

# Historical time series for research purposes

## Explanatory notes

### 1 Introduction

This historical time series for euro area monetary aggregates (M1, M2-M1 and M3) for the 1970s are made available for research purposes.

Data refer to end-of-month outstanding stocks, as consolidated at the euro area level, and to the associated flows, indexes of adjusted stocks and growth rates. Both seasonally adjusted and non-seasonally adjusted versions of the data are available. Flows are derived from the differences in stocks, except where relevant patterns associated with non-financial transactions could be identified and corrected using a reclassification adjustment. This method differs from the usual one used for compiling MFI balance sheet statistics.

### 2 Sources and data availability for the reference series

Two types of source have been used to derive the reference series:

1. best estimates of national contributions to the euro area aggregates, which, as far as possible, take account of the cross-border positions of MFIs within the euro area;
2. national monetary aggregates, which are largely non-harmonised.

National historical data have been converted into euro on the basis of the conversion rates which were irrevocably fixed on 31 December 1998.<sup>1</sup>

### 3 Deriving historical series

The basic procedure consists in “backcasting” the national reference series to January 1970, using a suitable non-harmonised series as an anchor. The suitability is ascertained by comparing the closeness of the reference series to the non-harmonised series over a sample period covering the 1980s. Once the suitability has been confirmed, backcasting takes place by means of a preliminary linearisation of the series, i.e. the effects of level shifts, additive outliers and transitory changes are filtered out using intervention variables. Where no anchor series was available (either because there was no available series at all or because the available non-

<sup>1</sup> Greek historical series have been converted using the GRD/ECU (Greek Drachma/European Currency Unit) exchange rate as at 31 December 1998.

harmonised series was considered to be unsuitable), a grossing-up procedure was followed.

## 4 The procedure in detail

The procedure adopted to derive a historical time series of euro area M3 for the 1970s is described below. A parallel procedure has been followed for the other monetary aggregates. The procedure has four steps.

1. Identifying a suitable non-harmonised national series for the 1970s and 1980s, which can be used as an anchor to backcast the series harmonised according to ECB definitions (which otherwise starts in January 1980 or later).
2. Linearising the suitable non-harmonised national series which filters out the effects of level shifts, additive outliers and transitory changes.
3. Backcasting the harmonised national series using the growth rate of the linearised series. In a second stage, level shifts, additive outliers and transitory changes are re-introduced.
4. Deriving a euro area series for the 1970s. In principle, this is obtained by adding up the backcasted harmonised national series. Since no such series can be derived for all the participating countries, a grossing-up procedure is generally required.

The procedure yields a series of stocks and reclassification adjustments, including values for January 1980 for all countries (a by-product of the estimation procedure), and some additional values relating to major level changes which are not associated with a financial transaction. No other adjustments are currently available. Consequently, the growth rates are obtained using only the adjustment flows derived during this procedure.

## Step 1: Identifying a suitable non-harmonised national series

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As a first step, ordinary least square (OLS) regressions of the type:

$$\text{non-harmonised series } (t,i) = \alpha + \beta \text{ harmonised series } (t,i)$$

$t = \text{January 1980 to December 1989}$ ,  $i \in (\text{euro area country})$

are run to gauge the suitability of the available non-harmonised series as an anchor for backcasting the corresponding harmonised series to the 1970s (which otherwise starts in January 1980). The non-harmonised series is considered to be a suitable anchor when the joint test ( $\alpha = 0$ ,  $\beta = 1$ ) is not rejected at the conventional statistical levels.

The information content of the difference (non-harmonised series  $(t,i)$  - harmonised series  $(t,i)$ ) is further checked by means of an augmented Dickey-Fuller (ADF) test. Where the hypothesis of a unit root cannot be rejected (i.e. the difference is stable and can be modelled as a random walk), the test indicates that the month-on-month changes in the difference series evolve randomly and provide no additional information that would help in backcasting the harmonised series.

## Step 2: Linearising the suitable non-harmonised national series

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The non-harmonised national series which has passed the above suitability test is then linearised (i.e. the effects of level shifts, additive outliers and transitory changes are filtered out using intervention variables). Subsequently, autoregressive integrated moving average (ARIMA) models are fitted to the linearised series using observations for the period from January 1970 to December 1989.

## Step 3: Backcasting the harmonised national series

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The fit of the ARIMA model yields the month-on-month growth rates which are used to backcast the harmonised series to January 1970. In a second stage, the level shifts, additive outliers and transitory changes identified in step 2 are re-added.

## Step 4: Deriving a euro area series for the 1970s

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Ideally, steps 1 to 3 are followed for each of the national series. The resulting euro area series for the 1970s is then obtained by adding together the backcasted harmonised national series.

However, where steps 1 to 3 cannot be followed for one or more of the national series (because no suitable non-harmonised series is available for the 1970s and 1980s), a preliminary aggregated series is obtained by adding together the available backcasted national series. This sum is then grossed up to the euro area level, taking relevant seasonal patterns into account.

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For specific terminology please refer to the [ECB glossary](#) (available in English only).