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Estimating Monthly Balance of Payments

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ESTIMATING MONTHLY BALANCE OF PAYMENTS

Summary

1.   The booklet *Statistical Requirements for Stage Three of Monetary Union* was published in July 1996 by the forerunner of the European Central Bank. It sets out the key items of the Balance of Payments needed on a monthly basis for each Member State participating in the monetary union. The requirements are more relaxed for non-participating Member States (exclusion of transactions with the euro area is desirable but not a requirement) and not so legally binding. Estimates are required by ECB within 30 working days (6 weeks) of the end of the reporting month.

2.   The UK statistical system for Balance of Payments and National Accounts is geared towards quarterly and annual inquiries directed to financial and non-financial businesses, supported by administrative data wherever appropriate. The Bank of England collects all data from banks, ONS cover the rest. The UK has made considerable progress towards meeting its commitment to make best estimates from its present reporting system. This paper describes the approach taken to produce the monthly estimates and outlines the methodology.

General approach

3.   ONS manages a major programme of projects developed to provide BoP monthly key items to the ECB as part of the UK's preparations for possible entry to the monetary union. The programme is sponsored by the Monetary Union policy team at HM Treasury and by the Bank of England. The programme contains 5 broad strategies: dissemination, communications, technical, contingency planning and resources.

4.   A key element of the programme is to ensure that all possible means to estimate the monthly data within existing resources are assessed and utilised. Monthly data are

used where available, monthly proxy indicators where appropriate, and forecasting techniques elsewhere to estimate a monthly path from quarterly data. As part of its quality assurance programme the ONS and Bank consult with the ECB to examine the quality and use of all the monthly data. Box 1 outlines the monthly key items and availability of monthly data. The proportions of actual, proxy and modelled monthly data varies from item to item, and within items. For example, the tables below show the proportions for trade in services and investment income at the moment:

Table 1: Trade in Services: derivation of monthly estimates

	Approx. percentage of total services	
Estimation method	Credits/Exports	Debits/Imports
Monthly data collected	23	43
Proxies	0	0
ARIMA forecasting	77	57
Repeat previous quarter	0	0
Total	**100**	**100**

Table 2: Investment Income: derivation of monthly estimates

	Approx. percentage of total income	
Estimation method	Credits/Exports	Debits/Imports
Monthly data collected	1	0
Proxies (Rate of Return)	37	0
ARIMA forecasting	62	100
Repeat previous quarter	0	0
Total	**100**	**100**

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│  BOX 1: MONTHLY KEY ITEMS          UK monthly data availability           │
│                                    as of end August 2000                  │
│    1. Current Account                                                     │
│    - goods                         data for non-EU; forecast for EU       │
│    - services                      mixture of monthly data and models     │
│    - income                        mixture of monthly data and models     │
│        direct investment                                                  │
│        portfolio investment                                               │
│        other investment                                                   │
│        compensation of employees                                          │
│                                                                           │
│    - current transfers             mostly monthly administrative data with models │
│                                                                           │
│    2. Capital Account              some monthly data with models          │
│                                                                           │
│    3. Financial Account            very limited monthly data: mostly modelled │
│    - direct investment             but some monthly data collected on large │
│                                        acquisitions and mergers           │
│    - portfolio investment                                                 │
│        - equity securities         large acquisitions and mergers used    │
│        - debt securities                                                  │
│                - bonds and notes                                          │
│                - money market instruments                                 │
│                - financial derivatives (not yet available)                │
│                                                                           │
│    - other investment                                                     │
│        - banks                      some banking data available monthly    │
│                - long-term         (long/short term split not available)  │
│                - short-term                                               │
│        - general government                                               │
│        - monetary authorities                                             │
│        - other sectors (enterprises and individuals)                      │
│                                                                           │
│    - reserve assets                monthly administrative sources         │
│                                                                           │
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Monthly Key Items: Data Sources

5.   **Trade in goods** statistics have always been compiled monthly. They are derived from returns for trade within European Union countries (the EU Intrastat system), and from HM Customs and Excise documentation for trade with non-EU countries. Figures

for non-EU trade are available well within the six-week period, Intrastat figures are not. The best method found for estimating EU trade figures at the six-week stage is ARIMA modelling on the monthly time series to forecast the required month. This has been carried out at the six-week deadline since July 1997. We are trying to accelerate our processing systems to bring Intrastat within the timescale. EU trade in goods accounts for around 55% of total trade in goods (split 59% exports, 54% imports).

