NOTICE TO READERS

The backcasts of the harmonized interest rate series described in this supplement are avaible on the Bank of Italy's website under Statistics – Consultation – Statistical database (BIP on-line): http://bip.bancaditalia.it/4972unix/homebipita.htm (Tables TDFE0083, TDFE0084, TDFE0085, TDFE0086)

BANCA D'ITALIA

Supplements to the Statistical Bullettin

Methodological Notes

Estimating Time-Series of Harmonized Bank Interest Rates

New series

Volume XVI Number 11 - 2 February 2006

BANCA D'ITALIA - CENTRO STAMPA - ROMA – PUBBL. MENSILE

CONTENTS

Estimating Time-Series of Harmonized Bank Interest Rates[1]

1. Introduction and main conclusions

Since January 2003 the Eurosystem has gathered statistics on the interest rates banks apply to households and non-financial corporations in the euro area.

These statistics are reported on a monthly basis and comprise 20 interest rates on banks' end-of-period balance sheet outstanding amounts and 25 interest rates on new business occurred during the period. Details of the indicators are provided in Table 1.

The statistics on interest rates provided for in Regulation ECB/2001/18 fulfil the requirements for high quality harmonized data to be gathered among euro-area countries and that are sufficiently detailed to allow analysis of the mechanism for the transmission of monetary policy to the real economy.[2]

The harmonized reporting system led to a break in the collection of bank interest rate statistics: under the new scheme, the criteria for gathering data have been changed (sample composition and design) and the definition of bank interest rates has been partly amended to reflect Eurosystem requirements.

The harmonized statistics cover a relatively short period. However, a large amount of data is an essential prerequisite for economic analysis. Astolfi, Ladiray and Mazzi (2001) note that:

> "One of the main requirements from the users of short-term statistics is their availability over a fairly long time period. Short series are completely useless for analytical purposes. A minimum requirement in terms of length can be identified in the possibility of covering at least two economic cycles. In other words, time series should be available over a period of about 15 years. Clearly for econometric modelling or for analysis based on non-linear techniques, longer time-series should be needed."

In a specific context, Maddala (1998), summarizing the methodologies for detecting cointegrated relationships, emphasizes that, "Tabulated critical values based on asymptotic distributions may be inappropriate if sample sizes are 100 or smaller."

The aim of this study is to provide a more extensive information for the analysis of bank interest rates. To this end, the harmonized time-series were extended by backcasting the data on the interest rates of most significance in the Italian banking system.

This study presents the estimated monthly time-series of bank interest rates from January 1995 to December 2002.[3] The statistics were obtained by means of regressions based

---

[1] By Giacomo Cau, Massimiliano Stacchini and Edoardo Tagliaferri.

[2] See P. Battipaglia and F. Bolognesi (2003).

[3] Where the availability of auxiliary information made it possible, the backcasting of the interest rates covered the period from January 1990 to December 2002.

on data aggregated at country level and micro-data from banks. Information on interest rates provided by econometric analysis are more accurate than those obtainable by looking directly at interest rate statistics collected in the past.[4] The methodology is based on the regression of the harmonized interest rates on the data derived from the ten-day reports. The coefficients obtained and the ten-day data are then used to estimate harmonized values for the months preceding January 2003.

Among lending rates, it was possible to backcast the average interest rate on loans to non-financial corporations, loans to households and loans for house purchases; the interest rates on bank overdrafts to households and non-financial corporations are also provided. Among deposit rates, the average interest rate on deposits, the interest rate on deposits with agreed maturity and the interest rate on repos are estimated. Among overnight deposits, the interest rates applied to non-financial corporations, households and these two categories together are provided. Details of the backcast series can be found in Table 2.

This study is structured in three sections. Following this introduction, a basic overview describes the literature on time-series backcasting, with a brief description of the nature of the problem. The methodology adopted for the backcasting of interest rates is reviewed and a summary of the results given in Section 3. The appendices summarize a few analytical details and include tables and charts showing the backcast series.

2. Nature of the problem and review of the literature on time-series backcasting

The literature on time-series backcasting focuses on the techniques for estimating the historical values of a statistic, namely those in the period preceding the introduction of a new reporting method (the historical period).

Backcasting techniques assign a crucial role to auxiliary information. Such additional data consist of variables reported in the historical period which are strongly correlated with the statistic to be backcast. Astolfi, Ladiray and Mazzi (2001) consider the backcasting of statistical indicators to be problematic where auxiliary variables are lacking.

Using the estimated coefficients, the estimate of the historical values of each indicator is obtained as a linear combination of the auxiliary indicators observed in the historical period. The identification of appropriate auxiliary indicators therefore constitutes a key aspect of time-series backcasting.

The literature analyzes the methods that employ auxiliary data for the historical period, distinguishing between cases in which such data are reported with the same frequency as the series to be backcast and those in which the frequency is lower.

[4] Interest rate data are provided by the ten-day reports (former and new systems) and data from the *Centrale dei rischi* [the Italian Central Credit Register].

When backcasting makes use of information with a frequency that matches that of the original series – as is the case in this study – the nature of the problem can be expressed, as in Astolfi, Ladiray and Mazzi (2001), as follows.[5]

Let y_t be the level of a harmonized series, as reported in the period t = {k, k+1, k+2, k+3,…,}. The backcasting aims to estimate the values of y_t relative to t = {k-1, k-2, …,} using data contained in the auxiliary variable R_t.

In general, R_t is useful for estimating y_t when the following conditions are met:

- a time period t = {k, k+1, k+2,...} exists in which the harmonized series y_t and the series R_t are simultaneously reported. This period is known as the "overlapping period"; and
- the R_t series has explanatory power for y_t.

If these conditions are satisfied, it is possible to write the following general model:

$$y_t = f(R_t, \beta, u_t) \qquad (1)$$

where β is a vector of parameters, u_t is an error term and f is a generic family of functions.

Using this model, it is possible to calculate estimates for the historical values of y_t, conditionally on R_t:

$$\hat{y}_t = \mathrm{E}[y_t \mid R_t] \qquad \text{for} \qquad t = \{k\text{-}1, k\text{-}2, k\text{-}3, \ldots,\} \qquad (2)$$

The functional link f reflects the statistical hypotheses adopted. The form of f is dependent on the length of the overlapping period of the two series, which provides the information resource for estimating the parameters.

The following models are derived from the form of f:

Simple backcasting model: $\nabla y_t = \nabla R_t$

Regression backcasting model: $y_t = \alpha + \beta R_t + u_t$

Dynamic backcasting model: $y_t = \frac{\beta(L)}{\alpha(L)} R_t + u_t$, in which the terms $\alpha(L)$ and $\beta(L)$ are polynomial functions in the lag operator L.

More sophisticated functions allow for the use of non-linear models (for example generalized additive, projection pursuit regression and neural networks models), which increase the flexibility of the link between the variables and, consequently, the accuracy of the backcast data.

