EUROPEAN CENTRAL BANK

EUROSYSTEM

EURO AREA BALANCE OF PAYMENTS AND INTERNATIONAL INVESTMENT POSITION STATISTICS

MARCH 2008

ANNUAL QUALITY REPORT

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In 2008 all ECB publications feature a motif taken from the €10 banknote.

ANNUAL QUALITY REPORT

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EXECUTIVE SUMMARY

This annual quality report is required by Article 6 of Guideline ECB/2004/15[1] (hereinafter "the Guideline"). It follows the basic principles of the International Monetary Fund (IMF) Data Quality Assessment Framework (July 2003) in terms of the different dimensions of data quality, and includes quantitative indicators.[2] Key aspects of quality are: (i) integrity; (ii) methodological soundness; (iii) periodicity and timeliness; (iv) accuracy; (v) revision practice and policy; (vi) stability; (vii) consistency; and (viii) accessibility.

The methodologies observed in Member States are covered in the country chapters of the ECB's publication "European Union balance of payments and international investment position statistical methods" (last update: May 2007). The ECB's website also contains a methodological note on the euro area balance of payments (b.o.p.) and international investment position (i.i.p.), which focuses on common methodological issues and on the aggregation procedures.[3]

In 2007, new breakdowns were introduced in the field of b.o.p. and i.i.p. In November 2007 new details for the annual foreign direct investment (FDI) were published for the first time, reflecting direct investment equity capital both for listed and unlisted companies (the former based on market prices and the latter on own funds at book value), and for cross-border real estate holdings, which have been calculated as a residual. In addition, the FDI stocks of listed companies at book value are included as a memo item. Moreover, a breakdown of the valuation adjustments in the annual i.i.p. into price changes, exchange rate changes and other adjustments was also published for the first time.

In November 2007, data vis-à-vis Brazil, Russia, India and China, as well as Hong Kong were published for the first time, as part of the geographical breakdown. This new breakdown starts in the first quarter of 2006 for the quarterly b.o.p. and at end-2005 for the annual i.i.p.

In 2007, various national compilers implemented methodological enhancements, which also triggered revisions to the euro area statistics. The new data improved the methodological soundness and consistency of country contributions to the euro area aggregates, but affected the stability of the data on investment income credits, in particular.

When releasing the first monthly b.o.p. estimates, full information on services and income is usually not yet available in the euro area Member States. For the time being, the results of the stability indicators show that these first estimates often underestimate services, credits and debits as well as investment income credits. Nonetheless, those patterns barely affect the net current account.

The improved coverage of certain economic agents, such as special purpose entities (SPEs) or special financial vehicles (SFVs) triggered an important part of the revisions in 2007. This is mainly reflected in relatively high revisions to the figures for direct investment.

The data for portfolio investment liabilities and for the related income still constitute a weak point in the euro area b.o.p. and i.i.p. Incomplete information on the final holder of the securities (i.e. the actual creditor) implies that the sector breakdown, as required by the fifth edition of the IMF's Balance of Payments Manual (BPM5), is estimated as a residual. In turn, this may considerably affect the accuracy of the euro area statistics.[4] The ECB and the EU NCBs are implementing a security-by-security (s-b-s) data collection system and a Centralised Securities Database (CSDB) to improve this situation. The full implementation of the s-b-s

1 OJ L 354, 30.11.2004, p. 34.
2 Based on the work of a joint ECB (DG-Statistics)/European Commission (Eurostat) Task Force on Quality, in which representatives of most of the then 15 EU Member States were also involved. The Task Force report is available under www.cmfb.org.
3 https://stats.ecb.europa.eu/stats/download/eas_ch07/eas_ch07/eas_note_ch7.pdf
4 The annual "Coordinated Portfolio Investment Survey" (CPIS) of the IMF has been set up to remedy large worldwide discrepancies among estimates for portfolio investment flows and stocks.

data collection system by euro area countries is envisaged for early 2009. For the moment, the b.o.p. and i.i.p. statistics compiled in Belgium, Greece, Spain, Italy, the Netherlands, Austria, Portugal and Slovenia are already based on an s-b-s system, as is also the case in France (but only for the MFI sector) and in Germany (but only for b.o.p. statistics). The remaining euro area countries plan to move to an s-b-s data collection in accordance with the following schedule: Ireland, France (for sectors other than MFIs) and Cyprus: first quarter of 2008, Germany (for the i.i.p. statistics): third quarter of 2008, and Luxembourg, Malta and Finland: first quarter of 2009.

Revisions to net i.i.p. for end-2005, published in November 2007, amounted to EUR -21 billion, which corresponds to 0.3 % of GDP. The revisions to the end-2006 i.i.p. (quarterly estimates replaced by the annual estimates reported by end-September 2007) were rather minor.

The size of the twelve-month cumulated euro area net errors and omissions, in absolute terms, has continuously increased since mid-2003, with only a short interruption at the end of 2005 and the beginning of 2006. The ECB and the euro area NCBs are stepping up their efforts to correct this persistent bias.

With regard to the external consistency of the euro area data with the data released by its main counterparts, the euro area as a whole and every euro area country individually show much higher exports of services to the United Kingdom than those recorded by the United Kingdom as imports from the euro area and also from the euro area countries. This results in a persistent relative difference of almost 40% of the higher of the two values. On the import side, the euro area services figures are also higher than those recorded by the United Kingdom as exports to the euro area. The asymmetries in the balance of services have decreased somewhat over the last three years. The euro area records higher values for both exports and imports of services vis-à-vis the United States, while for investment income the United States records higher values for both credits and debits. The current account balances of the euro area and Japan show increasing asymmetries over the last three years, although they are still relatively small and partially due to the different revision practices.

There are significant differences in levels between b.o.p. and external trade statistics, due to the deviating underlying methodologies. In the period 2004-06, the differences between the respective month-on-month growth rates have slightly improved for both imports and exports. With regard to the consistency between b.o.p. and monetary statistics, the results for the period 2004-06 have interrupted the improving trend which started in 2001. In addition, this discrepancy now has a bias that is significantly different from zero. This bias mainly reflects the fact that in some countries MFI balance sheet statistics exclude items under settlement from external assets and liabilities.

INTRODUCTION

The quantitative indicators in this report have been computed on the basis of the monthly b.o.p. observations from January 2004 to December 2006 (36 observations). These results are compared with those for the five previous three-year periods from 1999, see Annex 2. By contrast, the study of the euro area i.i.p. revisions is based on the different vintages of the estimates for each year. The analysis of the i.i.p. revisions focuses on the data for positions from end-2002 to end-2006.

The remainder of this report is organised as follows. Section 1 concentrates on the prerequisites of quality and on the assessment of integrity. Section 2 focuses on the methodological soundness, while Section 3 focuses on timeliness. In Section 4, the data accuracy is assessed on the basis of results that are available at the ECB. The current revision practice and the steps towards a common revision policy are explained in Section 5. This is complemented by quantitative indicators to measure the size and direction of revisions in Section 6. Section 7 deals with the internal consistency of the b.o.p. and its external consistency with b.o.p. estimates from the United Kingdom, the United States and Japan, on the one hand, and with related euro area statistics, on the other. Finally, Section 8 provides information on the accessibility of euro area b.o.p. and i.i.p. statistics.

1 PREREQUISITES OF QUALITY AND ASSESSMENT OF INTEGRITY

The euro area b.o.p. and i.i.p. are based on the aggregation of statistics provided by individual euro area countries concerning transactions and positions between their residents and non-euro area residents. The legal framework for collecting b.o.p./i.i.p. data stems from the Treaty, in particular Article 5 of the Statute of the European System of Central Banks and of the European Central Bank (ESCB Statute) which relates to the collection of statistical information.[5] In application of this provision, Article 2 of the Council Regulation (EC) No. 2533/98 on the collection of statistical information by the ECB[6] defines the reference reporting population, including "legal and natural persons residing in a Member State, to the extent that they hold cross-border positions or carry out cross-border transactions […]". The legal obligation set out in the Treaty and this Regulation is the basis for Guideline ECB/2007/3 of the ECB[7] on the statistical reporting requirements of the ECB in the field of b.o.p and i.i.p. statistics, and the international reserves template. This Guideline, which is legally binding for the NCBs of the euro area countries, was amended in 2007 to reflect the euro area enlargement and also some new data requirements designed to enhance the b.o.p and i.i.p. statistics. The Memorandum of Understanding between the ECB's Directorate General Statistics and Eurostat of March 2003 defines the shared responsibility between the European Commission and the ECB in the field of b.o.p./i.i.p. statistics.[8]

The IMF has established a Special Data Dissemination Standard (SDDS) to guide its member countries in the provision of their economic and financial data to the public. Sixty-four of its member countries have subscribed to the standard, including all euro area countries except Malta and Cyprus. The euro area is also regarded as a subscriber. References to the IMF SDDS benchmark are made in this report where appropriate.

Since 1999, several measures have been implemented to protect the integrity of euro area statistics and to increase the efficiency and effectiveness of statistical procedures. First, the

5 Article 5.1 sets out that "in order to undertake the tasks of the ESCB, the ECB, assisted by the national central banks, shall collect the necessary statistical information either from the competent national authorities or directly from economic agents".

6 OJ L 318, 27.11.1998, p. 8.

7 Guideline ECB/2007/3 entered into force in June 2007 and amended Guideline ECB/2004/15.

8 The Memorandum of Understanding, dated 10 March 2003, is available on the ECB's website http://www.ecb.europa.eu/ecb/legal/pdf/en_mou_with_eurostat1.pdf.

ECB has procedures in place to protect confidential data received from Member States as required in Council Regulation (EC) No. 2533/98 concerning the collection of statistical information by the ECB. Second, the Statistics Committee (STC) of the ESCB[9] and the Committee for Monetary, Financial and Balance of Payments Statistics (CMFB) have assisted the ECB's Directorate General Statistics (DG-Statistics) and the European Commission (Eurostat) in developing a data quality framework; the current report is an important outcome of this work.

The main purpose of euro area b.o.p. and i.i.p. statistics is to support the monetary policy of the ECB and other tasks of the Eurosystem[10] and the ESCB. In the Eurosystem's mission statement, accountability, transparency and good governance are important values which underpin the integrity of the statistical function as defined by the Treaty (Article 5 of the ESCB/ECB Statute). Moreover, in 2007 the Eurosystem adopted a public commitment in the area of statistics.[11]

2 METHODOLOGICAL SOUNDNESS

The methodologies applied by Member States when compiling the b.o.p. and i.i.p. are covered in the country chapters of the ECB's publication "European Union balance of payments/ international investment position statistical methods" (the "B.o.p. Book"; last update was in May 2007). This publication describes the b.o.p./i.i.p. data collection and compilation system in each EU Member State and includes details about the reporting population, the sources, the periodicity of surveys, the estimation methods and the legal framework. The agreed methodology goes somewhat beyond what was set out in the BPM5[12] in order to meet specific user requirements. For instance, this concerns the monthly frequency and the requirement for consistency with other monetary and financial statistics. The methods for compiling the statistics on the international reserves (flows and outstanding amounts) of the ECB/Eurosystem are described in a separate report.[13]

In addition, the ECB's website contains an up-to-date methodological note on the compilation of the euro area b.o.p. and i.i.p., including the aggregation procedures.[14]

Data on intra-euro area portfolio investment assets, broken down by euro area sector of the issuer, were reported by euro area Member States for the first time in June 2006. This has allowed the publication of the sector breakdown of the euro area portfolio investment liabilities in the first quarter of 2008. These new statistics start in the first quarter of 2006 for the quarterly b.o.p. and in the last quarter of 2005 for the quarterly i.i.p.

