

A NEW COINCIDENT INDICATOR FOR THE PORTUGUESE PRIVATE CONSUMPTION*

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1. INTRODUCTION

As it is well known, private consumption plays a major role in overall economic activity⁽¹⁾. Therefore, it is fundamental to follow closely private consumption evolution on a regular basis. Among the set of available indicators, the figures that receive, in general, the highest attention are the ones from Quarterly National Accounts. However, several problems arise, namely, measurement errors, availability only on a quarterly basis and the first estimate, which is usually subject to revisions, is released with a lag of about 70 days in the case of Portugal. To overcome some of these shortcomings, one has to resort to other available data on private consumption. The aim of this article is to provide a composite coincident indicator that summarizes the most relevant information on Portuguese private consumption and allows a timely analysis of its underlying trend.

Following Rua (2004), one resorts to the methodology proposed by Azevedo, Koopman and Rua (2003) to develop a composite coincident indicator. The resulting indicator for private consumption is compared with the one developed by Gomes (1995). Furthermore, the real-time reliability of the proposed coincident indicator is assessed.

The article is organised as follows. In section 2, an outline of the model underlying the construction of the composite indicator is provided. The

data used as input is discussed in section 3 and the resulting coincident indicator for private consumption is presented in section 4. In section 5, a real-time evaluation of the suggested composite indicator is undertaken. Finally, section 6 concludes.

2. THE MODEL⁽²⁾

The basic assumption of the model underlying the pursued composite indicator is that each series i , possibly after log transformation, is assumed as the sum of three components, trend (μ_{it}), cycle (ψ_{it}) and irregular (ε_{it}), that is,

$$y_{it} = \mu_{it} + \psi_{it} + \varepsilon_{it}, \quad i = 1, \dots, N \text{ and } t = 1, \dots, T.$$

In particular, the trend-cycle modelling adopted is the one proposed by Harvey and Trimbur (2003), which allows obtaining a smooth cycle likewise a band-pass filter. Additionally, if one considers that the business cycle consists of expansions and recessions occurring in several economic variables then a common cyclical component to all series can be imposed. Hence, the model can be specified as

$$y_{it} = \mu_{it} + \delta_i \psi_t + \varepsilon_{it}, \quad i = 1, \dots, N \text{ and } t = 1, \dots, T$$

where the parameter δ_i measures the contribution of the common cycle ψ_t in each series. However, one can generalise the model in order to take into account that some variables may be leading while

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(1) In Portugal, it represents more than 60 percent of GDP.

(2) This section follows closely Rua (2004). For more details on the model see Azevedo, Koopman and Rua (2003).

others may be lagging. This can be met by shifting the common cycle for each series according to their lead/lag. Allowing for shifts, the model can be written as

$$y_{it} = \mu_{it} + \delta_i \psi_{t+\xi_i} + \varepsilon_{it}, \quad i=1, \dots, N \text{ and } t=1, \dots, T$$

where ξ_i is the shift for series i . Since each series cycle can only be shifted with respect to another cycle, one of the series has to be subject to parameter constraints, namely $\delta_j = 1$ and $\xi_j = 0$. Thus, the cycle is common to all series but scaled differently and shifted ξ_i time periods in comparison to series j , which is the reference series for the identification of the cycle. The model can be casted in the state-space form and estimated by maximum likelihood.

3. DATA

First of all, one has to select the variables to be included in the composite coincident indicator. In the spirit of Rua (2004), it seems obvious to use real private consumption as the reference series for the identification of the cyclical component. In the model, this resumes to impose a unit common cycle loading and a zero phase shift for real private consumption series.

The remaining series considered for possible inclusion in the coincident indicator are those available on a high frequency basis, promptly released and with a reasonable time span. After a preliminary analysis of the information content of each series regarding private consumption cyclical developments⁽³⁾, one ended up with 8 series. Besides real private consumption, the other series are⁽⁴⁾: real retail trade turnover index, sales of light passenger vehicles, retail sales volume (trade survey), tourism nights spent by residents in Portugal, real industrial turnover index of consumer goods in the domestic market, households' financial situation and general economic situation (consumers' survey).

The economic reasoning underlying such selection can be justified as follows. On the one hand,

real retail trade turnover index and light passenger vehicles sales provide quantitative data on goods consumption evolution. These data can be complemented with qualitative one, namely, retail sales volume assessment. On the other hand, the number of tourism nights spent in Portugal by residents intends to capture, to some extent, developments on services consumption. Concerning the supply side, real industrial turnover index of consumer goods in the domestic market is considered. Moreover, since income and wealth are key determinants of consumption behaviour, households' assessment of their current financial situation is also included. Finally, in order to take into account the macroeconomic situation, consumers' opinion on the general economic situation is also considered. The corresponding series are presented in Chart 1.