[5] Where the frequency of the auxiliary series is lower, techniques for the temporal disaggregation of the time-series are adopted. They are based on the relationship between a (known) low frequency ARIMA model and its corresponding (unknown) high frequency model. The methodologies in question were proposed by Wei and Stram (1990) and Al'Osh (1989). In general, backcasting undertaken using lower frequency data produces historical values with limited fluctuations in which seasonal variations are reduced.

The use of dynamic or non-linear models for estimating historical values is heavily dependent on the availability of a very long overlapping period in which both sets of data were reported.

In the case considered here, the overlapping period is limited to the 14 monthly observations from January 2003 to February 2004.[6] With 14 observations, classical time-series analysis and methods for representing non-linear links between the variables do not provide robust estimates.

As illustrated below, the interest rate data used here – aggregate statistics and banks' individual data – have allowed a linear model to be adopted which corresponds to the regression backcasting model.

3. The methodology for backcasting bank interest rates

With reference to the model referred to in Section 2, the methodology for backcasting interest rates used in this study involves two stages:

- checking the availability of auxiliary variables for backcasting the harmonized statistics; and
- estimating the historical values of the harmonized series and the associated confidence intervals.

3.1 The auxiliary information

As indicated in equation (1), the link between the harmonized statistics and the auxiliary information is fundamental for time-series backcasting.

To ensure the quality of the backcasting, when choosing the non-harmonized indicators, consideration was given both to "qualitative" assessments associated with the characteristics of the auxiliary data and to diagnostic tests aimed at empirically examining the link between the two sources of data.

Some 21 statistics were selected for which reliable auxiliary indicators exist. The backcast was undertaken for these statistics.

3.1.1 "Qualitative" assessments of the auxiliary information

The auxiliary information available for the backcasting of bank interest rates derive from the ten-day reports (former system).

As noted above, under the harmonized reporting requirements, data on bank interest rates have been gathered on a monthly basis since January 2003. The auxiliary information were reported at ten-day intervals from the 1990s onwards. While for monthly data on

[6] In February 2004, the former system of ten-day reporting was terminated. The new ten-day reporting system is largely based on the definitions adopted for harmonized interest rates.

outstanding amounts, it is possible to refer to the third ten-day period reported, monthly data on new business were obtained by aggregating infra-monthly statistics.

Both the harmonized series and the ten-day series were reported from January 2003 to February 2004, thus providing an overlapping period of 14 monthly observations.

There are differences between the harmonized reporting system and the ten-day reporting system. The main differences concern the composition of the sample, the counterparts and the breakdown by maturity. The ten-day reports were produced from a sample of around 110 banks, whereas the harmonized statistics have been producing from a sample of just over 120. The samples used for the two sets of statistics have around 80 intermediaries in common.

The data refer to the interest rates applied to customers resident in Italy (mainly consisting of households, non-financial corporations and general government). The new harmonized series report separately the interest rates for households and non-financial corporations resident in the euro area. The classification of some harmonized statistics (on new business) also incorporate the initial period of rate fixation index, unlike the ten-day reports.

Although the phenomena observed are not identical, the two sets of statistics have significant similarities, for example, in terms of the counterparts and maturity. Therefore, a strong correlation between the ten-day indicators and some of the harmonized series can be expected a priori. Graphical analysis confirms this expectation: in the overlapping period from January 2003 to February 2004, some of the harmonized series are strongly correlated with the respective ten-day series. The correspondences between the harmonized series and the auxiliary variables are shown in Table 2. The charts in Appendix B show the parallel movement of the two series during the common reporting period.

3.1.2 Testing the explanatory power of the auxiliary information

The purpose of this section is to examine the empirical links between the harmonized reports and the ten-day reports. Of the whole set of interest rate statistics originally considered (see Table 1), only those that passed the diagnostic tests described in this section were employed for backcasting (see Table 2).

The individual data of around eighty intermediaries were used in order to examine the link between the harmonized reports and the ten-day reports[7]. In the period from January 2003 to February 2004, eighty banks reported data for both the harmonized statistics and the ten-day statistics. They are highly representative of both the samples used to compile the harmonized and ten-day statistics. In terms of volumes, these banks account for over 95 per

[7] In order to examine the link between the ten-day statistics and the harmonized statistics, the whole set of micro data originally provided for both sets of reported data was used, i.e. without excluding any outliers.

cent of the outstanding amounts (both loans and deposits) reported by the sample providing ten-day statistics and over 90 per cent of the outstanding amounts reported by the sample providing harmonized statistics.

The relationship between the two sets of individual data was expressed linearly as follows:

$$i_{it} = \beta_o R_{it} + u_{it} \qquad t = \{k, k+1, k+2, \ldots, k+13\} \qquad (3)$$

where i_{it} and R_{it} represent the reported harmonized and ten-day data provided by the *i*-th bank in month t. The time period {k,…, k+13} refers to the period from January 2003 to February 2004.

The intercept term is not included in the relationship. Both specifications – i.e. with and without the intercept term – were examined. Model (3) was selected on the basis of graphical analysis and econometric exercises.[8]

The model was estimated by OLS. The results confirm the significance of the link between the two sets of data. The explained variance of the model, expressed by the coefficient R^2, is very high – never less than 95% and in some cases almost 100%. Furthermore, the variability of the estimated coefficients $\hat{\beta}_o$ seems very small (less than 0.008)[9] and the *t* statistics are very high (see Table 3).

As regards the overlapping period from January 2003 to February 2004, a second test examined the statistical equivalence of the β_o, which were estimated separately for the 14 "cross-sections" making up the period. Estimating the static model (3) through a longitudinal database obtained by aggregating the 14 cross-sections would not have been possible if structural breaks had affected the relationship between the harmonized series and the ten-day series. Such a break would have led to a rejection of the statistical equivalence of the β_o. The procedure devised by Hausman (1978) was used for analyzing this equivalence.[10]

---

[8] In the two-dimensional diagram of the individual harmonized observations (y axis) and non-harmonized observations (x axis), most of the harmonized series is correlated with the respective non-harmonized series according to an approximately linear model passing through the origin of the axes. This evidence suggests a link between the harmonized series and the ten-day series which excludes the presence of the intercept term. In estimates of the relationship between the harmonized series and the ten-day series based on individual data, the presence of an intercept term, in the absence of a well-defined trend during the overlapping period, is accompanied by a large reduction in the R^2 and a notable increase in the variance of the β. For the purposes of this study, it proved preferable to use model (3) even for cases in which the α term appeared significant. In this way, by limiting the variance of the β, the aim was to favor the stability of the relationship between the harmonized series and the auxiliary one.

[9] The importance of this can be appreciated when it is recalled that the standard deviation of the β parameter is a major factor in estimating the confidence interval for the historical value of the backcast interest rate.