Additional details on end-year positions in FDI (from end-2004 onwards) were published in November 2007 for the first time, reflecting direct investment equity capital both for listed and unlisted companies (the former based on market prices and the latter on own funds at book value), and for cross-border real estate holdings, which have been calculated as a residual. In addition, the FDI stocks of listed companies at book value are included as a memo item. Moreover, a breakdown of the valuation adjustments in the annual i.i.p. into price changes, exchange rate changes and other adjustments was also published for the first time.

In November 2007, data vis-à-vis Brazil, Russia, India and China, as well as Hong Kong were published for the first time as part of the geographical breakdown. This new breakdown starts in the first quarter of 2006 for the quarterly b.o.p. and at end-2005 for the annual i.i.p.

9 The European System of Central Banks comprises the ECB and the NCBs of all 27 EU Member States.
10 The Eurosystem is the central banking system of the euro area. It comprises the ECB and the NCBs of the fifteen EU Member States that have adopted the euro.
11 http://www.ecb.europa.eu/stats/html/pcstats.en.html
12 The IMF Balance of Payments Manual (fifth edition) was released in 1993.
13 "Statistical treatment of the Eurosystem's international reserves", ECB, October 2000.
14 https://stats.ecb.europa.eu/stats/download/eas_ch07/eas_ch07/eas_note_ch7.pdf.

Quarterly historical series of the euro area direct investment income – reinvested earnings from the first quarter of 1999 onwards – were published for first time in 2007.

In March 2007, the ECB started publishing the b.o.p. for the enlarged euro area, including Slovenia. Consistent time series for the b.o.p. and i.i.p. of the enlarged euro area since January 1999 as well as the historical euro area b.o.p. and i.i.p. time series can be downloaded from the ECB's Statistical Data Warehouse (SDW) at http://sdw.ecb.europa.eu.

In 2007, the National Bank of Belgium moved from a settlement to a survey data collection system, in which the portfolio investment data are collected monthly on an s-b-s basis and the flows are derived from the stocks. Furthermore, the Banque de France started to compile general government trade credit positions in November 2007; back data revisions to stocks statistics have been already carried out, while back data for flows are expected in 2008.

The ECB and the NCBs are implementing an s-b-s and a CSDB for data on portfolio investment (flows, stocks and income). In the future, the national compilers of b.o.p. and i.i.p. statistics will use harmonised characteristics, as extracted from the CSDB, to classify the securities by sector and residence of issuers, by type of instrument, by maturity, etc. In addition, this database will assist the compilers when reconciling transactions and positions, or when calculating the income on portfolio investment. The CSDB will allow much flexibility in the compilation of statistics and will significantly reduce the burden on respondents. The full implementation of an s-b-s data collection system by euro area countries is envisaged for early 2009. For the moment, the b.o.p. and i.i.p. statistics compiled in Belgium, Greece, Spain, Italy, the Netherlands, Austria, Portugal and Slovenia are already based on an s-b-s system, as is also the case in France (but only for the MFI sector) and in Germany (but only for b.o.p. statistics). The remaining euro area countries plan to move to an s-b-s data collection system in accordance with the following schedule: Ireland, France (for sectors other than MFIs) and Cyprus: first quarter of 2008, Germany (for the i.i.p. statistics): third quarter of 2008, and Luxembourg, Malta and Finland: first quarter of 2009.

Further breakdowns of the euro area b.o.p. and i.i.p. by currency contribute to the annual review of the international role of the euro. Data on cross-border transactions of goods and services of selected euro area countries (Belgium, Germany, Greece, Spain, France, Italy, Luxembourg, the Netherlands and Portugal) vis-à-vis countries outside the euro area are broken down by currency on an annual basis and released on the ECB's website.[15]

3 PERIODICITY AND TIMELINESS

The euro area b.o.p. statistics are published on a monthly basis. Additional breakdowns by sector, instrument and geographical counterpart are available on a quarterly basis.

The euro area i.i.p. statistics are published quarterly. Additional FDI details and breakdowns by geographical counterpart have an annual frequency.

Together with the monthly release of the non-seasonally adjusted b.o.p. data, the ECB publishes seasonally and working day-adjusted data for the b.o.p. current account items. These data facilitate the interpretation of the latest developments by removing the seasonal pattern as well as variations owing to in working days and holiday effects. An up-to-date note on the methodology to seasonal adjust the euro area b.o.p. can be found on the ECB's website.[16]

In 2007, the ECB fully complied with its advance release calendar of publications. Monthly data were published seven weeks after the end of the respective months, thereby also enabling an assessment of the quarterly and

15 http://www.ecb.europa.eu/stats/external/balance/html/Exports_imports_IRE_pub.pdf.

16 http://www.ecb.europa.eu/stats/pdf/sa_procedures.pdf.

annual flows within two months (e.g. the first assessment for the full year 2006 was published on 21 February 2007).[17] Quarterly b.o.p details as well as the quarterly i.i.p. were published three-and-a-half months after the end of the reference quarter.[18] The annual i.i.p. with further details was released eleven months after the end of the reference year.

4 ACCURACY

The Member States regularly assess, for example, the coverage, sampling error and response error of the source data. In general, the coverage and the control of the reporting by certain agents, such as the special purpose entities (SPEs) or securitisation vehicles, appears to have improved. The outcome of these actions has triggered an important part of the back data revisions in 2007.

When compiling the euro area aggregate at all frequencies, the ECB performs several checks on the contributions received from all euro area Member States and from the ECB itself (derived from its accounting ledgers). The aim of these checks is to detect inaccurate, inconsistent or implausible data. Outliers in time series or inconsistencies with other data sources are analysed. If a potential problem is detected, the compiler in the country involved has to check, change or confirm the figures; in the latter case, a further explanation with regard to the underlying economic development is often delivered.

5 REVISION PRACTICE AND POLICY

The euro area b.o.p. and i.i.p. are revised in accordance with a predetermined schedule. Quarterly data are revised with the publication of the following quarter's statistics and twice a year thereafter, in April and November. Monthly b.o.p. data are revised with the publication of the following month's statistics, as well as with the revisions of the corresponding quarter. The annual i.i.p. is revised with the publication of data for the two subsequent years. In addition, extraordinary revisions are justified in the case of major changes of the methods, coverage or data collection systems in the Member States, or when the composition of the euro area changes.

Revisions are necessary to improve the data quality as the first assessments may be based, in part, on estimates due to late or erroneous responses by reporting agents. Revisions also provide users with more accurate data for time series analysis and forecasting. Frequently, however, large or systematic revisions may signal weaknesses in the data collection or compilation systems that need to be remedied.

Since 2003, b.o.p. aggregates for the euro area and the EU (the former is compiled by DG-Statistics, the latter by Eurostat) have been revised simultaneously in accordance with a schedule that also enabled the publication of a reconciled euro area i.i.p. This increases the comparability of the statistics, while also easing the reporting burden of Member States.

Further steps towards a revision policy across integrated statistics, in particular between quarterly euro area/EU accounts and b.o.p./i.i.p. data, were agreed in 2006 by the ESCB Statistics Committee (STC). EU Member States noted the interdependency of their national b.o.p. and i.i.p. revisions with external trade statistics (an important source) and with national accounts (an important user). A coordination of the revision practices at euro area/EU level may facilitate a process of gradual convergence of existing national practices towards a common European revision policy.

6 STABILITY

The first release of the monthly b.o.p. for the euro area occurs seven weeks after the reference period and is based on the contributions sent by national compilers one week earlier. This report contains a number of indicators that serve

17 The benchmark in the SDDS is three months.
18 For example, the end-2005 i.i.p. was published in April 2006. The benchmark in the SDDS is nine months.

to measure how close these first assessments were to the final estimates. Similarly, the i.i.p. revisions are analysed considering the different vintages resulting from the annual revisions.

When reviewing the stability indicators, it should be kept in mind that all changes in the underlying data collection or compilation methods, or methodological changes in one or a few Member States, may lead to breaks in, or substantial backward revisions to, the euro area series. At the same time, these reforms generally increase the accuracy of the statistics and may be expected to increase the stability of the series over time. Moreover, it is clear that the quality of the b.o.p. and i.i.p. can be negatively affected by increasing globalisation and by the requirement to limit, and sometimes even reduce, the statistical reporting burden of economic agents.

Owing to recent methodological work on direct investment and portfolio investment (for both b.o.p. flows and i.i.p. stocks) that were carried out by the STC, assisted by the Working Group on External Statistics,[19] new collection methods have been implemented by several Member States in the last years and will be implemented by the others in 2008. The new methods are designed to increase the methodological soundness and consistency of national contributions to the euro area aggregate in the medium term, but there may also be a new source of revisions and asymmetries. Furthermore, the International Accounting Standards will not be implemented at the same pace and to the same extent across Member States and among companies, in particular for their individual (non-consolidated) accounts. This may also lead to some difficulties in the statistical data collection and to revisions at a later stage.

The main results of the stability indicators are presented in the following sub-sections.

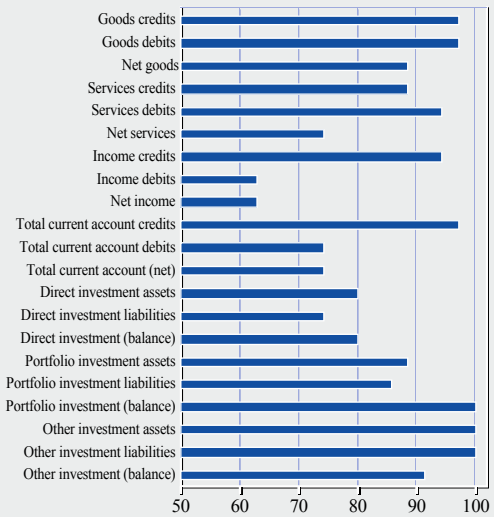
6.1 THE DIRECTIONAL RELIABILITY SHOWS WEAKNESS IN INCOME DEBITS AND A CONSIDERABLE IMPROVEMENT IN DIRECT INVESTMENT LIABILITIES

The directional reliability summarises how often the first assessments were able to correctly predict a decrease or an increase of the final value in comparison with the previous observation. The indicator shows unsatisfactory results for the income debits item in the euro area (63%) that are also reflected in the net income (63%). The direct investment liabilities item still shows one of the lowest results (74%), although there was a considerable improvement in comparison with previous periods (see Table 5 in Annex 2). Part of direct investment is composed of reinvested earnings, which are entirely based on estimates in the first assessment of the data. During this first monthly assessment, no results of companies are known, which also causes the low directional reliability for income debits. The

19 See reports of the Task Force on Foreign Direct Investment, ECB, March 2004, the Task Force on Portfolio Investment Collection Systems, ECB, June 2002, and the Task Force on Portfolio Investment Income, ECB, August 2003.

Chart 1 Overview of directional reliability

(correctly predicted sign of the month-on-month change in the first estimates as a percentage of all monthly estimates; 2004 - 2006)



Source: ECB.

reliability of portfolio investment liabilities data is improving over time.

The stability of the direction of the month-on-month changes constitutes a simple reliability measure, which is applicable to all b.o.p. items. Chart 1 contains the results of this indicator for the main items of the b.o.p. for the period 2004-06.

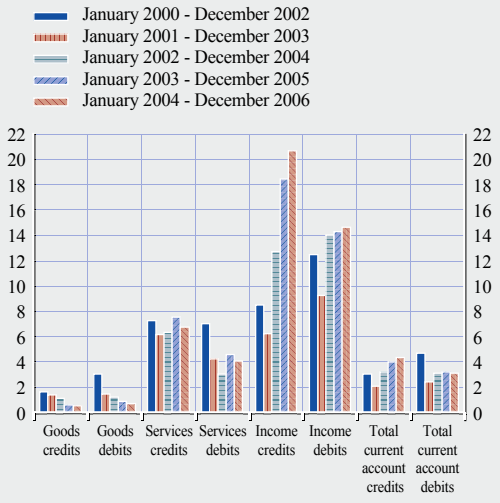
6.2 THE MEAN ABSOLUTE PERCENTAGE ERROR SHOWS A CONTINUOUS DETERIORATION OF THE STABILITY OF INCOME ESTIMATES AND A MODERATE IMPROVEMENT OF THE ESTIMATES FOR GOODS AND SERVICES

The mean absolute percentage error (MAPE) was calculated for the gross series of the euro area current account. The MAPE is equal to the average of the absolute revisions in relation to the size of the respective flow. Chart 2 contains the results for 2000-02, 2001-03, 2002-04, 2003-05 and 2004-06.