4. THE COINCIDENT INDICATOR

Once the variables are selected, the model can be estimated by maximum likelihood for the period 1977-2004⁽⁵⁾. The resulting common cyclical component is plotted in Chart 2 and the corresponding estimated shifts are presented in Table 1. Note that since real private consumption is used as the reference series it does not present, by definition, a phase shift. Regarding the remaining quantitative data, only real industrial turnover index is leading while real retail trade turnover index is lagging slightly more than one quarter. Concerning survey data, all series present a lead.

A growth indicator can be obtained by trend restoring the common cyclical component and then computing the corresponding growth rate. In particular, resorting to the estimated real private consumption trend and calculating the year-on-year growth rate, results in the growth indicator plotted in Chart 3⁽⁶⁾. The suggested coincident indicator tracks rather well the underlying trend of private consumption developments. Note that the coincident indicator is not aimed to pin point private consumption growth. In fact, the purpose of such

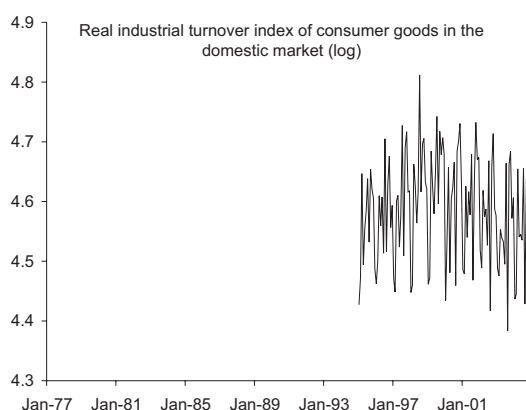
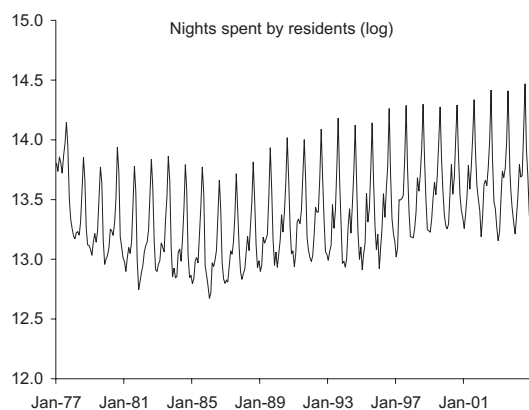
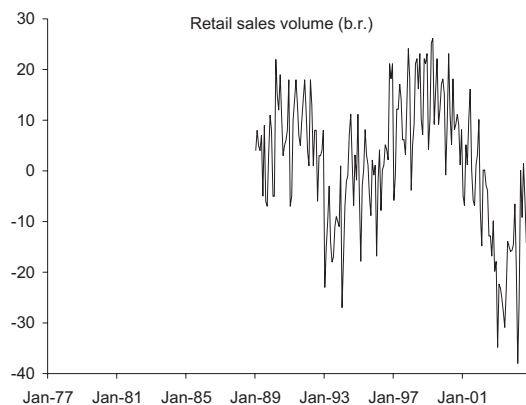
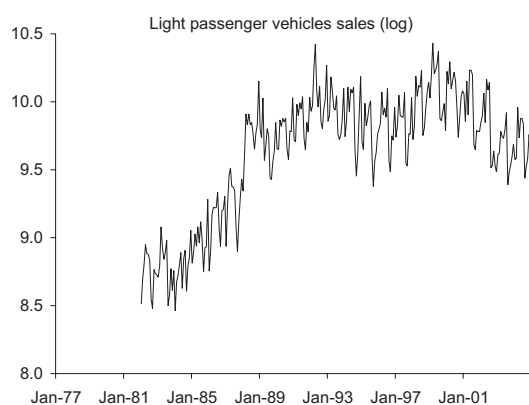
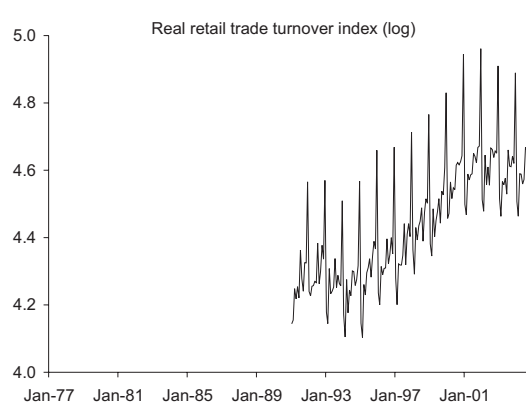
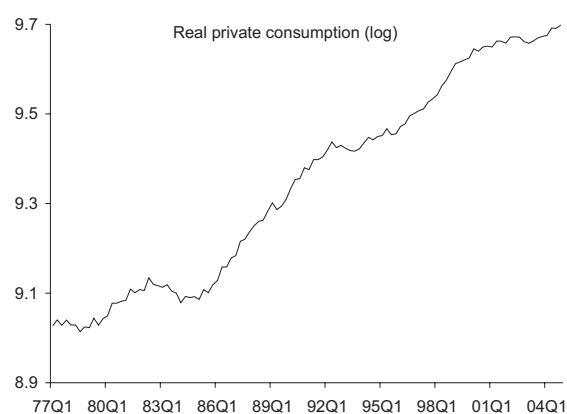
(3) For over four hundred series, each series cyclical component was compared with real private consumption cycle in terms of comovement through the cross-correlogram.