[10] The Hausman test distinguishes between two hypotheses by comparing the properties of two estimators of the same parameter. The first estimator has the properties of efficiency and consistency under the null hypothesis, but under the alternative one it is inconsistent. The second estimator has the property of consistency under both the null hypothesis and the alternative one, but it is not efficient. Hausman proposes distinguishing between the two hypotheses by testing the significance of the difference between the estimates obtained with the two estimators. If Ho is true, the two estimators have the same probability limit so that the discrepancy between

For each of the interest rates shown in Table 2, the results of the Hausman test were as follows:[11]

- differences between the β parameters, estimated separately for the 14 cross-sections of the overlapping period {k,…, k+13}, are not systematic, but random;
- the relationship between the harmonized series and the ten-day series is estimated efficiently by aggregating the data from the entire overlapping period and using the dataset in the estimate of model (3).

Based on the results of this section, the ten-day statistics appear to be highly correlated with the harmonized data and can therefore be used as auxiliary data for backcasting.

3.2 Estimating the historical values of the harmonized series

The harmonized series were backcast on the basis of the results obtained in the foregoing sections.

For the statistics in Table 2, the harmonized values of the interest rates were backcast for the months between January 1995 and December 2002.[12] Furthermore, a confidence interval for the backcast value was provided for each series, which gives an indication of the accuracy of the backcasting.

Just as for the link between the individual harmonized data and the individual ten-day data dealt with in the previous section, equation (l) was expressed linearly as follows:

$$i_t = \beta R_t + u_t \qquad t = \{\ldots, k-2, k-1, k, k+1, k+2, \ldots\} \qquad (4)$$

where i_t and R_t indicate, respectively, the harmonized statistics and the ten-day statistics.

In line with this model, an estimate of the harmonized interest rate was provided by:

$$\hat{i}_t = \hat{\beta}_o R_t \qquad t = \{k-1, k-2, k-3,\ldots\} \qquad (5)$$

where $\hat{\beta}_o$ is the parameter of model (3) estimated for the overlapping period from January 2003 to February 2004 and R_t is the value of the ten-day series for the historical period, i.e. the period prior to January 2003.

---

them tends to zero. For the implementation of the test, the 14 cross-sections of the overlapping period were analyzed separately. For each of the 14 periods the relationship $i_i = \beta R_i + u_i$, where a time index is no longer associated with the variables represented, was therefore estimated through OLS.

[11] The results of this study escape the criticisms usually leveled at the Hausman test (i.e. high variability of the estimated parameters and consequent low power of the test) since the standard deviation of the estimated β in model (3) (less than 0.008) and that estimated for the 14 cross-sections (less than 0.02) mean that the significance of the statistics is always very high

[12] Some statistics were backcast further for the time period from January 1990 to December 2002. The interest rate on loans for house purchase with an initial period of rate fixation up to one year was only backcast from January 1998 to December 2002. This type of loan is strongly influenced by variable rate mortgages.

3.2.1 Systematic errors in backcasting

The backcasting of historical values carried out in this study takes account of possible systematic errors that may have affected the estimates provided by (5) for some types of interest rates.

Via estimate (5) it is assumed that the link between the harmonized statistics and the ten-day statistics corresponds to the link between harmonized individual data and ten-day individual data as estimated in the previous section and expressed by $\hat{\beta}_o$. The use of $\hat{\beta}_o$ in the estimate of the historical values of the macro statistics on bank interest rates incorporates that assumption.

However, the harmonized statistics are obtained as a weighted average of the respective individual data: strictly speaking the two links coincide if the sample used for harmonized reports is homogeneous with the sample used for ten-day reports and if the weight of the *i*-th bank in the harmonized statistics reflects the weight of the same bank in the ten-day statistics. The conditions are described in detail in appendix A.

In the case in question, the sample used to estimate $\hat{\beta}_o$, which comprises eighty banks that reported data for both the harmonized statistics and the ten-day statistics, is highly representative of the samples used for these two sets of statistics.

However, this does not suffice to fulfil the stipulated condition. There are three factors which breach the condition and could give rise to systematic errors in backcasting:

i) notwithstanding the size, in terms of amounts, of the sample of eighty banks, for some types of loan it is possible that intermediaries of not insignificant weights are excluded from the sample and therefore from the estimate of the relationship between the harmonized micro data and the ten-day micro data;

ii) the weight of the *i*-th bank in the harmonized statistics may not correspond to the weight of the same bank in the ten-day statistics;

iii) in this study both the rates provided for in Regulation ECB/2001/18 and some average rates – i.e. at a higher level of aggregation (such as the average rate on deposits or the average rate on loans for house purchases) – were backcast. The average rates were obtained as the weighted average of the rates provided for in the Regulation. For the average rates on outstanding amounts, the amounts specified in the banks' balance sheet figures were used as weighting factors. The calculation of these balance sheet figures may include items, such as non-performing loans, which are excluded by banks from statistics on interest rates. The relationship between the "average" harmonized interest rate and the "average" ten-day rate, if estimated on the basis of individual data, is affected by this mismatch.

In order to take account of these factors, the estimates given by (5) were increased or reduced in line with the systematic error between the estimated series and the observed series. To this end, the 14 discrepancies obtained in the overlapping period between the values given by (5) and the observed data were measured and the average discrepancy was used as an

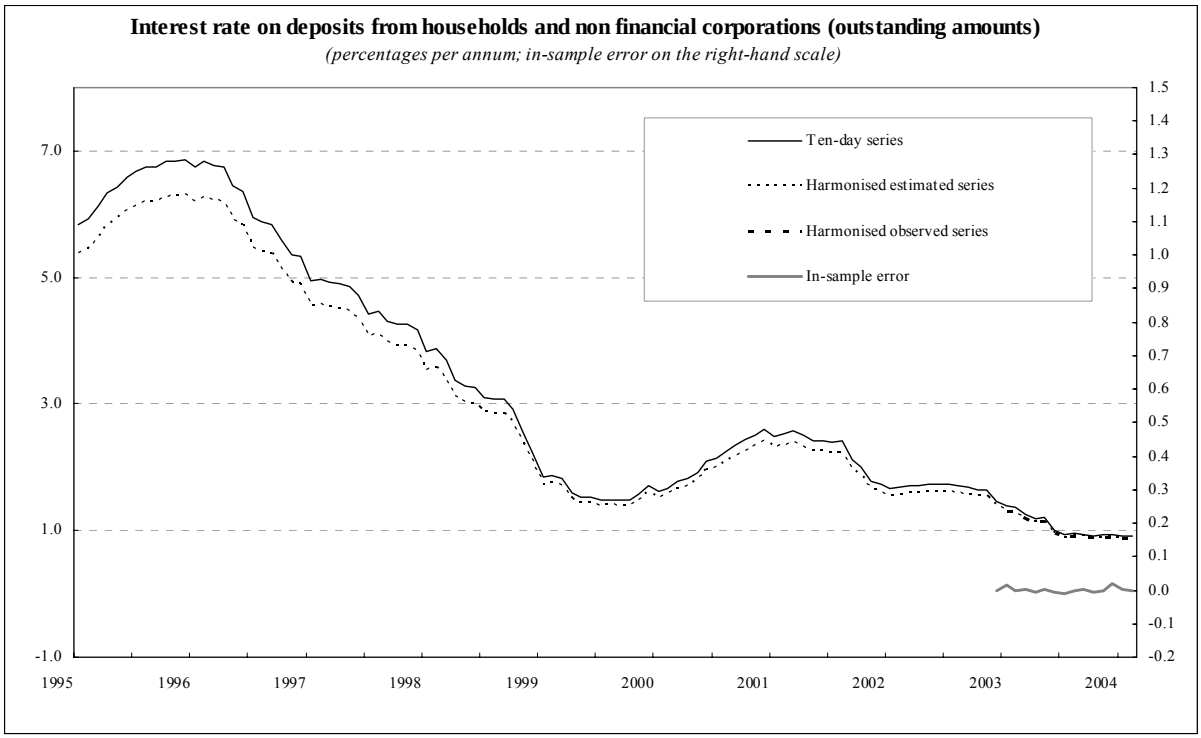
estimate of the error term. The error term was added to (5) to eliminate any overestimating or underestimating of the rate.