The relative magnitude of revisions continues to be much larger for income and services than for goods. The revisions to the income estimates even show a worsening trend, especially for income credits, while those for goods and services have improved somewhat in the most recent period. The lower stability of the preliminary estimates for income, and, to a lesser extent, for services, reflects the methodological changes implemented in some countries in recent years, as well as the correction of the first estimate of the retained earnings sub-item. In the case of services, the initial assessments continued to be systematically lower than the final assessments for both credits and debits. This feature is also observed for the recent estimates of income credits (see Charts 4, 5 and 7 in Annex 2). As a result of these developments, the relative magnitude of the revisions to the current account, as a whole, was almost stable: it increased by 0.4 percentage point for credits and it decreased by 0.1 percentage point for debits.

Chart 2 Revisions of the euro area current account as a percentage of the respective flow

(MAPE)



Source: ECB.

6.3 BIASES IN THE PRELIMINARY ESTIMATES OF NET SERVICES AND NET INCOME ARE REVEALED BY THE ROOT MEAN SQUARE RELATIVE ERROR

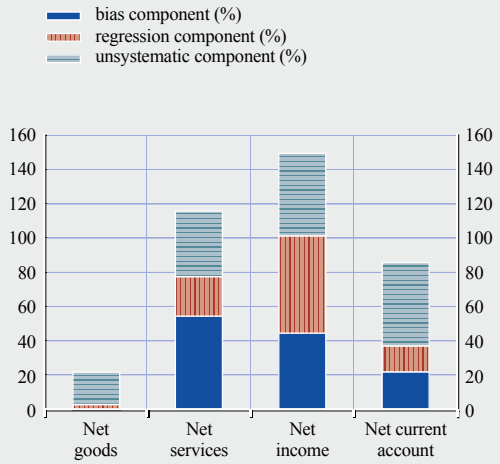
For the net items of the current account and for the financial account, another type of indicator is used: the root mean square relative error (RMSRE). The RMSRE measures the distance between the first assessment and the final assessment in relation to the volatility of each time series, as it is more difficult to correctly estimate more volatile series. The volatility of each series was estimated by its standard deviation, assuming that the series fluctuate around the average in a stable way.[20]

The results for all periods are shown in the tables in Annex 2. Chart 3 contains the results for 2004-06, and their further decomposition into a bias, a regression and an unsystematic component. The revisions to the current account balance have increased compared with the previous period, mainly due to relatively larger revisions to the net income item. The decomposition results

20 The assumption of stationarity for the net/balancing items was confirmed by standard statistical tests. In order to remove the effect of large outliers, mainly in the financial account, the standard deviation is calculated without considering the two extreme observations in the period concerned.

Chart 3 Decomposition of the revisions to the euro area current account as a percentage of volatility for 2004-2006

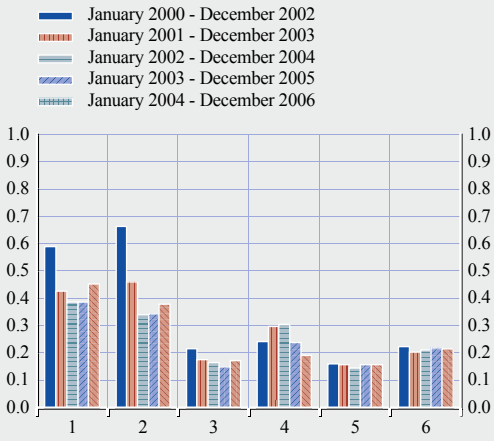
(RMSRE)



Source: ECB.

Chart 4 Revisions to the euro area financial account assets and liabilities as a percentage of the corresponding i.i.p. item

(MACE)



Source: ECB.

depict that the bias has disappeared for the goods item, and has significantly reduced for the estimates of net services (from 57% to 47% of the RMSRE value) and also somewhat for the net income estimates (from 33% to 30% of the RMSRE value). A large regression component for the net income estimates has appeared with the 2007 revisions. These were mainly generated by the application of the accrual principle to back data, which has decreased the volatility of the series.

6.4 THE MEAN ABSOLUTE COMPARATIVE ERROR CONTINUES TO SHOW THE HIGHEST REVISIONS FOR DIRECT INVESTMENT

The indicator used to evaluate the revisions to the preliminary estimates of assets and liabilities in the financial account is the mean absolute comparative error (MACE). The MACE is equal to the average of the absolute revisions in relation to the corresponding item in the i.i.p.

Chart 4 presents the results for the estimates of direct, portfolio and other investment assets and liabilities. The average revisions to the preliminary estimates of direct investment abroad (assets) and in the euro area (liabilities) continue to be the highest and have even increased in the last three years (from 0.39% to 0.45% of the direct investment positions abroad, and from 0.35% to 0.38% of the direct investment positions in the euro area). The portfolio investment liabilities item is the only one in the financial account whose relative revisions have fallen in the most recent years. The relative revisions to the estimates for the "other items" have remained quite stable.

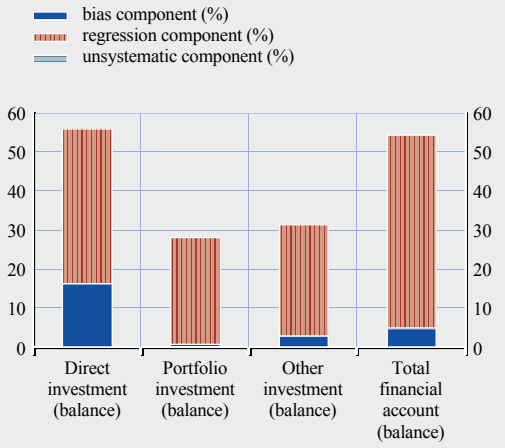
6.5 SIGNIFICANT BIAS IN THE REVISIONS TO DIRECT INVESTMENT ESTIMATES

The RMSREs for the net items of the current account (Chart 3) are higher than those for the balancing items of the financial account (Chart 5). This is not due to larger revisions, but to the lower volatility of the net items in the current account.

As in previous periods, the preliminary estimates for net direct investment show the highest revisions in relation to their volatility,

Chart 5 Decomposition of the revisions to the euro area financial account as a percentage of volatility for 2004-2006

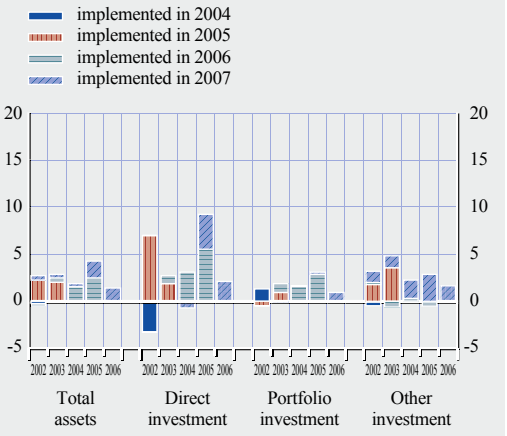
(RMSRE)



Source: ECB.

Chart 6 Revisions to the first estimates of the euro area i.i.p. - assets by reference period

(as percentage of i.i.p)



Source: ECB.
Note: From 2004, the first assestment is based on quarterly i.i.p.

although the overall reliability of the first results has moderately improved over time. At the same time, the bias component has much increased, becoming significantly different from zero according to a standard statistical test. The results for portfolio investment continue to improve.

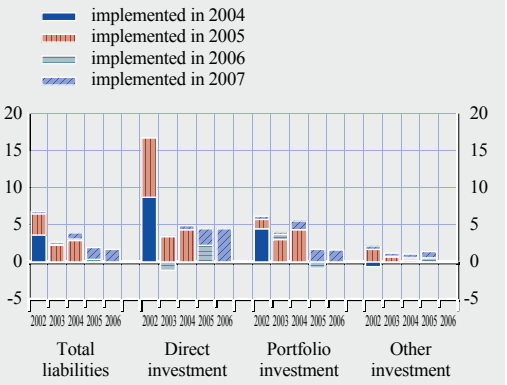
6.6 STABILITY OF THE INTERNATIONAL INVESTMENT POSITION

The revisions to the data for main items of the euro area i.i.p. assets and liabilities are shown in Charts 6 and 7 respectively. The revisions to the total asset positions as at end-2005 amounted to €461 billion, which represents 4.4% of the total assets. On the liabilities side, the corresponding revisions came to €244 billion (2.1% of the total liabilities). The first assessment of end-2005 data was released with a lag of only four months. The most significant revisions to end-2005 i.i.p. liabilities data were implemented in the 2007 revision round (its third assessment), while the revisions to the assets data are more evenly distributed between the publication of the first assessment of the annual i.i.p. in 2006 and the 2007 revision round. For the end-2006 data, the revisions implemented in 2007, with the publication of the annual i.i.p., mainly concern the data for direct investment and other investment assets (2.2% and 1.8% of their respective positions). On the liability side, the revisions implemented in 2007 focused on direct investment (5%).

In fact, the great majority of all revisions have been upwards. Chart 8 shows that the overall

Chart 7 Revisions to the first estimates of the euro area i.i.p - liabilities by reference period

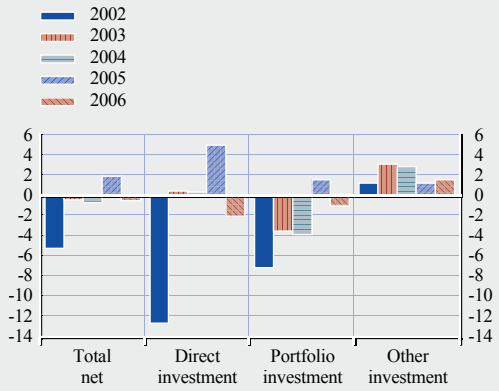
(as percentage of i.i.p)



Source: ECB.
Note: From 2004, the first assestment is based on quarterly i.i.p.

Chart 8 Total revisions to the first estimates of the end-year net euro area i.i.p by reference period

(as percentage of average of i.i.p. assets and liabilities)



Source: ECB.
Note: From 2004, the first assestment is based on quarterly i.i.p.

revisions to total assets and liabilities almost offset each other for the 2003, 2004 and 2006 data, although the latter, thus far, only include the revision published in November 2007. The revisions to the 2002 i.i.p. were much larger on the liabilities side, while the revisions to the 2005 i.i.p. were larger on the assets side.

In general, the revisions introduced in November 2007 had a minor effect on positions for previous years, as no significant changes were introduced in any euro area country (new compilation systems, methodological changes, etc.). In other investment assets, the improvement of the coverage achieved by some NCBs in 2007 has had a visible effect on positions dating back to 1999.

7 CONSISTENCY

Consistency indicators deal with two aspects: internal inconsistency, as revealed by the item on errors and omissions, and external inconsistency, as revealed by discrepancies vis-à-vis other statistics, such as foreign trade statistics and external flows derived from the balance sheets of MFIs. Furthermore, consistency also covers other aspects, such as the effect of a given transaction on subsequent b.o.p. and i.i.p. data (e.g. a change in positions may affect future income flows) or the same recording of a single transaction by both parties involved. The reconciliation between the b.o.p. and i.i.p. statistics has been published for the first time in 2007. The change in the annual positions (i.i.p.) that is not explained by transactions (b.o.p.) is broken down by type of adjustment: price changes, exchange rate changes and other adjustments. A box included in the annual quality report published in 2007 explained in detail the reconciliation between financial transactions included in the b.o.p. and stocks reflected in the i.i.p.

