ISTITUTO DI STUDI E ANALISI ECONOMICA

Cyclical features of the ISAE business services series

by

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ABSTRACT

The paper presents some first analysis on the ISAE Market Service Survey Series, focusing on the subset referring to Business Services (BS). The aim of the work is to identify the cyclical characteristics of BS series in order to build a confidence indicator that, in our plan, would improve the forecasts on economic fluctuations. To this end, ISAE BS series are rebuilt by merging the quarterly information collected from 1992 Q1 to 2002 Q4, with those collected on a monthly basis since January 2003.

The series are analysed in order to check whether the data arising from entrepreneurs' opinions about their current and future economic situation are subject to business cycle fluctuations. For this purpose, we compare the BS series chronology, detected using the Bry-Boschan routine, to the ISAE official chronology based on the ISAE – Bank of Italy methodology (Altissimo et al., 2000); however, since the official chronology indicates December 2000 as the last valid peak, we add some more recent turning points on the basis of the preliminary analysis recently presented by ISAE. Furthermore, we check whether the BS series are correlated with the GDP annual rate of growth and if they improve the forecast of GDP cyclical fluctuations. Thus, on the basis of the results of the analysis of both turning point synchronization and forecast properties, we appropriately selected some BS series to built alternative confidence indicators and compare them to the current ISAE Confidence Climate.

Finally, our analysis indicates that the predictive capacity of the ISAE Business Services Confidence Indicator could be improved replacing assessments and forecasts on order books with those on turnover. However, being the time series short and highly variable, our results are not conclusive.

Keywords: Confidence Climate, Leading Indicators, Turning Points.

JEL codes: E32, E37, E39.

NON-TECHNICAL SUMMARY

Over the past decades, the Market Service sectors have acquired a prominent role in almost all the industrialised economies, both in terms of weight on the total value added and of market shares growth. Nevertheless, the statistical information on these sectors are still relatively scarce, stemming from heterogeneous sources and being generally available with a considerable delay.

In this respect, the ISAE Business Service (BS) series, being synchronised with traditional economic activity indicators, could be used as a qualitative proxy of the economic performance. Moreover, data stemming from BS sector surveys could be useful to predict business cycle turning points. In particular, as the manufacturing and service sectors are even more interrelated, confidence indexes built on both BS and Manufacturing survey data may be adopted to improve the GDP short-term forecasting (Bouton and Erkel-Rousse, 2004).

The paper presents some first analysis on the ISAE Market Service Survey Series, focusing on the subset referring to BS. The aim of this work is to identify the cyclical characteristics of the BS series in order to build a confidence indicator improving the forecasts of economic fluctuations. To this end, ISAE BS series were rebuilt by merging the quarterly information collected from 1992 Q1 to 2002 Q4, with those collect on a monthly basis since January 2003.

The series are analysed in order to check whether the data arising from services entrepreneurs' opinions about their current and future economic situation are subject to business cycle fluctuations. For this purpose, we compare the BS series chronology, detected using the Bry-Boschan routine, to the ISAE official chronology based on the ISAE – Bank of Italy methodology (Altissimo et al., 2000); however, since the official chronology indicates December 2000 as the last valid peak, we add some more recent turning points on the basis of the preliminary analysis recently presented by ISAE. Furthermore, we check whether the BS series are correlated with the GDP annual rate of growth and if they improve the forecast of GDP cyclical fluctuations.

Finally, on the basis of the results of the analysis of both turning point synchronization and forecast properties, we appropriately selected some BS series to built alternative confidence indicators and compare them to the current ISAE Confidence Climate.

The analysis shows that the BS series are, in the main, in phase with the proposed economic cycle chronology. Furthermore, the bulk of the BS series share 5 out of 7 turning points with the economic cycle, with the exception of forecasts on employment (TEMP), which poorly performs as compared to our economy chronology. Moreover, the average lead/lag of the BS series with respect to the

ISAE cyclical chronology shows that, on average, most BS series lead the proposed aggregate turning points.