3.2.2 The "goodness" of the estimates

A method based on a solid link – assessed qualitatively and empirically – between the harmonized series and the respective auxiliary variable was used for the interest rates backcast in this study.

Graphical analysis allows an assessment of the results of the backcasting. This indicated that in the 14 months of the overlapping period from January 2003 to February 2004 the development of each of the observed harmonized series effectively mirrored the estimated series. This is shown in Chart 1 and Appendix B, which contains the charts for some of the harmonized interest rate statistics backcast in this study.

Chart 1



A further factor in the assessment is the size of the 95% confidence interval for the estimated historical value, which indicates the accuracy of the backcast value. On the basis of the methodology employed, the size depends both on the variability of the estimated β_o and the variability of the error term.[13] Table 3 shows details of the standard deviations of $\hat{\beta}_o$ and

[13] Furthermore, the accuracy of the backcast data declines as the difference between the average value of the historical ten-day series and the average value of the same ten-day data in the overlapping period increases. In calculating the confidence interval, the error term and the estimate of the $\hat{\beta}_o$ parameter were assumed to be statistically independent.

the size of the confidence interval of the estimates for the whole period for which the series were backcast.

The size of the confidence interval of the estimate is small on average. Higher values apply to the asset categories than to the liability categories. Among loans, the backcast data appear to be more accurate for rates on outstanding amounts than for rates on new business. Among deposits, backcasting is most accurate for the average rate on outstanding deposits and the rates on overnight deposits of households and non-financial corporations.

Finally, the accuracy of specific point-in-time historical estimates (not shown in a table) declines in phases furthest away in time from the overlapping period, i.e. when the level of interest rates was on average higher.

REFERENCES

Astolfi R., Ladiray D. and Mazzi G.L. (2001), "Business Cycle Statistics for the Euro-Zone: Situation and Prospectives", Universidad Carlos III de Madrid, *Monthly Debate*.

Al' Osh M. (1989), "A Dynamic Linear Approach Model for Disaggregating Time Series Data", *Journal of Forecasting*, 8, pp. 65-96.

Battipaglia P. and Bolognesi F. (2003), "The harmonization of European statistics on bank interest rates and the methodologies adopted in Italy, Banca d'Italia, *Supplements to the Statistical Bulletin*, No. 57.

Caporello G. and Maravall A. (2003), "A Tool for Quality Control of Time Series Data – Program TERROR".

Hastie T.J. and Tibshirani (1990), "Generalised Additive Models", Chapman & Hall.

Hausman J. (1978), "Specification Tests in Econometrics", *Econometrica*, pp. 1251-71.

Johnston J. (2001), "Econometrica", Franco Angeli.

Maddala G.S. (1998), "Unit Roots, Cointegration, and Structural Change", Cambridge University Press.

Wei W.S. and Stram D. (1990), "Disaggregation of Time Series Models", *Journal of the Royal Statistical Society*, Vol. 52, pp. 453-67.

APPENDIX A – MACRO STATISTICS AND INDIVIDUAL DATA

Take the relationship discussed in this study:

$$i_t = \beta R_t, \qquad \text{A.0}$$

where the variables i_t and R_t represent the aggregated harmonized and ten-day statistics.

Take also all the intermediaries which contribute to the reporting of at least one of the harmonized and ten-day statistics (*n* banks in total).

With reference to this population, the statistics i_t and R_t are obtained by averaging individual values, weighted according to the corresponding amounts:

$$i_t = (\sum_i^n w_{it}\, i_{it}) \text{ and } R_t = (\sum_i^n \delta_{it}\, r_{it}) \qquad \text{A.1}$$

where w_{it} and δ_{it} are the weights associated to the individual data. In this setting, the indicator (*i*) runs over the entire list of *n* banks.

The weight of the *i*-th bank may be zero (in the vectors w_{it} and δ_{it}) if that intermediary does not figure in the calculation of the weighted average of a statistic (or because it is excluded from the reporting or, although included, reports a negligible volume).

Now take the relationship between harmonized and ten-day individual data:

$$i_{it} = \beta\, r_{it} \qquad \text{A.2}$$

By premultiplying both terms by the vector of weights used in computing the ten-day statistic the following is obtained:

$\sum_i^n \delta_{it}\, i_{it} = \sum_i^n \delta_{it} \beta\, r_{it}$ from which

$\sum_i^n \delta_{it}\, i_{it} = \beta \sum_i^n \delta_{it}\, r_{it}$ namely, considering A.1,

$$\sum_i^n \delta_{it}\, i_{it} = \beta\, R_t \qquad \text{A.3}$$

and, if $$\sum_i^n \delta_{it}\, i_{it} = i_t \equiv \sum_i^n w_{it}\, i_{it} \qquad \text{A.4}$$

it is possible, by means of A.3, to write the relationship between the aggregate terms as

$$i_t = \beta\, R_t \qquad \text{A.5}$$

Accordingly, the use of relationship A.2 to draw inferences on the parameters of relationship A.0 depends on whether condition A.4 is respected.

Failure to meet this condition results in systematic errors in estimating the β parameter of A.5.