(4) See Annex for a detailed description of data.

(5) Both mixed data frequency and missing values can be handled in the state-space framework (see, for example, Harvey (1989)).

(6) In this figure, as in others below, due to the monthly nature of the time axis, a constant value is assumed within the quarter for the year-on-year growth rate of real private consumption.

Chart 1
THE INPUT SERIES



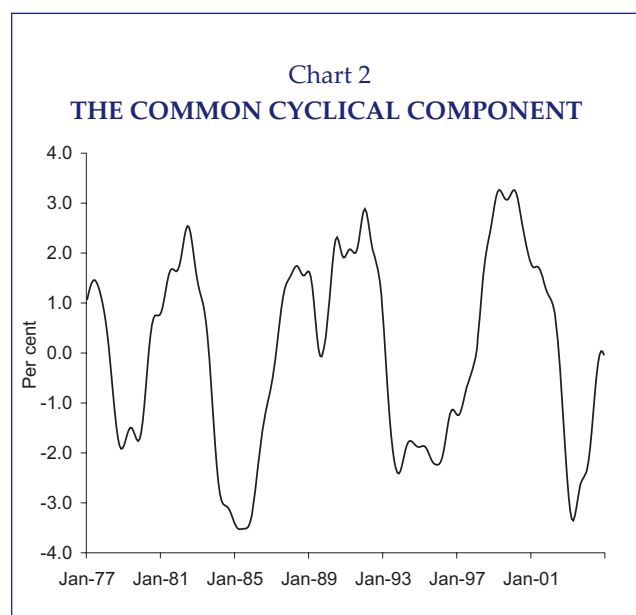


Table 1
PHASE SHIFTS

In months

	Phase shifts
Real private consumption	0.0
Real retail trade turnover index	-3.8
Light passenger vehicles sales	-0.4
Retail sales volume	4.2
Nights spent by residents	-1.5
Real industrial turnover index of consumer goods in the domestic market	6.0
Households' financial situation	7.8
General economic situation	10.9

Note: A positive figure denotes a lead whereas a negative one denotes a lag relative to the common cycle.

indicators is not to follow erratic movements, as they are not relevant for macroeconomic analysis (see, for example, Stock and Watson (1988)).

Following Dias (1993), Gomes (1995) developed a coincident indicator for private consumption. The quarterly indicator proposed by Gomes (1995), which is currently released by Banco de Portugal⁽⁷⁾, relies on Stock and Watson (1988, 1993) methodology. It includes only 3 series, namely: retail trade activity (trade survey), retail sales volume (trade survey) and overall demand in manufacturing industry of consumer goods (manufacturing industry survey). Note that all the series used in Gomes (1995) indicator stem from

(7) See *Monthly Economic Indicators*.