Furthermore, the analysis shows that the BS series are moderately correlated with the GDP annual rate of growth (i.e. they share recession and expansion phases with the GDP ones). On the top of it, they are able to signal – though with lead or lag - most of the reference turning points. However, amongst the variables included in the ISAE Confidence Indicator (CLIMA) calculation, forecasts on order book (TORD) presents a poor signalling feature as compared to the GDP cyclical fluctuations; on the contrary the forecasts on turnover (TTURN) series anticipates the turning points of the proposed chronology and shows a higher degree of correlation with the GDP. On the other hand, TTURN cannot help forecasting the GDP annual rate of growth, while more reliable forecasting properties characterize assessment on turnover (LTURN) and TEMP.

Hence, we calculate alternative Confidence Climate indexes by replacing assessment on order book (LORD) with LTURN and TORD with TTURN and TEMP. The comparison between those different index properties shows that, while the usually calculated ISAE CLIMA figures have in common 4 (out of 7) leading turning points with the proposed chronology, the composite indicator obtained by replacing assessments and forecasts on order book with those on turnover (CLIMA 2) shows on average a better performance in predicting turning points. Also, CLIMA 2 has a higher degree of cross correlation with the GDP annual rate of growth both at lag 0 and -1.

However, being the time series short and highly variable, our results are not conclusive. Actually, to support our preliminary findings, we should apply more sophisticated techniques to longer time series. For example, following Gayer and Genet (2006), we could apply factor analysis to select more efficiently the components to be included in the confidence index. Also, as suggested in Marcellino (2006), we could select variables prior to factor extraction on the basis of their correlation with the reference series.

CARATTERISTICHE CICLICHE DELL'INDAGINE ISAE PRESSO LE IMPRESE DI SERVIZI

SINTESI

Sono qui riportate alcune analisi sulle serie dell'indagine ISAE sui servizi di mercato in particolare quelle sui servizi alle imprese. Scopo del lavoro è l'identificazione delle caratteristiche cicliche delle serie relative ai servizi alle imprese (BS) per costruire un indicatore di fiducia che, a nostro parere, migliori le previsioni delle oscillazioni cicliche. A questo fine, le serie dei servizi alle imprese sono state ricostruite unendo le informazioni trimestrali dal 1° trimestre 1992 al 4° del 2002 con quelle mensili raccolte dall'inizio del 2003.

La cronologia delle serie dei servizi alle imprese, determinata secondo la routine Bry-Boschan, viene quindi confrontata alla cronologia ufficiale dell'ISAE basata sulla metodologia ISAE_Banca d'Italia ((Altissimo et al., 2000), aggiornata sulla base di recenti analisi svolte all'interno dell'ISAE. Si è inoltre cercato di vedere la correlazione fra le serie BS e il tasso di crescita annuale del PIL e se le prime possano dare un contributo positivo alle previsioni sulle fluttuazioni cicliche del PIL.

Infine, sulla base dei risultati delle analisi sia sulla sincronizzazione dei punti di svolta e delle capacità predittive, sono state selezionate alcune serie BS per costruire indicatori di fiducia alternativi e confrontarli con quello attualmente utilizzato dall'ISAE.

L'analisi mostra che la capacità predittiva del clima di fiducia potrebbe essere migliorata sostituendo giudizi e previsioni sugli ordinativi con quelli relativi al fatturato. Tuttavia, essendo le serie ancora brevi e affette da alta variabilità, i nostri risultati non possono ancora essere considerati conclusivi.

Parole chiave: Confidence Climate, Leading Indicators, Turning Points.

Classificazione JEL: E32, E37, E39.

CONTENTS

1 INTRODUCTION*

Over the past decades, the Market Service sectors have acquired a prominent role in almost all the industrialised economies, both in terms of weight on the total value added and of market shares growth. Nevertheless, the statistical information on these sectors are still relatively scarce, stemming from heterogeneous sources and being generally available with a considerable delay.

In this respect, the ISAE Business Service (BS) series, being synchronised with traditional economic activity indicators, could be used as a qualitative proxy of the economic performance. Moreover, data stemming from BS sector surveys could be useful to predict business cycle turning points. In particular, as the manufacturing and service sectors are even more interrelated, confidence indexes built on both BS and Manufacturing survey data may be adopted to improve the GDP short-term forecasting (Bouton and Erkel-Rousse, 2004).