6.   **Trade in services** statistics are derived from a variety of sources across the different components. The majority are either monthly (for Travel) or quarterly sample surveys. In some cases these are supplemented by more comprehensive annual surveys or censuses. Monthly estimates have been produced since 1997, and are published within the monthly UK Trade First Release around eight weeks after the end of each month.

7.   **Investment income** data are published quarterly by the ONS. The main data sources are quarterly surveys, but some use is made of monthly balance sheet data for banks collected by the Bank of England. For each of the investment income groups, both credits and debits are broken down to a lower level of aggregation to enable monthly data and estimates from the Bank of England to be incorporated where appropriate. Where data are available only at a quarterly frequency, ARIMA methodology is applied to calculate a quarterly forecast; a cubic spline is then used to interpolate the quarterly data and produce monthly estimates. Since July 2000, ONS has delivered a breakdown of Investment Income into its constituent elements (Direct Investment, Portfolio Investment & Other Investment Income) in line with ECB requirements from that date.

8.   The Bank of England also supplies monthly data from banks which can be included in the **financial account** and, from administrative sources, for reserve assets and reserve-related liabilities. Apart from the latter, the Bank's BoP statistics are collected within the money and banking statistics framework which provides directly-measured monthly observations at least for summary balance sheet stocks. Otherwise quarterly estimates for the financial account are generally based on the same data sources as investment income, i.e. quarterly and annual inquiry data. The development of a

methodology for monthly estimates will therefore follow a path similar to that for investment income.

9.   The flows series are can be volatile at monthly frequency which can make it difficult to find a suitable ARIMA model, particularly for portfolio investment. If it is not possible, after exhaustive study, to find a suitable proxy or a soundly-based modelled estimate for certain series, the contingency plan will assess the implications for the monthly collection of specific data items, including questions of cost/benefit and reporting burden.

10.   The initial development of estimates for the monthly key items has focused on national totals with the rest of the world. A significant, and challenging, next step in the programme will be to derive a split between intra and extra-MU flows on a monthly basis. It is likely, in the first instance, that this will be based on quarterly estimates of the EU/non-EU split of the current account. This breakdown of the RoW totals has been published since September 1997. Plans are being developed to deliver these splits on a staged basis, probably from the end of 2000.

11.   The United Kingdom commenced delivery of monthly key items to the ECB in December 1999. The process was described in more detail in an ONS Economic Trends article "Experimental Monthly Balance of Payments" in December 1999. The article also gave outside users the opportunity to comment on the approach and the methods adopted to derive monthly key items, and stressed that research into improved methodology was continuing. At this stage data provided to the ECB are supplied on an experimental basis for the internal use of the ECB Statistics Directorate.

Monthly Key Items: Estimation Methodology

Current Account: Trade in Goods

12.   The basic sources of data on trade in goods are customs declarations (the Single Administrative Documents) for trade with non-EU countries and Intrastat forms (Supplementary Declarations) for trade with EU countries. The statistics are compiled in accordance with the "general trade" system, as described in the UN's "International Merchandise Trade Statistics: Concepts & Definitions". Imports are classified according to the country from which goods are consigned and exports according to the country of consignment, as identified at the time of export. For statistical purposes, the customs data use the cif/fob valuation and ONS make a number of adjustments to these basic source data to bring them onto a BPM5 trade in goods basis. The time series for trade in goods with the rest of the world are available monthly from 1980, with a split of the monthly data between EU and non-EU countries available from 1988. These data are available both seasonally adjusted (using X11ARIMA) and not seasonally adjusted.

13.   Monthly data are published about four weeks after the end of the month to which the data relate for trade with non-EU countries (well within the ECB deadline) and about eight weeks after the end of the month to which the data relate for trade with EU countries. The best method found for estimating total EU trade is ARIMA models on the monthly time series to forecast the required month. In order to derive a split between euro area and non-euro area Member States, it is intended to use proportions derived from published data for trade with individual Member States on a BPM5 basis.