APPENDIX B – TABLES AND CHARTS

Table 1 – Interest rates provided for in Regulation 2001/18 and other interest rates published by the Banca d'Italia

LENDING RATES	All instr.categories	To households - Outstanding amounts To households and non-financial corporations up to one year - Outstanding amounts
	Bank overdrafts	To households and non-financial corporations To non-financial corporations To households
	Consumer credit	New business
		Consumer credit and other loans up to 1 year - Outstanding amounts Consumer credit and other loans over 1 year and up to 5 years - Outstanding amounts Consumer credit and other loans over 5 years - Outstanding amounts
		Floating rate and initial period of rate fixation up to 1 year - New business Initial period of rate fixation over 1 year and up to 5 years - New business Initial period of rate fixation over 5 years - New business
		Aprc
	Loans for house purchases	Outstanding amounts New business
		Loans up to 1 year - Outstanding amounts Loans over 1 year and up to 5 years - Outstanding amounts Loans over 5 years - Outstanding amounts
		Floating rate and initial period of rate fixation up to 1 year - New business Initial period of rate fixation over 1 and up to 5 years - New business Initial period of rate fixation over 5 and up to 10 years - New business Initial period of rate fixation over 10 years - New business
		Aprc
	Loans for other purposes	Floating rate up to 1 year - New business Floating rate over 1 and up to 5 years - New business Floating rate over 5 years - New business
	Loans to non-financial corporations	Outstanding amounts New business
		Loans to non-financial corporations up to 1 year - Outstanding amounts Loans to non-financial corporations over 1 year and up to 5 years - Outstanding amounts Loans to non-financial corporations over 5 years - Outstanding amounts
	Up to 1 million euro	New business
		Floating rate and initial period of rate fixation up to 1 year - New business Initial period of rate fixation over 1 year and up to 5 years - New business Initial period of rate fixation over 5 years - New business
	Over 1 million euro	New business
		Floating rate and initial period of rate fixation up to 1 year - New business Initial period of rate fixation over 1 year and up to 5 years - New business Initial period of rate fixation over 5 years - New business
DEPOSIT RATES	All instr.categories	From households and non-financial corporations - Outstanding amounts
	Overnight deposits	From households and non-financial corporations From households From non-financial corporations
	Deposits with agreed maturity	From households - New business
		Up to 2 years from households - Outstanding amounts Up to 2 years from non-financial corporations - Outstanding amounts Over 2 years from households - Outstanding amounts Over 2 years from non-financial corporations - Outstanding amounts
		Up to 1 year from households - New business Up to 1 year from non-financial corporations - New business Over 1 and up to 2 years from households - New business Over 1 and up to 2 years from non-financial corporations - New business Over 2 years from households – New business Over 2 years from non-financial corporations - New business
	Deposits redeemable at notice	Up to 3 months Over 3 months
	Repo deposits	Outstanding amounts New business

Table 2 – Backcast harmonised series and auxiliary series

		HARMONISED SERIES	TEN-DAY SERIES
LENDING RATES	All instr.categories	To households – Outstanding amounts	Loans to all customers – Outstanding amounts **
	Bank overdrafts	To households and non-financial corporations To non-financial corporations	Bank overdrafts to all customers Bank overdrafts to all customers
	Loans for house purchases	Outstanding amounts New business	Loans to all customers – Outstanding amounts ** Medium and long-term loans to households – New business
		Over 1 and up to 5 years – Outstanding amounts Over 5 years – Outstanding amounts	Medium and long-term loans to customers – Outstanding amounts Medium and long-term loans to customers – Outstanding amounts
		Floating rate and up to 1 year – New business	Medium and long-term loans to households – New business
	Loans to non-financial corporations	Outstanding amounts New business	Loans to all customers – Outstanding amounts ** Medium and long-term loans to non-financial corporations – New business
		Over 1 and up to 5 years – Outstanding amounts Over 5 years – Outstanding amounts	Medium and long-term loans to all customers – Outstanding amounts Medium and long-term loans to all customers – Outstanding amounts
	over 1 milion euro	New business	Medium and long-term loans to non-financial corporations - New business
DEPOSIT RATES	All instr.categories	From households and non-financial corporations – Outstanding amounts	Deposits from all customers – Outstanding amounts*
	Overnight deposits	From households and non-financial corporations From households From non-financial corporations	Overnight deposits from all customers Overnight deposits from all customers Overnight deposits from all customers
	Deposits with agreed maturity	From households – New business Up to 2 years from households – Outstanding amounts Up to 1 year from households – New business	Certificates of deposit from all customers with maturity up to 6 months – New business Certificates of deposit from all customers - Outstanding amounts Certificates of deposit from all customers with maturity up to 6 months – New business
	Repo deposits	Outstanding amounts	Repo deposits from all customers - Outstanding amounts

*Interest rate obtained as the weighted average of the following ten-day reported rates: repo deposits, certificates of deposit with maturity up to 18 months, overnight deposits from all customers
**Interest rate obtained as the weighted average of the following ten-day reported rates: short-term loans, medium and long-term loans

Table 3 – Backcast harmonised series: regression coefficients, standard deviations and confidence intervals of the backcast values

HARMONISED SERIES			$\hat{\beta}_O$	$\hat{\sigma}_{\beta_O}$	Confidence intervals of the backcast values**
LENDING RATES	All instr.categories	To households – Outstanding amounts	1.1562	0.0035	0.35
	Bank overdrafts	To households and non-financial corporations	1.0447	0.0032	0.27
		To non-financial corporations	0.9780	0.0031	0.26
	Loans for house purchases	Outstanding amounts	0.9370	0.0055	0.25
		New business	0.8102	0.0042	0.55
		Over 1 and up to 5 years – Outstanding amounts	1.0947	0.0074	0.45
		Over 5 years – Outstanding amounts	1.0147	0.0052	0.29
		Floating rate and up to 1 year – New business	0.7678	0.0047	0.61
	Loans to non-financial corporations	Outstanding amounts	1.0430	0.0035	0.10
		New business	0.9354	0.0049	0.60
		Over 1 and up to 5 years – Outstanding amounts	0.9358	0.0041	0.33
		Over 5 years – Outstanding amounts	0.9350	0.0036	0.32
	Over 1 milion euro	New business	0.8211	0.0054	0.54
DEPOSIT RATES	All instr.categories	From households and non-financial corporations – Outstanding amounts	0.9396	0.0058	0.11
	Overnight deposits	From households and non-financial corporations	0.9343	0.0050	0.09
		From households	0.8325	0.0052	0.11
		From non-financial corporations	1.1821	0.0077	0.20
	Deposits with agreed maturity	From households – New business	0.9899	0.0024	0.13
		Up to 2 years from households – Outstanding amounts	0.8890	0.0061	0.33
		Up to 1 year from households – New business	0.9824	0.0022	0.12
	Repo deposits	Outstanding amounts	0.9736	0.0019	0.11

**Average size of the confidence intervals (at a 95% probability level) for point in-time backcast values in the historical period.