The aim of this work is to identify the cyclical characteristics of the BS series in order to build a confidence indicator improving the forecasts of economic fluctuations. To this end, ISAE BS series were rebuilt by merging the quarterly information collected from 1992 Q1 to 2002 Q4, with those collect on a monthly basis since January 2003.

The series are analysed to check whether data arising from services entrepreneurs' opinions on their current and future economic situation are subject to business cycle fluctuations. For this purpose, we compare BS series chronology, detected using the Bry-Boschan routine, to the ISAE official chronology based on the ISAE – Bank of Italy methodology (Altissimo et al., 2000); however, since the official chronology indicates the last valid peak in December 2000, we add some more recent turning points on the basis of a preliminary analysis recently presented by ISAE (see ISAE Report, Forecast on the Italian Economy, July 2006).

Furthermore, we check whether the BS series are correlated with the GDP annual rate of growth and if they improve the forecast of GDP cyclical fluctuations. Actually, the proper reference series should be the Business Service Gross Value Added. However, the ISTAT National Account series refer to aggregate values on the NACE Rev.1.1 J and K sections, thus including sectors that are not embraced in the BS aggregate (see Martelli and Rocchetti, 2006). For this reason, a more general indicator of the economic activity, rather than a not-properly-defined industry

* The author wish to thank for the helpful suggestions the participants to the XXVI Ciret Conference (Rome, September 2006) where a preliminary version of this paper has been presented. The opinions expressed in this paper are the authors' own and do not reflect those of ISAE. Though the paper is a joint effort of both authors, for administrative reasons we remind that sec. 2 is to be attributed to Bianca Maria Martelli and par.1, 3, 4, 5,and 6 to Gaia Rocchetti.

aggregate, is preferred. Finally, on the basis of the results of the analysis of both turning point synchronization and forecast properties, we appropriately select some BS series to build alternative confidence indicators and compare them to the current ISAE Confidence Climate.

The paper is structured as follows. In Section 2, a brief description of the ISAE Market Service Survey is presented together with the new series obtained with the aggregation procedure. Section 3 reports the test results for the presence of unit roots and the estimation of the BS series cyclical components. In Section 4, the analysis of the synchronization between BS series turning points and the proposed chronology is presented, while in Section 5 the cross correlation and forecast performance analysis is illustrated. Finally, Section 6 contains some preliminary analysis on alternative formulas for computing the Confidence Climate and Section 7 concludes the work.

2. THE ISAE MARKET SERVICE SURVEY

2.1 Survey Breakdown

History, major features, and main methodological upgrading

The investigation of the service sector is relatively recent, even though it represents a relevant part of the industrialised economies. Hereafter the major features of the ISAE Service Survey are synthetically recalled, while a thorough discussion of the survey design can be found in Martelli and Rocchetti (2006). Within the E.U. Joint Harmonised Project, ISAE started a quarterly business service survey for Italy in 1992, on a random panel of about 1,000 business firms. The NACE Rev.1 two-digit sectors originally investigated are those providing high-technology and high-content services, namely: 72 (Computer and related activities), and an up-to-four-digit breakdown of all the most meaningful professional activities included in division 74[1]. The questionnaire comprised, besides some questions of national interest, six harmonised questions (see Table 1). Aggregation of results was performed using size weights only, namely the turnover declared by firms themselves.

[1] The breakdown of Nace rev.1 K section comprises: 74.12 (Accounting), 74.13 (Marketing, market research), 74.14 (Administration and management consulting), 74.2 (Engineering, planning, architecture), 74.4 (Advertising), 74.5+74.8 (Personnel selection, exhibition preparations).

Since 1998 Q1, the sectoral coverage has been enlarged by including Division 71 (Machinery renting), 73 (Research and development), and 90 (Sewage and refusal disposal), so that the ISAE survey has taken up a more global BS survey feature. The sample was updated by adopting a stratified (by sectors) random design with proportional allocation of the sampling units. The questionnaire was enlarged with the introduction of two further harmonised questions since the fourth quarter (see Table 1).