14.   These forecasts are replaced with published data with the next delivery of data to the ECB. Customs data are subject to revision for some months after they are first published so that, for example, final data from that source for the months of 1999 will not be available until September 2000. In addition there may be further small revisions to the adjustments made to convert the source data to a BPM5 basis. Table 3 shows the reliability of the monthly estimates during the past year.

Table 3: World Trade in Goods: reliability of monthly results

Period	Credits / Exports			Debits / Imports			Balance	
	First Published Total (£m)	Variation* from ARIMA forecasts £m	%	First Published total (£m)	Variation* from ARIMA forecasts £m	%	First published total (£m)	Variation* from ARIMA forecasts £m
Aug 1999	12,982	295	2.3	15,303	1028	7.2	-2,321	733
Sept 1999	14,831	157	1.1	16,581	151	0.9	-1,750	308
Oct 1999	14,698	124	0.8	16,943	615	3.5	-2,245	491
Nov 1999	15,294	101	0.7	17,491	217	1.3	-2,197	116
Dec 1999	14,015	26	0.2	15,773	97	0.6	-1,758	71
Jan 2000	13,088	106	0.8	15,878	291	1.8	-2,790	185
Feb 2000	14,383	21	0.2	17,014	532	3.2	-2,631	511
Mar 2000	16,604	628	3.9	18,404	252	1.4	-1,800	376
April 2000	13,941	295	2.1	17,004	462	2.7	-3,063	167
May 2000	15,278	161	1.0	17,784	818	4.8	-2,506	979
June 2000	16,340	581	3.7	18,558	376	2.0	-2,218	957
Mean	**14,678**	**227**	**1.5**	**16,976**	**440**	**2.6**	**-2,298**	**445**

* absolute difference

Trade in Services

15.   Monthly estimates are produced at a high level of disaggregation, using models, where no actual or proxy data exists, to produce estimates at the six-week stage. The most volatile contribution to the monthly profile is the travel item. The timeliness of this item has been improved to meet the six-week deadline with collected data.

16.   Components for which monthly data are available comprise some 25% of trade in services credits and 40% of debits. These are mainly travel data collected via the International Passenger Survey, as well as some insurance services data. For the remainder, other monthly data sources are being examined to see if they provide a good correlation with existing quarterly series and might be used as proxies, eg monthly data on UK airline traffic and passengers on overseas aircraft. Where no monthly data or

proxies are available, ARIMA models are used to extrapolate a quarterly estimate from existing sources and interpolate a monthly path using a cubic spline. The quality of the estimates continues to be monitored with the move to the BPM5 presentation. Table 4 shows the reliability of the monthly estimates during the past year.

Table 4: World Trade in Services; reliability of monthly results

	Credits / Exports			Debits / Imports			Balance		
	First Published	Variation* from ARIMA forecasts		First Published	Variation* from ARIMA forecasts		First published	Variation* from ARIMA forecasts	
Period	Total (£m)	£m	%	Total (£m)	£m	%	total (£m)	£m	
Q2 1999	15,656	394	2.5	13,017	835	6.4	2,639	441	
Q3 1999	17,740	337	1.9	15,193	238	1.6	2,547	99	
Q4 1999	15,513	240	1.6	12,318	144	1.2	3,195	96	
Q1 2000	14,834	672	4.5	11,672	147	1.3	3,162	117	
Mean	**15,936**	**411**	**2.6**	**13,050**	**341**	**2.6**	**2,886**	**188**	

* absolute difference

Investment Income

17.   Monthly estimates have been produced using statistical models (usually ARIMA) with a small element of monthly data from the Bank of England based on rates of return and balance sheet data and for earnings on reserve assets taken from administrative sources.

18.   ARIMA models have been used where they provide a better forecast than repeating the previous quarter: a quarterly estimate is extrapolated and then a cubic spline provides the monthly path. The models are reviewed regularly because the behaviour of certain series might change significantly over time. Identification of ARIMA models and compilation of monthly estimates has been carried out using SAS^{TM}. In general, estimates of income from direct investment, non-banks' portfolio investment and other investment

are derived using forecast and spline methodology. Table 5 shows the reliability of the monthly estimates since delivery to ECB commenced in December 1999.