Chart 2

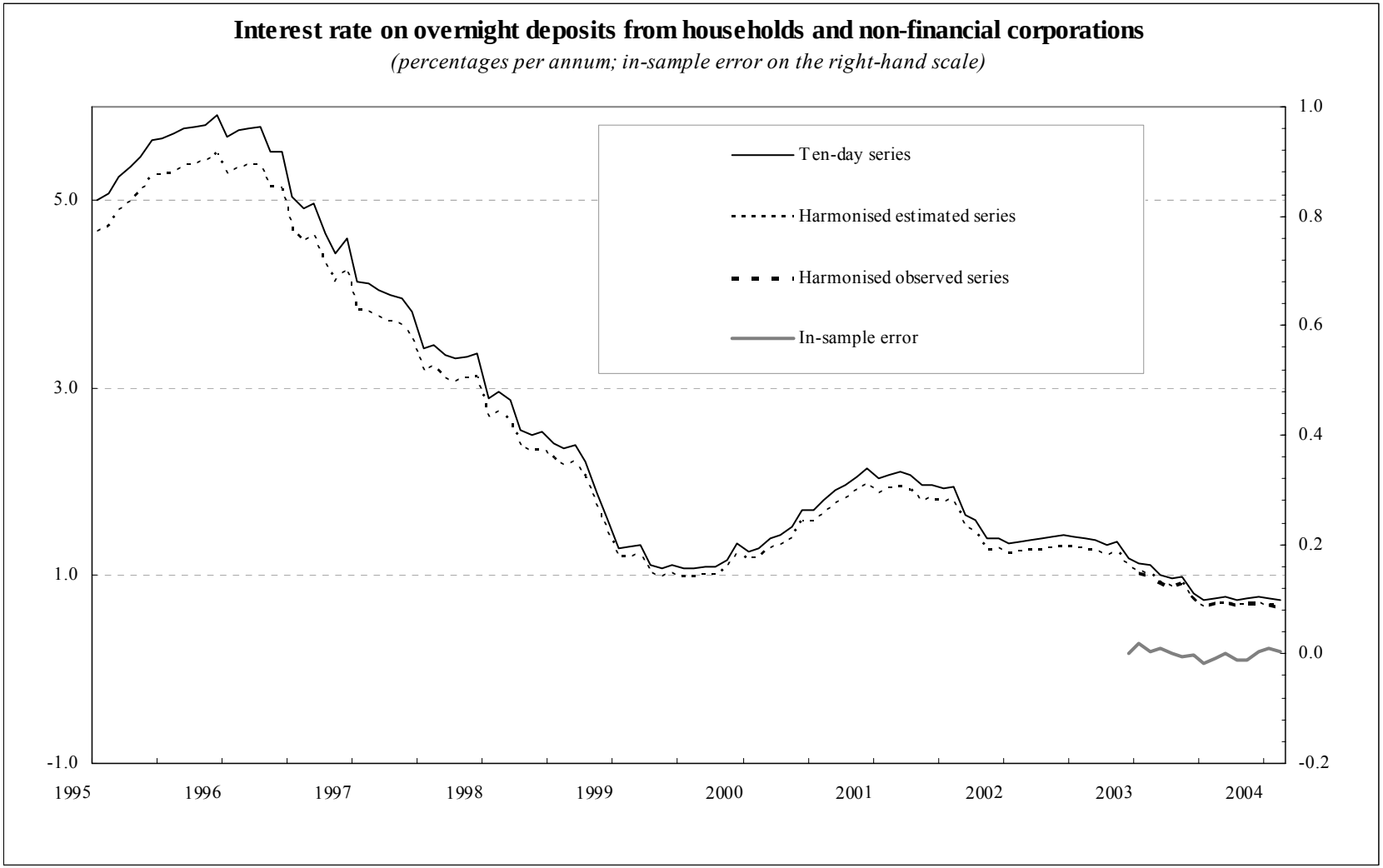

Interest rate on overnight deposits from households and non-financial corporations
(percentages per annum; in-sample error on the right-hand scale)
Ten-day series
Harmonised estimated series
Harmonised observed series
In-sample error
5.0
3.0
1.0
-1.0
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004