In 2007, overall consistency between the same transactions and positions reported to different euro area statistics compilers was still not fully achieved. While the exchange of information has improved considerably, there is still scope for further progress, because, following (i) a decision of the ECB Governing Council in April 2005; and (ii) the entry into force of Regulation (EC) 184/2005 on Community statistics concerning balance of payments, international trade in services and FDI in 2006,[21] a bilateral exchange of detailed information across the ESCB and with statistical authorities contributing to Community statistics can take place, where needed. Of course, all measures have been taken to protect the confidentiality of the data in compliance with the legal requirements, as set out in Article 8 of Council Regulation (EC) No. 2533/98.

7.1 INTERNAL CONSISTENCY

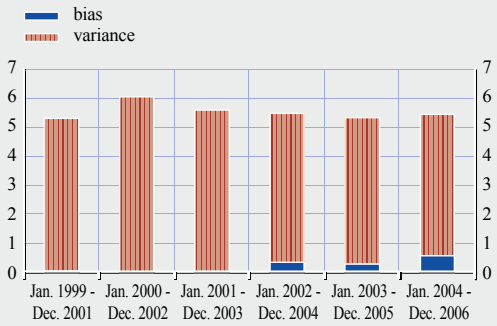
Net errors and omissions constitute the overall balancing item of the b.o.p. and thus provide an indicator of its internal inconsistency. In fact, the principle of double-entry book-keeping implies that the sum of all transactions vis-à-vis the rest of the world should be equal to zero. A large or persistent residual may hinder data analysis and interpretation.

The root mean square error (RMSE) indicator was calculated from the time series on net errors

21 OJ L 35, 8.2.2005, p. 23.

Chart 9 RMSE of net errors and omissions as percentage of gross flows in the euro area current account

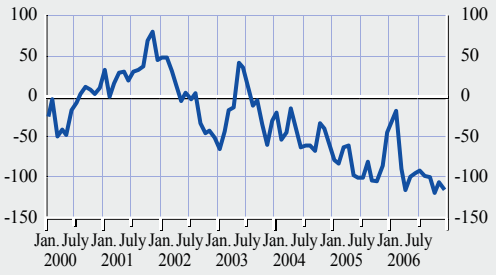
(RMSE)



Source: ECB.

Chart 10 12-month cumulated euro area net errors and omissions

(EUR billions)



Source: ECB.

and omissions as a percentage of the gross flows in the euro area current account. This indicator is also used to identify any potential bias (as normally positive and negative errors and omissions should cancel each other out).

In the period from January 2004 to December 2006, the net errors and omissions showed an increasing bias, although it is not yet significant according to a standard statistical test. The RMSE amounted to 5.5% of average gross flows in the current account in that period. Chart 9 shows that the internal consistency of the b.o.p. has not improved over time.

Chart 10 shows how the size of the 12-month cumulated euro area net errors and omissions, in absolute terms, has continuously increased since mid-2003, with only a short interruption at the end of 2005 and the beginning of 2006. The ECB and the euro area NCBs are stepping up their efforts to correct this persistent bias.

BOX

CONSISTENCY OF THE EURO AREA B.O.P. WITH THAT OF ITS MAIN PARTNERS

In the IMF Balance of Payments Yearbook, the IMF calculates the "global discrepancies" in balance of payments statistics by major components. The discrepancies refer to the world-wide difference between the sum of the debit and the credit entries of corresponding components reported by countries and estimated by the IMF. The 2007 issue of the Yearbook reflects increasing and systematic global asymmetries in most of the current account components, in particular in goods and services, while the financial account shows some large and erratic global asymmetries.

The publication of a geographical breakdown of the euro area counterparts from 2003 onwards has allowed a comparison of some items of the euro area b.o.p. with the corresponding figures published by some main counterpart countries. The study reported below focused on the current account of the United Kingdom, the United States of America and Japan due to the limited availability of other mirror data.[1]

1 A description of the data sources used for this study is available upon request.

Table 1 Euro area current account transactions with the United Kingdom from 2004 to 2006

EUR billion

	2004		2005		2006		2004		2005		2006	
Item in EA b.o.p.	as recorded by the EA	as recorded by GB	as recorded by the EA	as recorded by GB	as recorded by the EA	as recorded by GB	difference	relative difference	difference	relative difference	difference	relative difference
Current account, balance	84.94	-31.93	79.16	-40.40	79.22	-35.59	53.01	91%	38.76	65%	43.63	76%
Current account, export to GB / import from EA	377.04	316.38	408.23	364.14	458.93	433.72	60.66	17%	44.09	11%	25.21	6%
Current account, import from GB / export to EA	292.10	284.45	329.07	323.74	379.71	398.13	7.65	3%	5.33	2%	-18.42	-5%
Goods, balance	61.37	-38.86	51.93	-44.39	50.80	-41.44	22.51	45%	7.54	16%	9.36	20%
Goods, export to GB / import from EA	204.17	186.01	207.52	203.41	223.81	240.85	18.17	9%	4.11	2%	-17.05	-7%
Goods, import from GB / export to EA	142.80	147.15	155.59	159.02	173.00	199.41	-4.34	-3%	-3.43	-2%	-26.41	-14%
Services, balance	26.77	-1.42	25.79	-1.91	21.11	-1.59	25.35	180%	23.89	172%	19.52	172%
Services, export to GB / import from EA	94.45	57.93	101.00	62.73	102.65	65.67	36.51	48%	38.27	47%	36.98	44%
Services, import from GB / export to EA	67.68	56.52	75.21	60.82	81.54	64.09	11.16	18%	14.38	21%	17.46	24%
Income, balance	-4.74	8.64	0.09	6.16	6.15	7.60	3.90	58%	6.25	200%	13.74	200%
Income, receipts from GB / expenditure to EA	68.80	69.41	89.79	94.70	121.72	124.16	-0.61	-1%	-4.91	-5%	-2.44	-2%
Income, expenditure to GB / receipts from EA	73.54	78.05	89.70	100.86	115.58	131.76	-4.51	-6%	-11.16	-12%	-16.18	-13%
Current transfers, balance	1.54	-0.30	1.35	-0.26	1.16	-0.16	1.24	135%	1.08	134%	1.00	151%
Current transfers, receipts from GB / expenditure to EA	9.62	3.03	9.91	3.29	10.75	3.03	6.58	104%	6.62	100%	7.72	112%
Current transfers, expenditure to GB / receipts from EA	8.08	2.73	8.57	3.03	9.59	2.87	5.34	99%	5.54	95%	6.72	108%

Source: ECB and the Office for National Statistics of the United Kingdom.
Note: The relative differences are calculated as the absolute value of the difference divided by the average of the absolute values of both estimates. Although the income estimates are not the largest source of asymmetries, the euro area debit side shows an increasing number of discrepancies. This may be related to the different geographical allocation of the international investment positions applied by the United Kingdom and the euro area. In relative terms, the asymmetries of the current transfer estimates are quite significant and persistent. The euro area records much higher values for both credits and debits.

Current and capital accounts results

The asymmetries between the current account balances of the euro area and the United Kingdom are mainly due to unequal recordings of euro area exports of services (see Table 1). The euro area as a whole and every euro area country individually show much higher exports of services to the United Kingdom than those recorded by the United Kingdom as imports from the euro area and also from the euro area countries. This results in a persistent relative difference of almost 50% of the average of the export of services by the euro area to the United Kingdom and the import of services by the United Kingdom from the euro area. This is almost equivalent to 40% of the higher of the two values. On the import side, the euro area service figures are also higher than those recorded by the United Kingdom as exports to the euro area. The asymmetries in the balance of services have decreased somewhat over the last three years.

Although the income estimates are not the largest source of asymmetries, the euro area debit side shows an increasing number of discrepancies. This may be related to the different geographical allocation of the international investment positions applied by the United Kingdom and the euro area. In relative terms, the asymmetries of the current transfer estimates are quite significant and persistent. The euro area records much higher values for both credits and debits.

The current account balances of the euro area and the United States show less sizeable asymmetries, which have remained quite stable over the last two years (see Table 2). Furthermore, the revisions published from June 2007 up to now by the ECB and the BEA have improved the consistency for both years for most of the items. However, the discrepancies in services and in the balance of current transfers have remained relatively high. The euro area records higher values for both exports and imports of services vis-à-vis the United States, while for investment income the United States records higher values for both credits and debits.

Table 2 Euro area current and capital account transactions with the United States in 2005 and 2006

EUR billion

	2005		2006		2005		2006	
Item in EA b.o.p.	as recorded by the EA	as recorded by US	as recorded by the EA	as recorded by US	difference	relative difference	difference	relative difference
Current account, balance	47.34	-67.90	43.99	-63.55	-20.56	36%	-19.56	36%
Goods, balance	66.58	-75.43	66.60	-74.20	-8.85	12%	-7.60	11%
Goods, export to US / import from EA	180.17	184.63	198.55	196.56	-4.46	-2%	2.00	1%
Goods, import from US / export to EA	113.59	109.20	131.95	122.36	4.39	4%	9.59	8%
Services, balance	-8.85	2.62	-5.31	2.01	-6.24	109%	-3.30	90%
Services, export to US / import from EA	74.16	57.73	80.00	63.08	16.43	25%	16.92	24%
Services, import from US / export to EA	83.01	60.35	85.31	65.09	22.66	32%	20.22	27%
Income, balance	-8.36	11.16	-16.67	12.22	2.80	29%	-4.45	31%
Income, receipts from US / expenditure to EA	84.87	90.48	104.92	113.42	-5.61	-6%	-8.50	-8%
Income, expenditure to US / receipts from EA	93.23	101.64	121.59	125.64	-8.41	-9%	-4.04	-3%
Compensation of employees, net	0.51	-0.09	0.55	-0.10	0.42	141%	0.46	139%
Compensation of employees, receipts from US / expenditure to EA	1.49	0.24	1.42	0.25	1.25	145%	1.17	140%
Compensation of employees, expenditure to US / receipts from EA	0.98	0.15	0.87	0.15	0.83	148%	0.72	141%
Investment income, net	-8.87	11.25	-17.23	12.32	2.38	24%	-4.91	33%
Investment income, receipts from US / expenditure to EA	83.39	90.24	103.50	113.17	-6.86	-8%	-9.67	-9%
Investment income, expenditure to US / receipts from EA	92.25	101.49	120.73	125.49	-9.24	-10%	-4.76	-4%
Current transfers, balance	-2.04	-6.24	-0.62	-3.58	-8.28	200%	-4.21	200%
Capital account, net	-0.06	-0.13	-1.88	-0.20	-0.19	200%	-2.08	200%

Source: ECB and the US Bureau of Economic Analysis.
Note: The relative differences are calculated as the absolute value of the difference divided by the average of the absolute values of both estimates.

Table 3 Euro area current and capital account transactions with Japan from 2004 to 2006

EUR billion

Item in EA b.o.p.	2004 as recorded by the EA	2004 as recorded by JP	2005 as recorded by the EA	2005 as recorded by JP	2006 as recorded by the EA	2006 as recorded by JP	2004 difference	2004 relative difference	2005 difference	2005 relative difference	2006 difference	2006 relative difference
Current account, balance	-30.61	32.22	-27.40	32.69	-32.35	38.49	1.61	5%	5.29	18%	6.13	17%
Goods, balance	-19.54	18.19	-17.48	15.74	-19.92	17.75	-1.34	7%	-1.74	10%	-2.18	12%
Services, balance	2.59	-2.57	3.26	-1.28	2.87	-0.32	0.03	1%	1.98	87%	2.56	160%
Income, balance	-13.59	16.69	-13.65	18.63	-15.11	21.14	3.10	20%	4.98	31%	6.03	33%
Current transfers, balance	-0.08	-0.09	0.47	-0.39	-0.20	-0.08	-0.17	200%	0.07	17%	-0.28	200%
Capital account, balance	-0.03	-0.40	0.06	-0.23	0.37	-0.17	-0.43	200%	-0.17	120%	0.21	76%

Source: ECB and the Ministry of Finance of Japan.
Note: The relative differences are calculated as the absolute value of the difference divided by the average of the absolute values of both estimates.