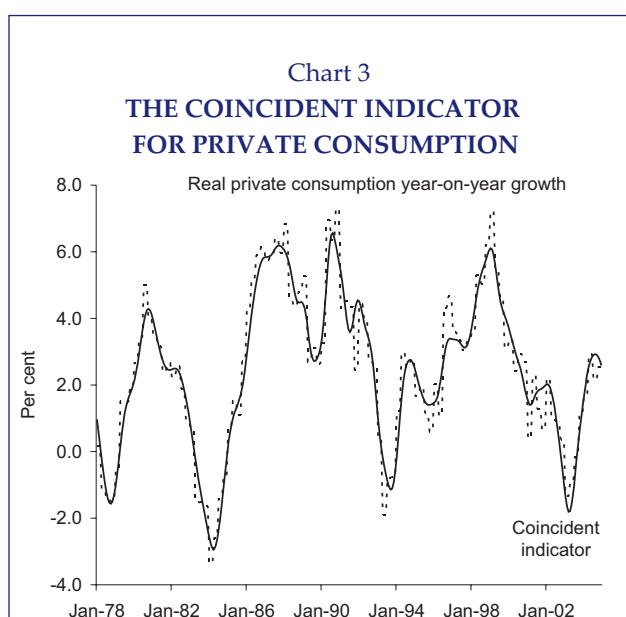
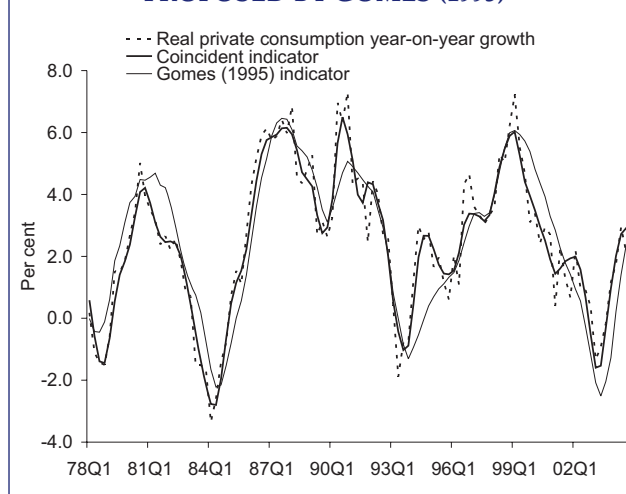


Chart 4
THE COINCIDENT INDICATOR AND THE ONE PROPOSED BY GOMES (1995)



surveys whereas in the suggested coincident indicator only 3 of the 8 series are of a qualitative nature. Therefore, besides being more broadly based the herein proposed indicator allows for a diversification of the nature of the data used as input.

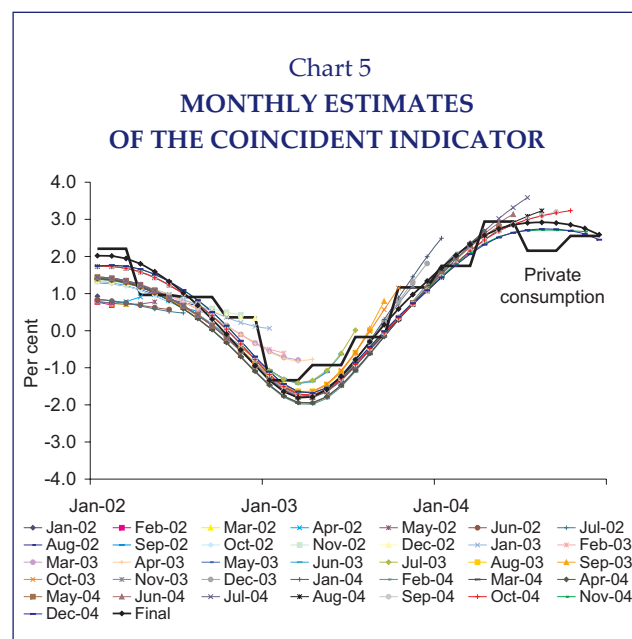
Both indicators are presented in Chart 4 along with real private consumption year-on-year growth. One can see that, despite the similar pattern, the now suggested coincident indicator seems to follow more closely the underlying trend of private consumption developments. In fact, it appears that Gomes (1995) indicator is slightly lagging⁽⁸⁾. However, one should keep in mind that the proposed indicator includes real private consump-

tion series while Gomes (1995) indicator does not. Additionally, the suggested coincident indicator is available on a monthly frequency whereas Gomes (1995) indicator is quarterly.

5. A REAL-TIME EVALUATION

Since data are, in general, revised and more data becomes available as time goes by, the coincident indicator is naturally subject to revisions over time. Therefore, it is also important to assess the real-time reliability of the coincident indicator. Likewise Rua (2004), an out-of-sample exercise is performed. First the model is estimated using the available data up to December 2001⁽⁹⁾ and then, taking into account data release calendar and using real-time estimates⁽¹⁰⁾, the coincident indicator is calculated each month until the end of 2004⁽¹¹⁾. This exercise provides real-time estimates of the monthly coincident indicator for the last 3 years (see Chart 5)⁽¹²⁾. One can see that the most recent monthly figures of the coincident indicator are subject to revisions, in particular, near turning points. However, the revisions affect mainly the level and not the signal regarding private consumption accelerating/decelerating trend.

