign currency to the euro

Other reclassifications occurred in January 2001 in the EU12

$$V_{Jan01} = \text{Revaluation adjustment}$$

$$E_{Jan01} = \text{Exchange rate adjustment.}$$

For the calculation of growth rates and the index of adjusted stocks in respect of January 2001, the standard procedure was modified. The index for January 2001 (Jan01) of adjusted stocks is defined as:

$$I_{Jan01} = I_{Dec00} \times \left(1 + \frac{F_{Jan01(EU12)}}{L_{Dec00(EU12)}} \right)$$

- In this case the denominator is not simply the stock of the previous month (EU11): a new stock has been calculated by adding the stocks of Greece to the ones previously reported by the EU11. This increases the consistency between stocks and flows and

can be done in this case because stock data are available for the exact point when the adjustment (the entrance of Greece) took place.

For analytical purposes, historical data for the EU11 plus Greece were calculated and presented for a number of key series in the ECB Monthly Bulletin (January 2001). These data were based on a backward period of two years of *supplementary* data, set at least on a best estimates basis. All data were recalculated so as to consider the new entrant as part of the euro area, and for its national currency to be the euro for the whole period under consideration:

- EU11 NCBs identified and transmitted only balance sheet positions vis-à-vis Greek residents as well as transactions undertaken in GRD. Using these series (' Δ -series'), it was then possible to derive aggregated and consolidated balance sheet statistics (stock and adjustment data) for an enlarged euro area on the basis of the currently provided balance sheet item (BSI) data (including the balance sheet statistics from Greece). NCBs were permitted to use best estimates if needed.
- Greece reported data as if it had been a member of the euro area for at least the same period – historical balance sheet data were provided for reference periods March 1998 to December 2000 because of the actual data availability in Greece.
- Data reported by Greece were converted into euro using the current exchange rate at the end of each reference period.

Further *historical data* according to the new composition of the euro area were only /to be reported by the new entrant. These data included monetary aggregates and loans series.

ANNEX IV: QUALITY CHECKS

Two types of checks are applied.

1. Accounting checks

Linear constraints

These are implemented for each country and each individual dataset. For example: Total assets = Total liabilities.

2. Standard warning checks

These are implemented for each country and each balance sheet item, subject to adjustments.

The purpose of these warnings is to check, in case balance sheets significantly differ, whether there is an adjustment that could partially explain this discrepancy. The system will provisionally give a warning whenever the difference of balance sheets between two consecutive months is higher, in absolute terms, than the certain percentage (currently set at 30%) of the previous stock, if part of this development is not justified by an adjustment above the threshold. Therefore, a warning will appear if there is an increase/decrease of a certain percentage from month to month.

$$|F_t / S_{t-1}| \leq 30\%$$

where for period t

F_t = Flow

S_t = Stock.

Checks have been implemented for each balance sheet, and a warning will appear if the sign does not coincide with what was expected. For example, a specific check has been implemented to check the negative sign in the 'Write-down/write-off adjustments' sent for the loans (normally, these adjustments should have a negative sign).

ISBN 92-9181-866-6



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