The current account balances of the euro area and Japan (see Table 3) show increasing asymmetries over the last three years, although they are still relatively small. Estimates for bilateral income and services flows are the main sources for these increasing differences. The total current account asymmetries from 2004 to 2006 have increased in the last six months due to the different revision practices followed by the compiling institutions: while the ECB revised the euro area data for 2004 to 2006 in November 2007, the Ministry of Finance of Japan has not yet revised these figures. The ECB revisions improved the mirror data for the goods and services accounts, while the discrepancies of the income estimates increased considerably.

Financial account results

The results of a comparison of the euro area b.o.p. with data from the United Kingdom, the United States and Japan show significant discrepancies in estimates for bilateral FDI, mainly vis-à-vis the euro area countries that host many special purpose entities (SPEs). In addition, the discrepancies are also substantial for portfolio and other investment flows with the United States. The discrepancies do not seem to be related to substantial conceptual differences, as all countries adhere to the same international standards (BPM5) when compiling b.o.p. and i.i.p. statistics. Asymmetries may arise from the application of different criteria for the identification of the origin or destination of direct investment transactions or positions. For example, while the euro area considers the residency of the direct investor or the direct investment enterprise as the counterpart of the transaction, other compilers look through the SPE and record the origin of the investment as the counterpart. This issue is being investigated with the main partner countries of the euro area.

Taking into consideration the increasing relevance of FDI data at the global level, as well as the quite uneven quality of the current recording among countries, a Coordinated Direct Investment Survey (CDIS) is planned to be conducted for the reference year 2009, under the auspices of the IMF and with the collaboration of the IMF's interagency partners. The purpose of the CDIS is to improve the coverage and comparability of b.o.p and i.i.p. statistics on FDI.

Table 1 Euro area goods in b.o.p. and in external trade statistics

(month-on-month growth rate in percentage points)

	Period	Exports	Imports
Average of absolute differences	1999-2001	0.75	0.99
	2000-2002	0.69	0.73
	2001-2003	0.74	0.68
	2002-2004	0.89	0.68
	2003-2005	0.93	0.74
	2004-2006	0.73	0.70
Average of differences	1999-2001	0.18	0.10
	2000-2002	0.08	0.01
	2001-2003	0.10	0.00
	2002-2004	0.00	-0.05
	2003-2005	0.02	-0.01
	2004-2006	-0.07	-0.12

Source: ECB.

7.2 EXTERNAL CONSISTENCY

This box compares some items of the euro area b.o.p. and i.i.p. with the corresponding figures published by main counterpart countries.

The b.o.p. series have also been compared with the corresponding data published by Eurostat for euro area external trade in goods, and with the external transactions derived from the MFI balance sheet statistics. Although the methodologies of those series are not fully consistent with the b.o.p., they broadly reflect the same economic phenomenon. Therefore, the comparisons are useful to see whether the differences are stable over time.

Table 1 contains the results for the average of the absolute differences between the growth rates of both series of exports and imports data. The indicators show that in 2004-06 this discrepancy has decreased for both exports and imports. The ordinary averages of the differences reveal no systematic divergence in the growth rates of both series.

In Table 2, the root mean square relative error (RMSRE) reflects the distance between comparable b.o.p. and monetary statistics, in relation to the volatility of the b.o.p. series concerned. Although the levels of this indicator for 2004-06 remained similar to the average of those levels from zero onwards, the bias component has significantly increased. It has become significantly different from zero according to a standard statistical test. This bias mainly reflects the different recording, by some NCBs, of short-selling transactions in the b.o.p statistics, on the one hand, and the monetary statistics on the other hand. In recent years, these transactions have become quite sizeable. The clarification and solution of this

Table 2 Euro area deposits/loans of MFIs - comparison with corresponding net transactions from monetary statistics

Period	RMSRE	Bias component (%)	Regression component (%)	Unsystematic component (%)
1999-2001	15.5	3.5	0.5	96.0
2000-2002	9.0	0.9	1.2	97.9
2001-2003	9.3	0.4	0.3	99.3
2002-2004	8.7	2.2	1.5	96.3
2003-2005	7.6	3.0	0.3	96.6
2004-2006	8.6	14.0	0.8	85.2

Source: ECB.

issue is being investigated by all compilers involved.

8 ACCESSIBILITY

The press releases of the euro area b.o.p. and i.i.p. data – in total 17 per annum – are published through wire services and on the ECB's website in accordance with the advance release calendar. The most recent data and longer time series with current or historical composition of the euro area are also available in the ECB Statistical Data Warehouse (SDW)[22] and in CSV files. The data are also published in the ECB's Monthly Bulletin following the press release.

The ECB has a specific e-mail address for external users of statistics: statistics@ecb.int. Complex queries concerning external statistics are forwarded to the External Statistics Division, which is in charge of the b.o.p. and i.i.p. statistics at the ECB.

22 http://sdw.ecb.europa.eu.

ANNEX I

METHODOLOGICAL DOCUMENTATION FOR QUALITY INDICATORS [1]

This annex contains the methodology used for the quantitative indicators to assess reliability/stability and serviceability/consistency.

1 RELIABILITY/STABILITY

In the IMF's terminology, the study of revisions is normally referred to as *reliability*, while some quality work at the European level is also referred to as *stability*. The underlying concept is however the same and can be defined as *"the closeness of the initial estimated value(s) to the subsequent estimated values. Assessing reliability involves comparing estimates over time. In other words, assessing reliability refers to revisions".* [2]

The number of revisions observed depends on the revision policy/practice of a statistical agency or department, which normally decides beforehand (sometimes in collaboration with the users) how many times and when the estimates should be revised and communicated to the public.

As an example, with reference to a series X with N observations, the statistical agency can decide to publish it k times with predefined time lags $\{l_1, l_2, ..., l_k\}$. From the k sets of data, revisions can easily be derived, normally as the difference between two subsequent assessments. Therefore, a revision variable or series can be defined as the difference $R_{ij} = X_j - X_i$, where i and j identify two specific time-lags, with $j > i$. The joint ECB (DG-S)/Commission (Eurostat) Task Force on Quality (TF-QA) suggested measuring revisions by means of the difference between the first and latest assessments: $R = X_k - X_1$.

Revisions may also be calculated over a transformation of the original series, such as the respective first difference or the growth rate.

1.1 SIMPLE MEASURES OF REVISIONS

1.1.1 Size indicators

Simple indicators of revisions express the changes in relation to the size of the variable X.

An average of these revisions ($\overline{R}$) then provides an indication of how far on average the first assessment was from the latest assessment. However, if large positive and negative revisions almost cancel out, this may provide a spuriously positive impression of data quality. Therefore, the average of the absolute revisions ($|\overline{R}|$) is generally seen as a better stability indicator.

1.1.2 Directional indicators

In principle, positive and negative revisions should occur with roughly the same frequency. If the revisions are systematically positive, this may point to an undercoverage in early estimates, which needs to be corrected somehow. A simple indicator for this phenomenon is the ratio between upward revisions and the number of observations (N).

upward revisions ratio = (# upward revisions)/N

To assess whether the information on the direction of changes as contained in the earlier estimates has been altered by the revisions, a *2 x 2* contingency table can be set up. In this contingency table the columns consist of positive and negative first differences of the early estimates $\Delta x_{t_1} = x_{t_1} - x_{(t-1)_1}$, while the rows consist of positive and negative changes of the latest values $\Delta x_{t_k} = x_{t_k} - x_{(t-1)_k}$.

1 Based on the report by the joint ECB (DG-S)/Commission (Eurostat) Task Force on Quality.

2 Carol S. Carson and Lucie Laliberté, "Assessing accuracy and reliability: a note based on approaches used in national accounts and balance of payments statistics", IMF Working Paper 02/24, February 2002.

Contingency table for directional reliability

	$\Delta\chi_{r1} > 0$	$\Delta\chi_{r1} \leq 0$	Subtotal
$\Delta\chi_{r1} > 0$	n_{11}	n_{12}	$n_{11}+n_{12}$
$\Delta\chi_{r1} \leq 0$	n_{21}	n_{22}	$n_{21}+n_{22}$
Subtotal	$n_{11}+n_{21}$	$n_{12}+n_{22}$	N

The directional reliability indicator (Q) is then as follows:

$$Q = \frac{n_{11} + n_{22}}{N} .$$

This coefficient Q is equal to 1 if the changes following the earliest and the latest estimates always have the same sign ($n_{11} + n_{22} = N$), while it is equal to 0 when there is a total dissociation ($n_{11} + n_{22} = 0$). Obviously, higher values of this indicator are preferred.

1.2 RELATIVE MEASURES OF REVISIONS

It is often useful to also provide relative measures, which relate the revisions to dimensional measures of the variable concerned. Two main types of indicators have been developed depending on whether the observations of a time series have only positive values (series on gross transactions or on asset or liability positions) or can have either positive or negative values (series on net transactions or balances).

1.2.1 Gross transactions or asset/liability positions

In the case of gross data, the relative revision equals the percentage change of the initial assessment $\left(\frac{R}{X}\right)$. If the average over time $\overline{\left(\frac{R}{X}\right)}$ is then computed, this is called the *mean percentage error* (MPE).

As revisions can be positive or negative, it is usually more appropriate to take the absolute value, in order to avoid that revisions of opposite sign cancel out in the resulting indicator. So, if the average is calculated with the absolute values, we get $\overline{\left|\frac{R}{P}\right|}$, the *mean absolute percentage error* (MAPE).

1.2.2 Net transactions or balances between assets and liabilities

In the case of net data, revisions cannot be properly related to the series value itself because the observations may have different signs and, even more importantly, the values of the series may often be close to zero.

1.2.2.1 Transactions in assets and liabilities

A solution for assets and liabilities of the b.o.p. financial account is to use the corresponding item in the i.i.p. for assessing the relative size of the revision. This provides a relative measure that the user can easily interpret. The indicator will be expressed as $\left(\frac{R}{P}\right)$, were P is the related i.i.p. item. As for the gross data, an average of the absolute value of this ratio can be taken over time, in order to avoid that revisions of opposite signs cancel out in the resulting indicator.

The *mean absolute comparative error (MACE)* is defined as $\overline{\left|\frac{R}{P}\right|}$.

As the i.i.p. is not available at a monthly frequency, the calculations of the MACE for b.o.p. data use the level of the i.i.p. at the end of the corresponding quarter. [3]

1.2.2.2 Net transactions in the current account and balances in the financial account

For the b.o.p balancing items, the i.i.p. can have positive and negative observations as well. Therefore, a measure of the volatility of the series X is used as a reference for the size of the revisions. This measure reflects that in practice it is more difficult to correctly estimate values of a volatile series.

3 Before 2003, this is done with annual data.

The mean absolute relative error (MARE) is then defined as $\frac{|\overline{R}|}{vol\,(X_k)}$.

There are several ways of calculating the volatility of X, using the standard deviation, the average distance from the mean or the median of the distances from the median [4]. In principle, the volatility should be calculated for the latest assessment X_k, because those values should be the most accurate ones.

An advantage of using the average distance from the mean is that with a small transformation that indicator can be decomposed into a bias and a variance component. This indicator is calculated as the square root of the ratio between the average of the square revisions and the variance of the series (S^2). It is called the root mean square relative error (RMSRE): $RMSRE = \sqrt{\frac{\overline{R^2}}{S^2}}$.