Since Gomes (1995) indicator is available only on a quarterly frequency, real-time quarterly estimates of the coincident indicator are also presented to ease the comparison of the real-time reliability of both indicators (see Chart 6). One can see



that Gomes (1995) coincident indicator is also subject to revisions, which are more pronounced in the neighbourhood of a turning point.

Additionally, since the most recent estimate receives a lot of attention, it is also important to assess the information content of first estimates. Naturally, the quality of an estimate is a function of the amount of data available in its calculation. In particular, the coincident indicator estimates that could be obtained at the middle of the following month were considered. First estimates of private consumption year-on-year growth as well as of Gomes (1995) coincident indicator are also plotted (Chart 7). In Table 2, some statistics are reported for comparison of the growth rate as well as of the acceleration/deceleration of both coincident indicators against private consumption. In particular, the contemporaneous correlation between first estimates of the composite indicators and real private consumption is presented, the sign concordance which measures the proportion of times sharing the same sign and the Root Mean Squared Error (RMSE) to assess the magnitude of the differences. Caution should be taken in the analysis of the results, as the sample period is not long and more importantly the coincident indicator does not aim to pin point private consumption growth. Nevertheless, the results obtained seem promising as the suggested coincident indicator is never outperformed by Gomes (1995) indicator.

(8) Resorting to the cross-correlogram, one can conclude that the maximum cross-correlation between Gomes (1995) indicator and real private consumption year-on-year growth is attained at lag one, that is, Gomes (1995) indicator is lagging one quarter.

(9) The resulting estimates for the parameters of interest are similar to the ones obtained with the entire sample.

(10) Since survey data and vehicles sales are not subject to revisions, real-time estimates are not considered for these variables. Moreover, due to a methodological change, real-time estimates for nights spent by residents are only considered since the beginning of 2003.

(11) Each month, the coincident indicator is computed resorting to the available data at the middle of the following month. Besides real private consumption, which is released with a lag of 70 days, this estimate is also obtained without real retail trade turnover index, which is released at the end of the following month, real industrial turnover index and nights spent by residents, which are available only at the beginning of the second following month.

(12) In this figure, as in others below, the final estimate refers to the estimate obtained with the whole sample.