Chart 3

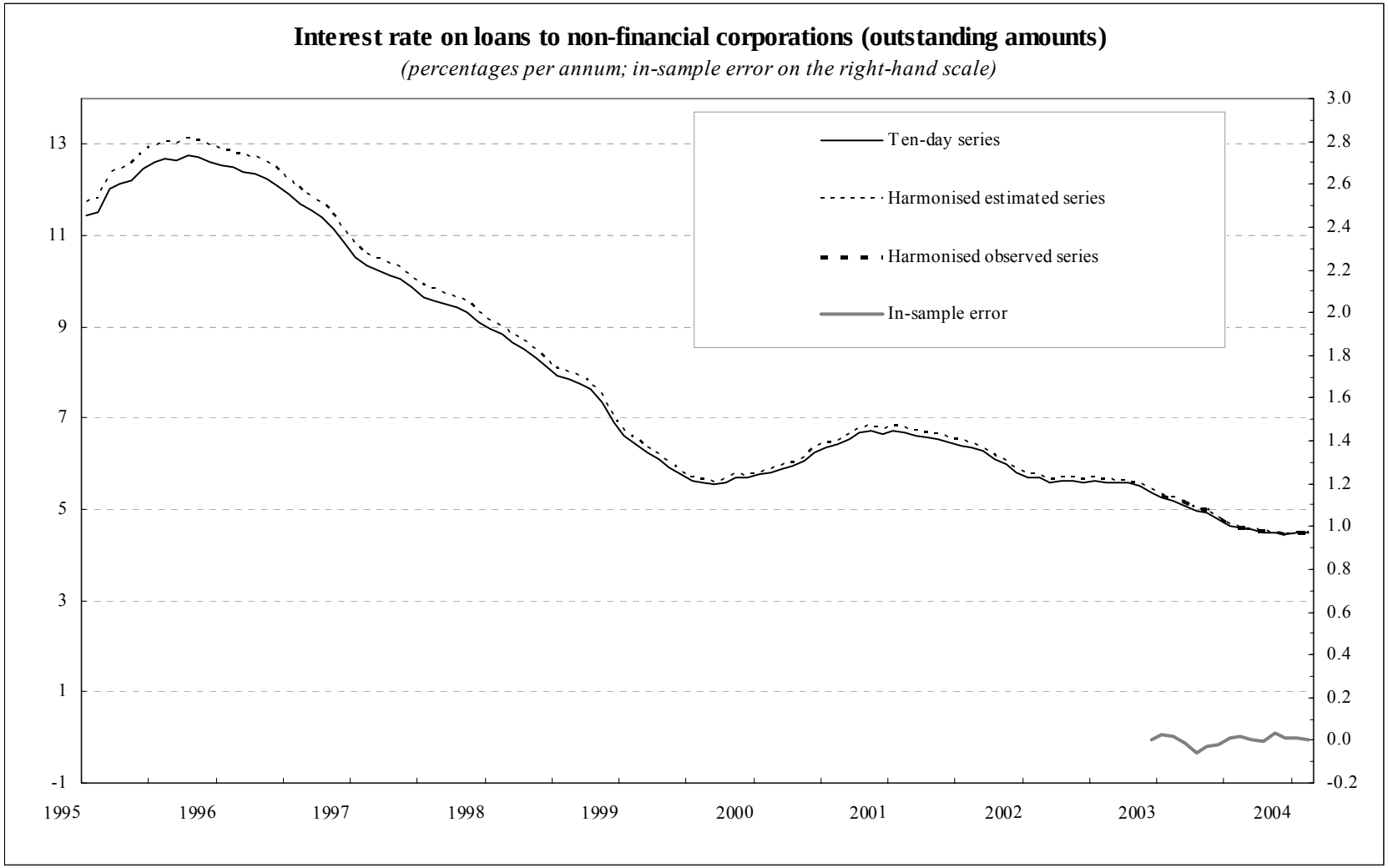

Interest rate on loans to non-financial corporations (outstanding amounts)
(percentages per annum; in-sample error on the right-hand scale)
Ten-day series
Harmonised estimated series
Harmonised observed series
In-sample error
13
11
9
7
5
3
1
-1
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004

Chart 4

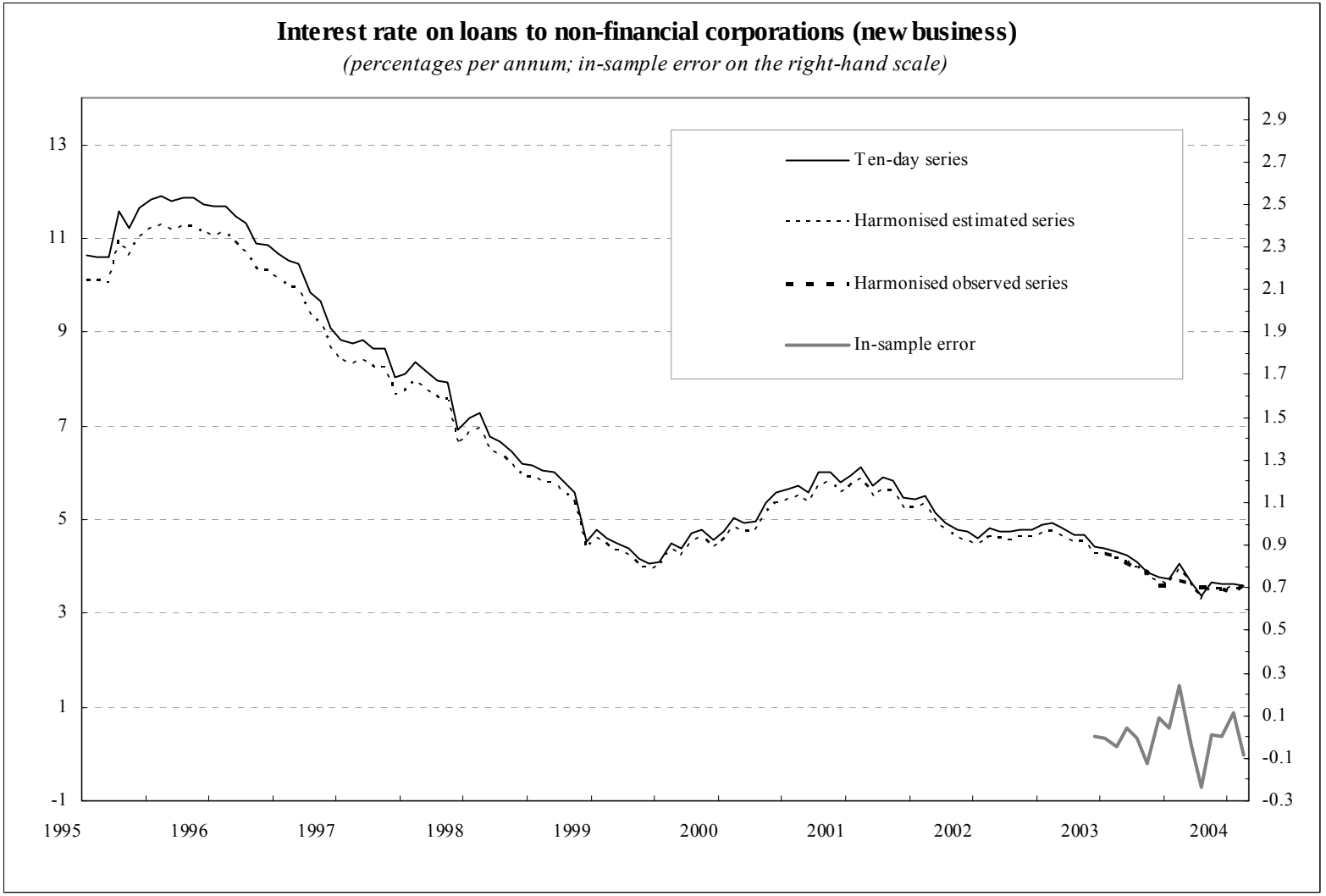

Interest rate on loans to non-financial corporations (new business)
(percentages per annum; in-sample error on the right-hand scale)
Ten-day series
Harmonised estimated series
Harmonised observed series
In-sample error
13
11
9
7
5
3
1
-1
2.9
2.7
2.5
2.3
2.1
1.9
1.7
1.5
1.3
1.1
0.9
0.7
0.5
0.3
0.1
-0.1
-0.3
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004