The value of the RMSRE is 0 when the *first assessment* always equals the latest, 1 if the *first assessment* is only as accurate as the reference *forecast*, which is the time series average, and greater than 1 when the *first assessmen*t is less accurate than such a forecast of the series. [5] The square of the RMSRE can be decomposed as follows:

$$RMSRE^2 = \left[\frac{\overline{X}_k - \overline{X}_1}{S_{X_k}}\right]^2 + \left[r_{X_k X_1} - \frac{S_{X_1}}{S_{X_k}}\right]^2 + \left[1 - (r_{X_k X_1})^2\right]$$

where $r_{x_k x_1}$ is the correlation between the two series, and S_{x_k} and S_{x_1} are the respective standard deviations.

The three components can be interpreted as follows:

1) The *bias component* provides an indication of systematic error, since it measures the extent to which the average values of the early and later assessments deviate from each other. The revisions can be considered biased if the mean of the revisions is significantly different from zero. [6]

2) The *regression component* is another systematic component which reflects whether the overall pattern of the series with the early estimates was close to that of the series with the later estimates. If the initial estimates correctly reflect the pattern/volatility of the later estimates, the correlation between both series will be quite high and this component of the indicator will be close to zero.

3) The *unsystematic component* is the variance of the residuals obtained by regressing the early estimates on the later estimates. This reflects more random revisions. [7]

The limitations of this indicator are: (i) in the case of non-stationary series, its value and decomposition become meaningless and (ii) its interpretation is less straightforward.

After successful tests of the stationarity of the series, this indicator has been applied to assess the revisions in the net current and capital accounts as well as to the balancing items in the financial account. [8]

4 For more detailed information, refer to Annex 1 of the "Euro area balance of payments and international investment statistics annual quality report", ECB, January 2005, or to the report by the joint ECB (DG-S)/Commission (Eurostat) Task Force on Quality http://www.cmfb.org/pdf/TF-QAreport_final_CMFB_jul04.pdf, and to "Quantitative quality indicators for statistics – and application to euro area balance of payments", ECB, Occasional Paper No 54, November 2006.

5 Other measures, like the median and the trimmed mean, were tested as well. Assuming that the b.o.p. financial account net flows are stationary, the average was chosen owing to its simplicity and its ease of interpretation, and because it enables a decomposition of the indicator into meaningful components. If the series is not stationary, the indicator can still be applied using the previous value of the series as the reference value, or using the first difference of the series.

6 Assuming normality for revisions, so as to be able to apply the t test.

7 However, the unsystematic part could still hide systematic non-linear patterns.

8 To calculate the indicator for every period (36 observations), the two extreme values have been removed in order to make the results more comparable over time.

The following table shows which measures of revisions for the b.o.p. are used in the annual quality report:

Measures of b.o.p revisions

	Debits	Credits	Net
Current account items	MAPE	MAPE	RMSRE
	Assets	**Liabilities**	**Balance**
Financial account items	MACE	MACE	RMSRE

2 SERVICEABILITY/CONSISTENCY

In the IMF's Data Quality Assessment Framework (DQAF), *consistency* is defined as: (i) over time; (ii) between data collected at different frequencies; (iii) internationally; (iv) across variables, either vertically (across transactions), horizontally (across institutional sectors), and/or between flows and stocks. The TF-QA focused on the following sub-categories:

- internal consistency, e.g. within the integrated statistics (b.o.p./i.i.p. or national accounts); and
- external consistency (between different sources of data and/or different statistical frameworks); this may include mirror statistics, as international statistics should be the same also when they are compiled by different institutions or by different units of the same institution.

2.1 INTERNAL CONSISTENCY

According to the IMF's 2001 DQAF for the b.o.p., internal consistency implies checking that "over the long run the errors and omissions item *has not been large* and *has been stable* over time".

A measure of the size of this item can be provided by the *average of the absolute net errors and omissions*, $\overline{|EO|}$.

As with revisions, an alternative measure of the size is the *root mean square error of the net errors and omissions*.

$$RMSE\,(EO) = \sqrt{\overline{EO^2}}$$

As before, this indicator can be decomposed into bias and variance components: [9]

$$RMSE^2 = bias\ component + variance\ component$$
$$RMSE^2 = \overline{EO}^2 + S^2$$

where S is the standard deviation of the errors and omissions.

Besides, the number of positive EO divided by the number of observations N can be used to assess the relative frequency of positive EO:

$$CP\,(EO) = \frac{Count\,(EO_t > 0)}{N}$$

2.2 EXTERNAL CONSISTENCY

Although minor discrepancies arising from methodological differences can still be present in two sets of data stemming from different sources and/or different statistical frameworks, [10] a comparison of these two datasets can still provide a useful measure of consistency.

2.2.1 Size indicators

2.2.1.1 Series with positive values

Simple indicators of external consistency relate the differences to the values of the variable that is compared. A simple indicator measuring the consistency between b.o.p. and international trade statistics (ITS) can be computed using the latest assessment of both series.

9 Following the simplest MSE decomposition. See Francis X. Diebold, "Elements of Forecasting", 2001.

10 E.g. the comparison between the euro area goods item (b.o.p.) and Eurostat's external trade data, or the comparison between the b.o.p. flows of the MFI sector and flows derived from the consolidated MFI balance sheet from money and banking statistics.

A preferable indicator is similar to the MAPE ($\overline{|P|}$), but with the percentage differences calculated as proportions of the average of both time series.[11] This indicator captures the magnitude of the discrepancies in absolute value, and relates it to the average size of both series.

Another simple measure is based on the average differences of the growth rates. This also has the advantage that it abstracts from differences in levels between time series, e.g. the imports of goods are measured on a c.i.f. basis in the external trade statistics and on a f.o.b. basis for the b.o.p., while in both statistics exports are measured on a f.o.b. basis. A simple indicator of external consistency then becomes:

$$G = \overline{|G_x - G_y|}$$

2.2.1.2 Series with positive and negative values

Differences between b.o.p. transactions and similar transactions derived from the MFI balance sheet can be attributed to a variety of factors: time of recording and reporting, revision policies and valuation methods.

Relative indicators for assessing reliability can also be used to assess consistency between comparable net flows. The RMSRE indicator is calculated for the latest assessment of each series, using the b.o.p. series as the benchmark.

2.2.2 Directional indicators

Similar to the directional indicators set out in Sub-section 1.1.2, such indicators can also be constructed to check whether the signs of the changes are typically the same in both the series being compared.

[11] $$C = \frac{1}{a}\sum_{t=T-a}^{T}\frac{|x_t - y_t|}{(x_t + y_t)/2}$$

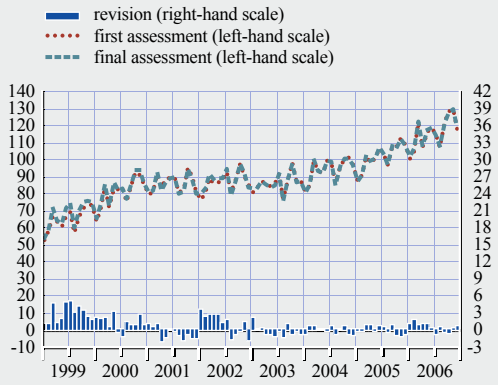
Based on S. Keuning and S. Algera, "Some elements of a quality framework for CMFB statistics", Statistics Netherlands, October 2001.

ANNEX 2

RESULTS OF STABILITY INDICATORS

Chart 1 Euro area goods – credits

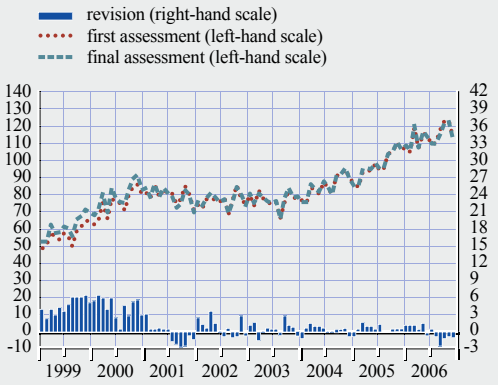
(EUR billions)



Source: ECB.

Chart 2 Euro area goods – debits

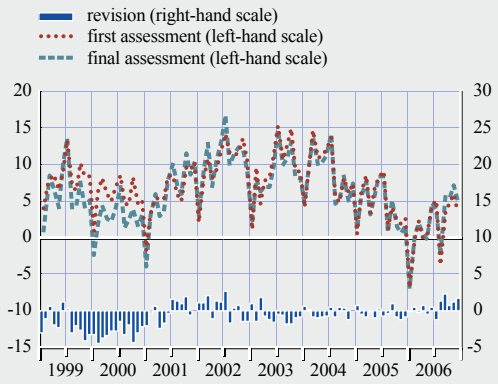
(EUR billions)



Source: ECB.

Chart 3 Euro area goods – net

(EUR billions)



Source: ECB.

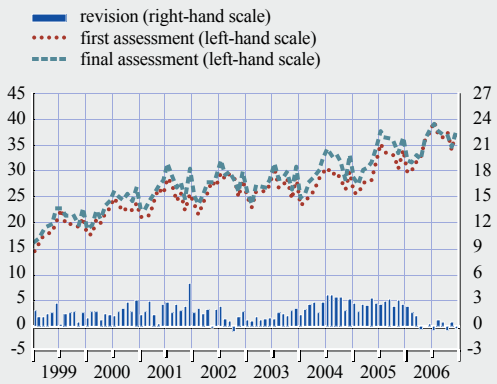
Table 1 Stability indicators for the euro area goods

Quality indicator	Reference period Jan.-Dec.	Goods		
		Credits	Debits	Net
$\overline{R}$ (EUR billions)	1999 - 2001	1.18	2.84	-1.66
	2000 - 2002	0.62	1.55	-0.94
	2001 - 2003	0.16	0.32	-0.16
	2002 - 2004	0.33	0.57	-0.24
	2003 - 2005	-0.04	0.46	-0.50
	2004 - 2006	0.16	0.22	-0.07
$\lvert\overline{R}\rvert$ (EUR billions)	1999 - 2001	1.75	3.44	2.12
	2000 - 2002	1.43	2.33	1.85
	2001 - 2003	1.18	1.22	1.23
	2002 - 2004	1.02	0.98	1.05
	2003 - 2005	0.58	0.75	0.84
	2004 - 2006	0.57	0.77	0.74
MAPE/ RMSRE (%)	1999 - 2001	2.41	5.22	0.73
	2000 - 2002	1.72	3.09	0.49
	2001 - 2003	1.40	1.56	0.36
	2002 - 2004	1.19	1.25	0.38
	2003 - 2005	0.63	0.90	0.27
	2004 - 2006	0.55	0.78	0.21
Q (%)	1999 - 2001	97.14	94.29	88.57
	2000 - 2002	97.14	94.29	88.57
	2001 - 2003	100.00	94.29	91.43
	2002 - 2004	97.14	97.14	91.43
	2003 - 2005	97.14	100.00	97.14
	2004 - 2006	97.14	97.14	88.57

Source: ECB.
Note: The MAPE is used for credits and debits and the RMSRE for net data.

Chart 4 Euro area services – credits

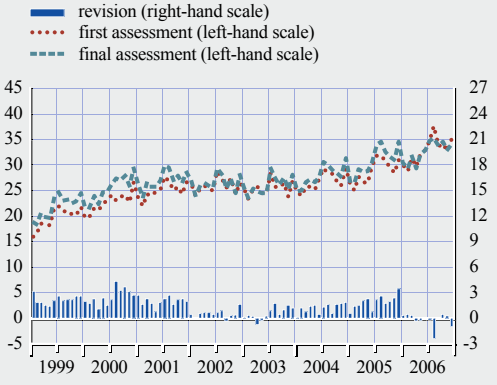
(EUR billions)



Source: ECB.