Chart 6A
QUARTERLY ESTIMATES
OF THE COINCIDENT INDICATOR

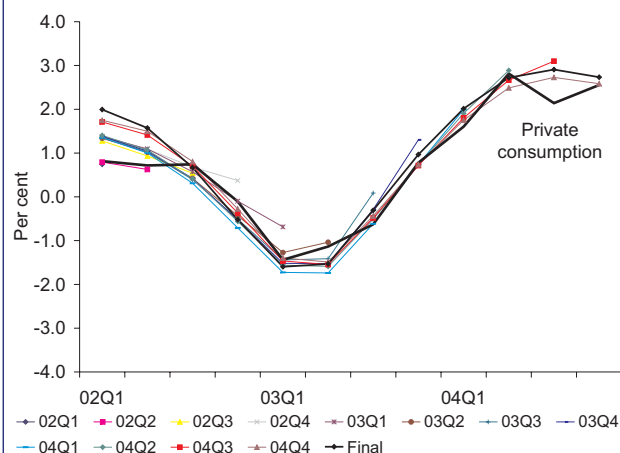


Chart 6B
ESTIMATES OF GOMES (1995)
INDICATOR

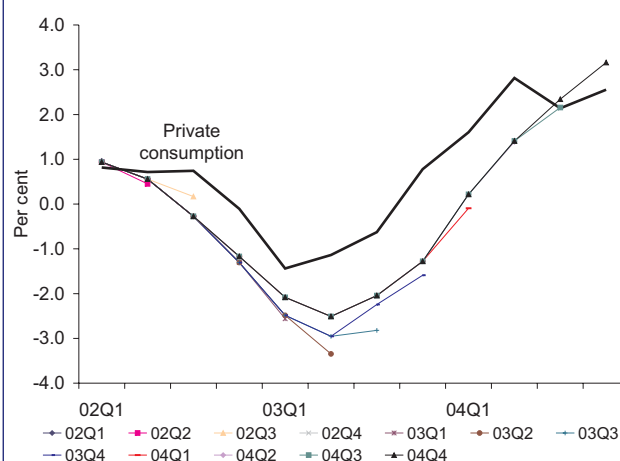


Chart 7
FIRST ESTIMATES OF THE COINCIDENT
INDICATOR, PRIVATE CONSUMPTION AND
GOMES (1995) INDICATOR

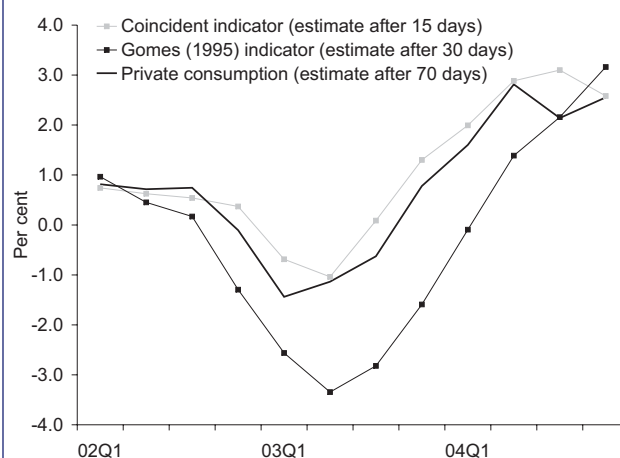


Table 2

CORRELATION, SIGN CONCORDANCE AND
RMSE OF FIRST ESTIMATES

	Coincident indicator	Gomes (1995) indicator
<i>Growth rate</i>		
Correlation	0.96	0.90
Sign concordance	0.83	0.83
RMSE	0.48	1.41
<i>Acceleration/Deceleration</i>		
Correlation	0.69	0.63
Sign concordance	0.67	0.67
RMSE	0.67	0.74

6. CONCLUSIONS

Resorting to the methodology proposed by Azevedo, Koopman and Rua (2003), a new coincident indicator for the Portuguese private consumption is developed. The resulting indicator makes use of both quantitative and qualitative data, constituting a synthetic measure of current private consumption evolution. Notwithstanding all the erratic behaviour of the input series, the co-

incident indicator turns out to be smooth which eases the short-term analysis of private consumption developments. In contrast with Gomes (1995) coincident indicator, the one herein suggested is available on a monthly basis. Besides the high frequency assessment, the proposed indicator also allows for a timelier one. Although early estimates are subject to revisions, it is shown that these estimates are quite informative.

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ANNEX

Quarterly real private consumption (seasonally adjusted) is provided by *INE* (National Statistics Office), in accordance with the European System of Accounts (ESA) 1995, since 1995. From 1995 backwards the series was growth chained using ESA 1979 quarterly figures. Retail trade turnover index (not seasonally adjusted) is available from *INE*, in real terms, since January 2000. Prior to that date, *INE* only provides the index in nominal terms. Once adjusted for price developments (Banco de Portugal estimates), one can use it to obtain a longer time span series for real retail trade turnover index. The number of new light passenger vehicles, including 4x4, sold is released by ACAP (Portuguese Automobile Trade Association) and it is not seasonally adjusted. Since the series including 4x4 is only available from January 1993 onwards, it was growth chained backwards using a series excluding 4x4 vehicles. The retail sales volume variable stems from the monthly trade survey released by *INE*. The figures refer to the balance of respondents (b.r.) regarding current volume sales in retail trade and are not seasonally adjusted. The series only start in June 1994. However, using the previous *INE* series, which is based on a different survey sample, it was possible to obtain a series since January 1989. The values prior to June 1994 were adjusted by a constant value,

which resulted from the average difference between both series for the common period. The number of tourism nights spent by residents in Portugal is released by *INE* and is not seasonally adjusted. Due to a methodological change at the beginning of 2003, the current series is only available since January 2001. Therefore, it was growth chained backwards resorting to the previously published figures. Real industrial turnover index of consumer goods in the domestic market was obtained by adjusting its nominal counterpart for price developments using industrial producer price index of consumer goods. Nominal industrial turnover index of consumer goods in the domestic market is released by *INE* (not seasonally adjusted) but due to a basis change, the most recent series was growth chained with the previous one. The same applies for industrial producer price index of consumer goods. Regarding households' financial situation and general economic situation, both stem from the monthly consumers' survey released by the European Commission. Both series are seasonally adjusted and the first one refers to the balance of respondents regarding household current financial situation against 12 months ago while the second one regards consumers' assessment about the general economic situation over the last 12 months.