Chart 5

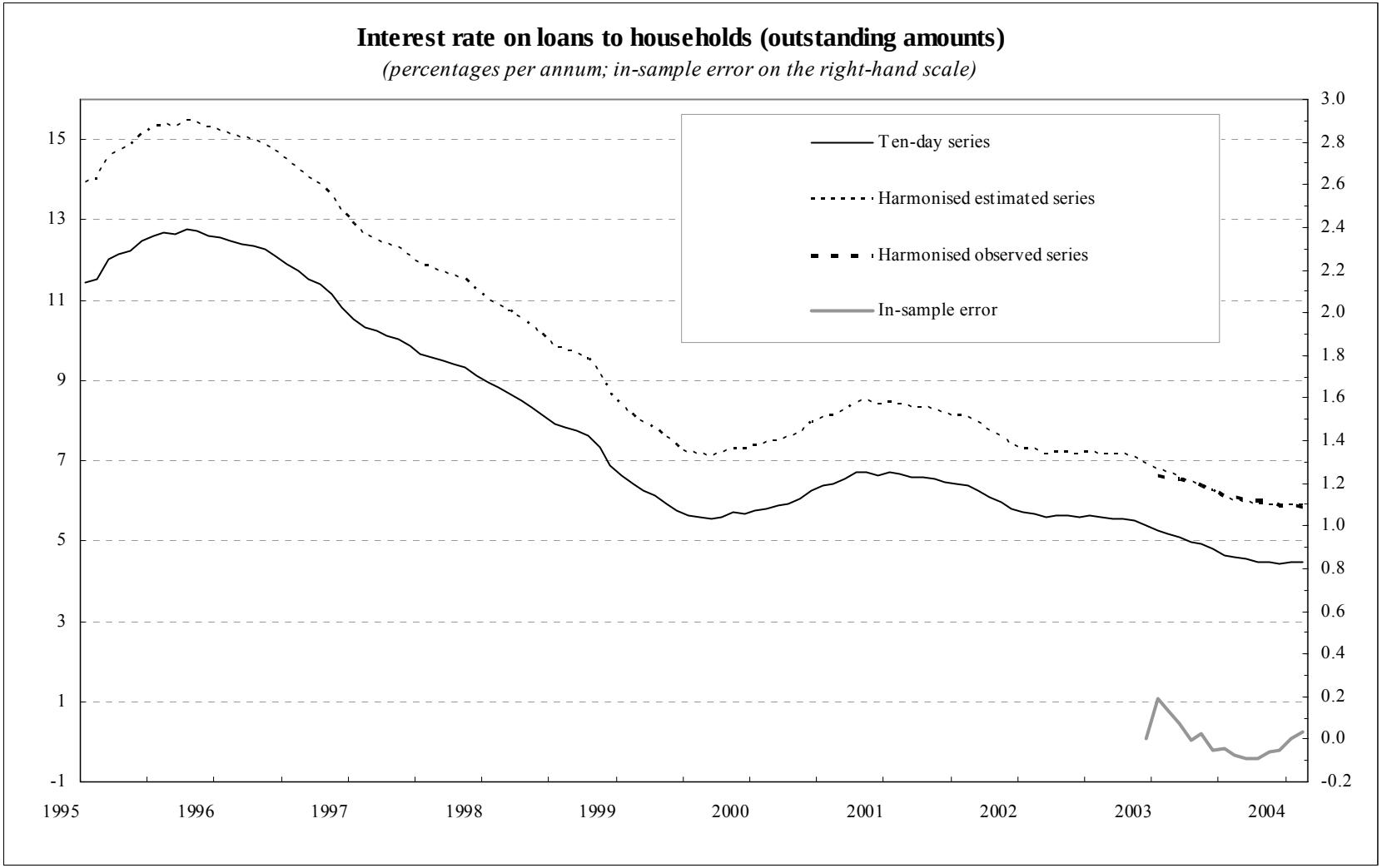
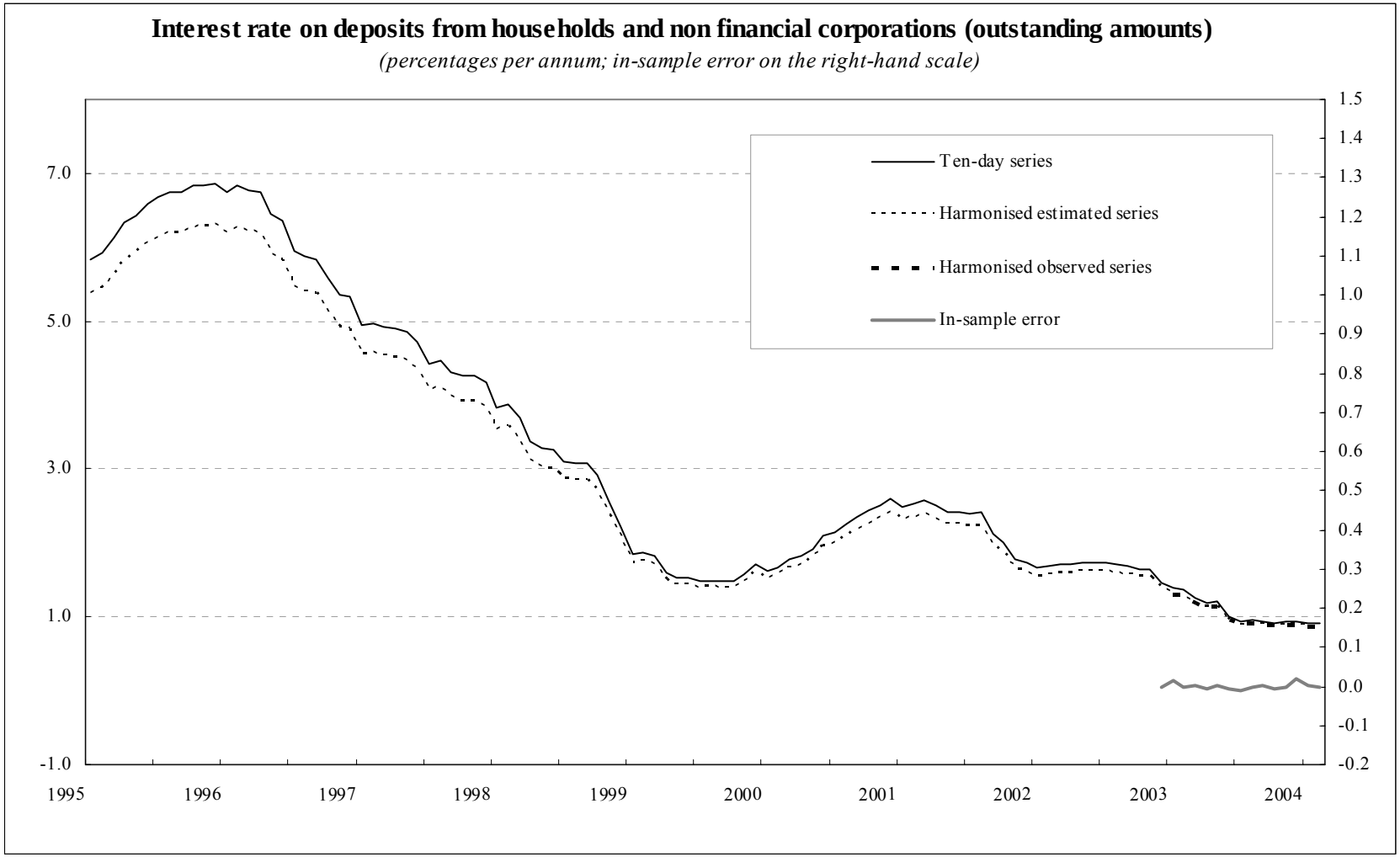

Interest rate on loans to households (outstanding amounts)
(percentages per annum; in-sample error on the right-hand scale)
Ten-day series
Harmonised estimated series
Harmonised observed series
In-sample error
15
13
11
9
7
5
3
1
-1
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004

Chart 6


Interest rate on deposits from households and non financial corporations (outstanding amounts)
(percentages per annum; in-sample error on the right-hand scale)
Ten-day series
Harmonised estimated series
Harmonised observed series
In-sample error
7.0
5.0
3.0
1.0
-1.0
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004