Chart 5 Euro area services – debits

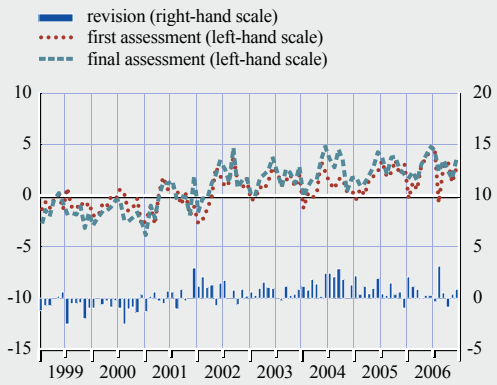
(EUR billions)



Source: ECB.

Chart 6 Euro area services – net

(EUR billions)



Source: ECB.

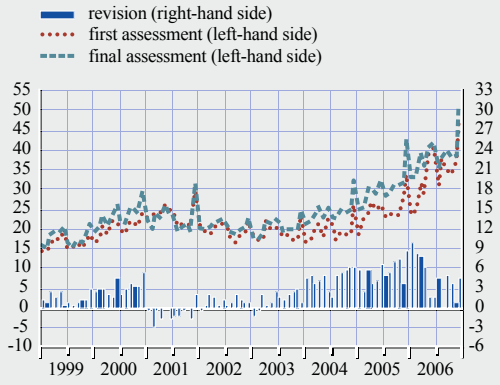
Table 2 Stability indicators for the euro area services

Quality indicator	Reference period Jan.-Dec.	Services		
		Credits	Debits	Net
$\overline{R}$ (EUR billions)	1999 - 2001	1.78	2.24	-0.47
	2000 - 2002	1.72	1.69	0.03
	2001 - 2003	1.54	1.03	0.52
	2002 - 2004	1.70	0.75	0.95
	2003 - 2005	2.17	1.22	0.95
	2004 - 2006	1.95	0.99	0.96
$\lvert\overline{R}\rvert$ (EUR billions)	1999 - 2001	1.78	2.24	0.85
	2000 - 2002	1.75	1.70	0.87
	2001 - 2003	1.57	1.09	0.80
	2002 - 2004	1.74	0.82	1.04
	2003 - 2005	2.17	1.27	1.02
	2004 - 2006	2.02	1.20	1.09
MAPE/ RMSRE (%)	1999 - 2001	8.18	10.12	0.87
	2000 - 2002	7.35	7.07	0.63
	2001 - 2003	6.21	4.29	0.62
	2002 - 2004	6.40	3.10	0.88
	2003 - 2005	7.57	4.60	1.04
	2004 - 2006	6.83	4.16	1.15
Q (%)	1999 - 2001	85.71	82.86	77.14
	2000 - 2002	91.43	88.57	74.29
	2001 - 2003	88.57	91.43	77.14
	2002 - 2004	94.29	91.43	77.14
	2003 - 2005	94.29	88.57	71.43
	2004 - 2006	88.57	94.29	74.29

Source: ECB.
Note: The MAPE is used for credits and debits and the RMSRE for net data.

Chart 7 Euro area income – credits

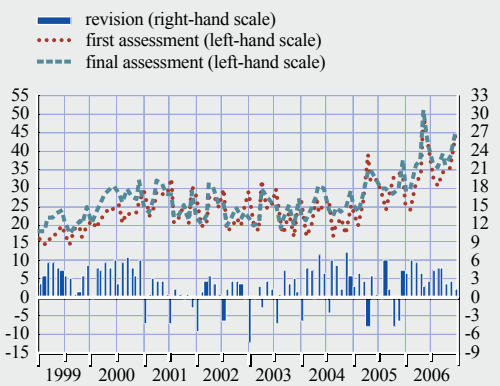
(EUR billions)



Source: ECB.

Chart 8 Euro area income – debits

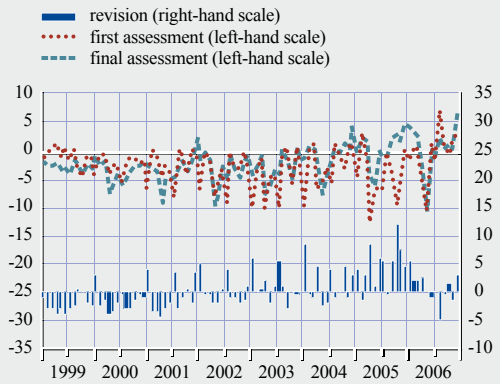
(EUR billions)



Source: ECB.

Chart 9 Euro area income – net

(EUR billions)



Source: ECB.

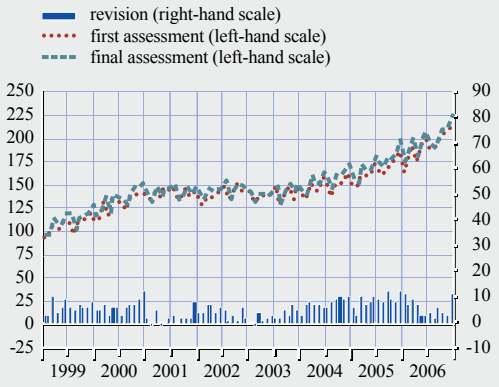
Table 3 Stability indicators for the euro area income

Quality indicator	Reference period Jan.-Dec.	Income		
		Credits	Debits	Net
$\overline{R}$ (EUR billions)	1999 - 2001	1.29	2.71	-1.41
	2000 - 2002	1.13	1.77	-0.64
	2001 - 2003	0.54	0.32	0.22
	2002 - 2004	2.33	1.33	1.00
	2003 - 2005	3.85	1.35	2.49
	2004 - 2006	4.91	2.52	2.39
$\overline{\lvert R \rvert}$ (EUR billions)	1999 - 2001	1.90	3.36	2.30
	2000 - 2002	1.77	2.97	2.11
	2001 - 2003	1.25	2.27	2.07
	2002 - 2004	2.43	3.05	2.04
	2003 - 2005	3.92	3.30	3.18
	2004 - 2006	4.92	3.68	3.25
MAPE/ RMSRE (%)	1999 - 2001	9.68	16.20	1.46
	2000 - 2002	8.57	12.56	1.12
	2001 - 2003	6.31	9.36	1.11
	2002 - 2004	12.81	14.09	1.07
	2003 - 2005	18.46	14.36	1.52
	2004 - 2006	20.71	14.65	1.49
Q (%)	1999 - 2001	80.00	77.14	71.43
	2000 - 2002	82.86	82.86	74.29
	2001 - 2003	82.86	82.86	80.00
	2002 - 2004	94.29	68.57	74.29
	2003 - 2005	97.14	54.29	65.71
	2004 - 2006	94.29	62.86	62.86

Source: ECB.
Note: The MAPE is used for credits and debits and the RMSRE for net data.

Chart 10 Euro area current account – credits

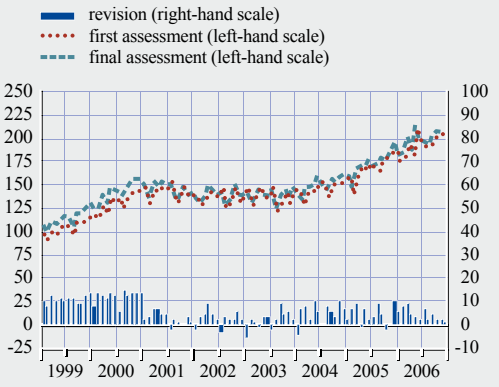
(EUR billions)



Source: ECB.

Chart 11 Euro area current account – debits

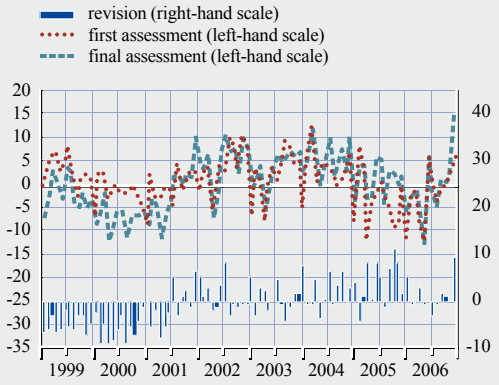
(EUR billions)



Source: ECB.

Chart 12 Euro area current account – net

(EUR billions)



Source: ECB.

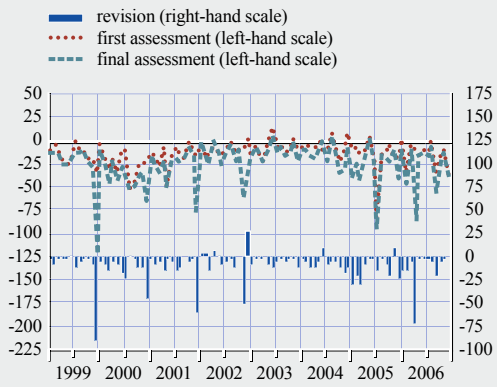
Table 4 Stability indicators for the euro area current account

Quality indicator	Reference period Jan.-Dec.	Current account		
		Credits	Debits	Net
$\overline{R}$ (EUR billions)	1999 - 2001	4.58	8.55	-3.97
	2000 - 2002	3.90	5.86	-1.96
	2001 - 2003	2.64	2.44	0.21
	2002 - 2004	4.61	3.30	1.31
	2003 - 2005	6.16	3.80	2.37
	2004 - 2006	7.22	4.66	2.56
$\lvert\overline{R}\rvert$ (EUR billions)	1999 - 2001	4.83	8.72	4.82
	2000 - 2002	4.14	6.33	3.97
	2001 - 2003	2.96	3.47	2.85
	2002 - 2004	4.67	4.47	2.72
	2003 - 2005	6.23	4.86	3.60
	2004 - 2006	7.22	5.15	3.49
MAPE/ RMSRE (%)	1999 - 2001	3.99	7.41	1.14
	2000 - 2002	3.07	4.77	0.72
	2001 - 2003	2.12	2.52	0.67
	2002 - 2004	3.24	3.21	0.87
	2003 - 2005	4.03	3.29	1.17
	2004 - 2006	4.39	3.19	0.86
Q (%)	1999 - 2001	85.71	88.57	68.57
	2000 - 2002	85.71	88.57	68.57
	2001 - 2003	88.57	97.14	68.57
	2002 - 2004	94.29	85.71	65.71
	2003 - 2005	94.29	74.29	65.71
	2004 - 2006	97.14	74.29	74.29

Source: ECB.
Note: The MAPE is used for credits and debits and the RMSRE for net data.

Chart 13 Direct investment abroad

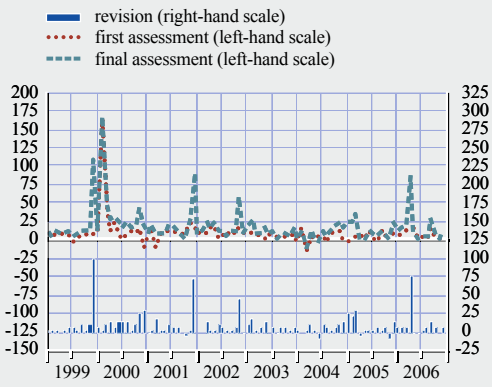
(EUR billions)



Source: ECB.

Chart 14 Direct investment in the euro area

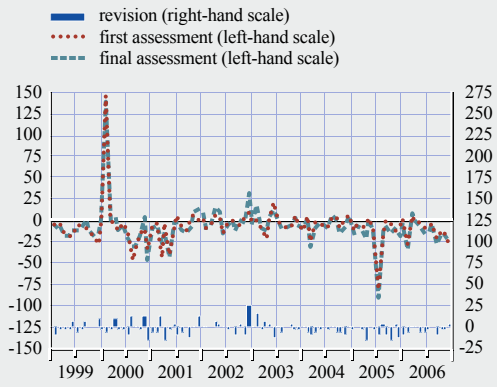
(EUR billions)



Source: ECB.

Chart 15 Direct investment – balance

(EUR billions)



Source: ECB.