Table 5: Investment Income: reliability of monthly results

| | Credits / Exports | | | Debits / Imports | | | Balance | |
| | First Published | Variation* from ARIMA forecasts | | First Published | Variation* from ARIMA forecasts | | First published | Variation* from ARIMA forecasts |
Period	Total (£m)	£m	%	Total (£m)	£m	%	total (£m)	£m
Q3 1999	26,367	2,855	10.8	24,499	1,619	6.6	1,868	1,236
Q4 1999	28,298	264	0.9	26,190	3,242	12.4	2,108	3,506
Q1 2000	30,003	490	1.6	30,422	6,484	21.3	-419	5,994
Mean	**28,223**	**1,203**	**4.3**	**27,037**	**3,782**	**14.0**	**1,186**	**3,579**

* absolute difference

Current Transfers

19.   Components for which monthly data are available, mainly administrative data on grants and subsidies, comprise around 40% of total current transfer credits and debits. For the remainder, other monthly data sources are being examined to see whether they provide a good correlation with the existing quarterly series (such as monthly insurance premia data from Lloyds of London). For those series with no monthly data or acceptable proxies, statistical modelling is used to extrapolate a quarterly estimate and interpolate a monthly path. As the majority of the volatility in the current transfers data is driven by those series that are available on a monthly basis, it is hoped that this methodology will provide good predictions of the quarterly outturns.

Capital Account

20.   Components for which monthly data are available comprise up to around 50% of total capital account credits. For the remainder, other monthly data sources will be examined to see whether they provide a good correlation with the existing quarterly series. For those series with no monthly data or acceptable proxies, statistical modelling is used to extrapolate a quarterly estimate and interpolate a monthly path.

Financial Account: Direct Investment

21.   The ONS maintains on a monthly basis a continuous database of reported cross-border acquisition and merger (A&M) deals. The results are being used as proxies for that part of quarterly direct investment. The residual part of the investment series is modelled using ARIMA modelling and interpolation. It has been found that adding back the monthly acquisitions and merger data significantly improves the quality of the forecast compared with modelling alone. Taking 1999 as a whole, the proportion of estimates accounted for by A&M deals amounts to 80% for both assets and liabilities.

Portfolio Investment

22.   Monthly portfolio investment data are not available from ONS or Bank of England surveys. Data from banks' balance sheets are used as proxies in the modelling of some series. In addition counterparty equity values of major acquisition and merger deals (generally over £5bn) are used to inform estimates for equity securities (assets and/or liabilities) for the appropriate month of transaction. Further work is planned to make use of key economic indicators to improve other Portfolio Investment flows estimates.

Financial Derivatives

23.   Both the Bank of England and the ONS have been collecting quarterly information on financial derivatives since 1998. Such a short time series means that conventional estimation techniques of the kind used elsewhere for monthly key items cannot be used here. The methodology will be reviewed as experience is gained of the data collected.

Other Investment

24.   Monthly data on Other Investment are not available from ONS surveys. Estimation of these series is generally via ARIMA modelling and interpolation. However, the Bank of England produces monthly financial account data on Other Investment transactions for banks, using monthly balance sheet levels. These monthly data are used to inform OI estimates for banks. The difficulties associated with this approach centre on the volatility of data from the banks on a month-by-month basis, particularly when comparing assets and liabilities over the same time period. These directly-derived banking flows may be counterparted elsewhere in the BOP accounts by estimates modelled from quarterly data, thereby giving rise to large net balancing items on a monthly basis, although, as one might expect, over a quarter the numbers tend to balance out.

25.   For the time being broad estimates only are available to distinguish banking transactions with the euro area and with the rest of the world, and a split into short-term and long-term debt is not available. In the context of the money and banking statistics, the Bank of England has reached agreement with the banks to introduce a set of supplementary returns after a Government decision to join EMU to meet the additional data requirements. These returns have also been framed to address the present deficiencies in the analysis of the contribution of monetary financial institutions to OI.

Reserve Assets

26.	In the UK the official reserves are the property of HM Government and do not form part of the balance sheet of the central bank. The Bank of England compiles monthly data for transactions in reserve assets from administrative sources, reflecting its operational role in reserves management on behalf of the Government. Since January 2000, BOP statistics for reserve assets have been compiled in a manner fully consistent with the BPM5 concept of residency and with the IMF/BIS Template in respect of the coverage, breakdown and valuation of instruments.

UK/ONS	September 2000