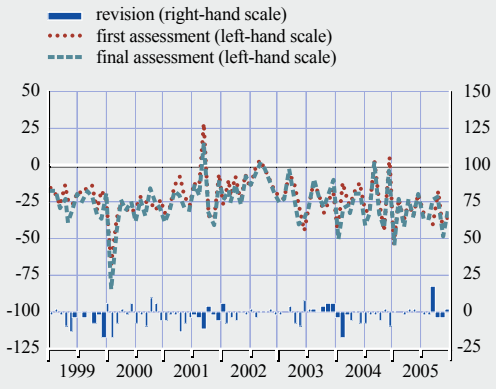
Table 5 Stability indicators for the euro area direct investment

Quality indicator	Reference period Jan.-Dec.	Direct investment		
		Abroad	euro area	Net
$\overline{R}$ (EUR billions)	1999 - 2001	-11.54	11.51	-0.03
	2000 - 2002	-9.18	9.84	0.66
	2001 - 2003	-6.74	7.56	0.82
	2002 - 2004	-5.55	6.06	0.51
	2003 - 2005	-8.21	6.25	-1.96
	2004 - 2006	-10.63	7.55	-3.08
$\overline{\lvert R \rvert}$ (EUR billions)	1999 - 2001	11.64	11.95	5.74
	2000 - 2002	11.38	10.42	6.34
	2001 - 2003	8.87	8.38	5.84
	2002 - 2004	8.28	6.90	4.73
	2003 - 2005	9.42	7.71	4.85
	2004 - 2006	11.84	9.09	4.38
MACE/ RMSRE (%)	1999 - 2001	0.70	0.93	0.58
	2000 - 2002	0.59	0.66	0.54
	2001 - 2003	0.43	0.46	0.70
	2002 - 2004	0.39	0.34	0.58
	2003 - 2005	0.39	0.35	0.68
	2004 - 2006	0.45	0.38	0.56
Q (%)	1999 - 2001	82.86	65.71	74.29
	2000 - 2002	82.86	71.43	82.86
	2001 - 2003	91.43	57.14	85.71
	2002 - 2004	88.57	60.00	85.71
	2003 - 2005	82.86	57.14	82.86
	2004 - 2006	80.00	74.29	80.00

Source: ECB.
Note: The MACE is used for assets and liabilities and the RMSRE for balance data.

Chart 16 Euro area portfolio investment – assets

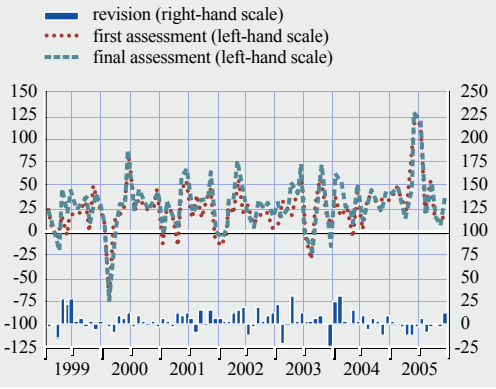
(EUR billions)



Source: ECB.

Chart 17 Euro area portfolio investment – liabilities

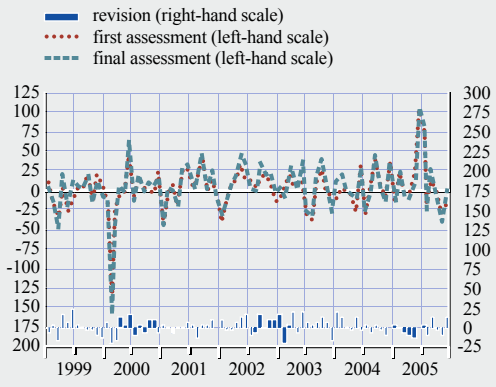
(EUR billions)



Source: ECB.

Chart 18 Euro area portfolio investment – balance

(EUR billions)



Source: ECB.

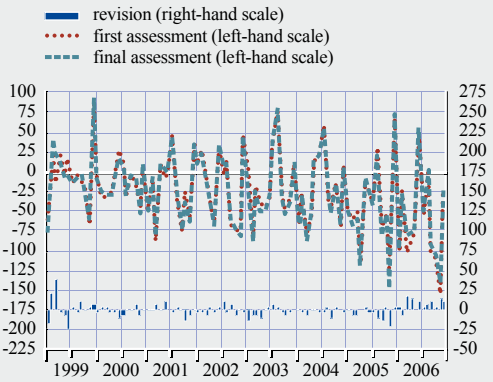
Table 6 Stability indicators for the euro area portfolio investment

Quality indicator	Reference period Jan.-Dec.	Porfolio investment		
		Assets	Liabilities	Balance
$\overline{R}$ (EUR billions)	1999 - 2001	-4.50	5.58	1.08
	2000 - 2002	-3.28	6.11	2.83
	2001 - 2003	-2.27	6.65	4.38
	2002 - 2004	-2.36	7.20	4.84
	2003 - 2005	-1.69	4.31	2.62
	2004 - 2006	-5.07	5.79	0.73
$\lvert\overline{R}\rvert$ (EUR billions)	1999 - 2001	6.19	8.12	8.04
	2000 - 2002	5.29	7.98	8.18
	2001 - 2003	4.42	10.25	8.89
	2002 - 2004	4.42	10.99	9.63
	2003 - 2005	4.46	9.50	8.75
	2004 - 2006	6.28	9.03	6.33
MACE/ RMSRE (%)	1999 - 2001	0.27	0.26	0.42
	2000 - 2002	0.22	0.24	0.41
	2001 - 2003	0.18	0.30	0.49
	2002 - 2004	0.17	0.31	0.53
	2003 - 2005	0.15	0.24	0.43
	2004 - 2006	0.17	0.19	0.28
Q (%)	1999 - 2001	74.29	94.29	85.71
	2000 - 2002	88.57	85.71	82.86
	2001 - 2003	91.43	74.29	77.14
	2002 - 2004	88.57	68.57	80.00
	2003 - 2005	85.71	77.14	88.57
	2004 - 2006	88.57	85.71	100.00

Source: ECB.
Note: The MACE is used for assets and liabilities and the RMSRE for balance data.

Chart 19 Euro area other investment – assets

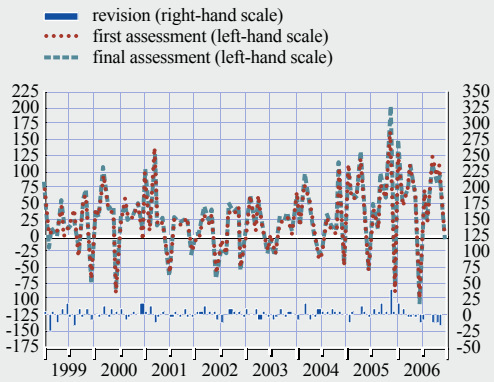
(EUR billions)



Source: ECB.

Chart 20 Euro area other investment – liabilities

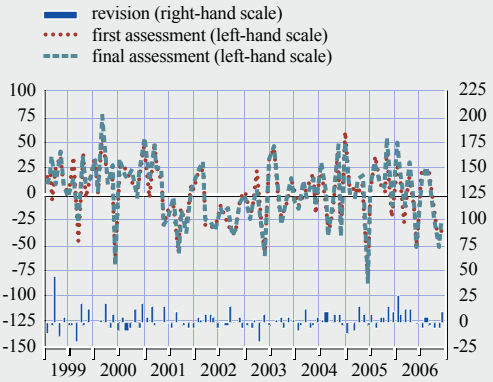
(EUR billions)



Source: ECB.

Chart 21 Euro area other investment – balance

(EUR billions)



Source: ECB.

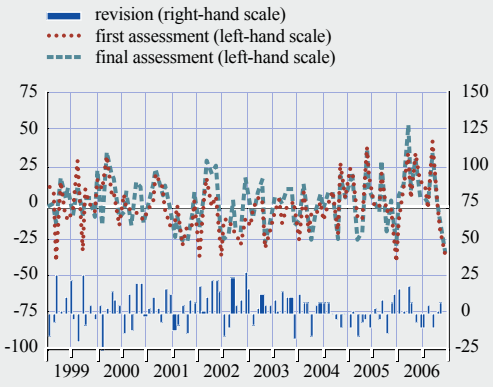
Table 7 Stability indicators for the euro area other investment

Quality indicator	Reference period Jan.-Dec.	Other investment		
		Assets	Liabilities	Balance
$\overline{R}$ (EUR billions)	1999 - 2001	0.25	1.27	1.52
	2000 - 2002	-0.71	2.39	1.67
	2001 - 2003	-1.33	1.86	0.52
	2002 - 2004	-1.86	2.55	0.70
	2003 - 2005	-3.26	4.24	0.98
	2004 - 2006	0.13	2.50	2.62
$\lvert\overline{R}\rvert$ (EUR billions)	1999 - 2001	6.62	7.64	8.64
	2000 - 2002	4.09	6.47	6.47
	2001 - 2003	4.31	6.13	5.37
	2002 - 2004	4.05	6.39	5.25
	2003 - 2005	4.95	7.44	6.14
	2004 - 2006	5.87	8.26	7.19
MACE/ RMSRE (%)	1999 - 2001	0.29	0.30	0.42
	2000 - 2002	0.16	0.22	0.26
	2001 - 2003	0.16	0.21	0.26
	2002 - 2004	0.15	0.21	0.26
	2003 - 2005	0.16	0.22	0.28
	2004 - 2006	0.16	0.22	0.31
Q (%)	1999 - 2001	88.57	91.43	88.57
	2000 - 2002	94.29	91.43	82.86
	2001 - 2003	94.29	91.43	85.71
	2002 - 2004	97.14	94.29	88.57
	2003 - 2005	97.14	97.14	91.43
	2004 - 2006	100.00	100.00	91.43

Source: ECB.
Note: The MACE is used for assets and liabilities and the RMSRE for balance data.

Chart 22 Total financial account – net

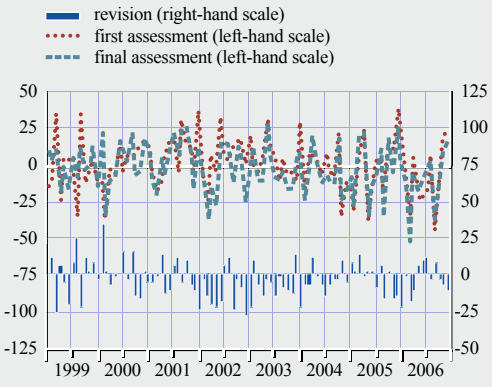
EUR billions



Source: ECB.

Chart 23 Euro area errors and omissions

EUR billions



Source: ECB.

Table 8 Stability indicators for the euro area errors and omissions and total financial accounts

Quality indicator	Reference period Jan.-Dec.	Errors and omissions	Total financial account
$\overline{R}$ (EUR billions)	1999 - 2001	1.12	2.90
	2000 - 2002	-3.55	5.64
	2001 - 2003	-6.33	6.26
	2002 - 2004	-7.39	6.07
	2003 - 2005	-3.95	1.59
	2004 - 2006	-2.98	0.52
$\lvert\overline{R}\rvert$ (EUR billions)	1999 - 2001	10.66	11.04
	2000 - 2002	10.94	11.97
	2001 - 2003	11.04	11.13
	2002 - 2004	10.96	10.53
	2003 - 2005	8.56	8.20
	2004 - 2006	8.28	7.64
RMSRE *(%)*	1999 - 2001	1.05	
	2000 - 2002	0.85	
	2001 - 2003	0.83	
	2002 - 2004	0.90	
	2003 - 2005	0.63	
	2004 - 2006	0.57	
Q *(%)*	1999 - 2001	71.43	
	2000 - 2002	74.29	
	2001 - 2003	80.00	
	2002 - 2004	85.71	
	2003 - 2005	88.57	
	2004 - 2006	97.14	

Source: ECB.