In January 2003, following the Commission recommendations, three major innovations took place: a) the frequency became monthly, b) the questionnaire was revised and further enlarged, c) the sector coverage was enlarged so as to comprise all market services. As a necessary consequence of the above-mentioned innovations and with the aim of upgrading the survey without loosing the previous information, a deep revision of the sample design was set up, leading the sample size to reach about 2,100 units. In details, according to a) and b), the wording of the questions was revised so as to accomplish the requested monthly timing prescriptions and an additional quarterly question (as for manufacturing) was added regarding obstacles to production.

The sectoral coverage enlargement[2], led to the choice of including all the MS sectors, with different degrees of detail mainly in BS sectors (Nace Rev.1.1 division 74)[3]. The sectors considered are reported in Table 1. At present, the ISAE MS survey does not comprise retail trade and non-market services (all collective services, non-profit organisations, recreational and cultural activities and other personal services), the former being the subject of another specific survey and the latter presenting features not easy to investigate with the usual harmonised questions.

The updated sample is now a panel based on a random stratified (by sectors and geographical partitions) sample. The units' allocation to strata is performed according to the Neyman technique. Also the aggregation procedure was accordingly updated by introducing a two-stage weighting system (turnover and strata value added) as recommended by OECD (2003 pp 36-47).

2 Carried out in the first half of 2002.

3 Preliminary results, also on a monthly basis, were collected by ISAE - but not disseminated - since August 2002.

Tab. 1 ISAE Market Service Survey: The Main Features

	Nace Rev.1.1 Sectors		1992	1998	2003
HOUSEHOLDS SERVICES	55	Hotels and restaurants			M
	60+61+62	Transports			M
	63.3	Travel agencies			M
	64	Post and telecommunications			M
	70	Real estate activities			M
FINANCIAL SERVICES	65	Financial intermediation a			M
	66	Insurance, pension funding			M
	67	Activities auxiliary to financial interm.			M
BUSINESS SERVICES	71	Machinery and equipment hiring		Q1	M
	72	Computer and related activities	Q1		M
	73	Research and development			M
	74.12	Accounting	Q1		M
	74.13	Marketing, market research	Q1		M
	74.14	Administration and management consulting	Q1		M
	74.2	Engineering, planning, architecture	Q1		M
	74.4	Advertising	Q1		M
	74.5+74.8	Other services	Q1		M
	90	Sewage and refusal disposal		Q1	M
Sample		**design**	Purposive panel	Stratified proportional random panel	Stratified random panel Neyman allocation
		size	1000	1000	2100
Weighting			Internal weight (turnover)	Internal weight (turnover)	Internal weight (turnover) and stratum's value added
Monthly questions					
	LORD	Assessment on order book	Q1		M
	LEMP	Assessment on employment		Q4	M
	LTURN	Assessment on turnover	Q1		M
	TORD	Forecasts on order book	Q1		M
	TEMP	Forecasts on employment	Q1		M
	TTURN	Forecasts on turnover	Q1		M
	TPRIC	Forecasts on selling prices	Q1		M
	TECON	Forecasts on economic situation		Q4	M

Qq: available since column year, quarter q , on a quarterly basis
M: available since January of column year, on a monthly basis

2.2 Rebuilding Series

While starting cyclical analysis on the ISAE service series, a major problem arises regarding the series length. In fact, while the new MS survey is now covering nearly 39% of Italian GDP (Martelli and Rocchetti, 2006), this information is available only since 2003.

We have therefore to limit our first investigation only to the BS subset as, even with some limits, the series are available since 1992. The first problem that emerges is bound to the frequency, as up to 2002 only quarterly information was collected. We therefore transformed the most recent data (since 2003) into quarterly ones by applying the arithmetic average on the three months composing the quarter.

A second problem stems from the former aggregation procedure that did not consider value added weights. We then approximate a more appropriate aggregation by selecting the BS sub-sectors and re-aggregating them with the same value added sectoral weights applied in the new survey. The resulting series, on which we are performing the cyclical analysis, are presented in Graph. 1 .

3 THE BUSINESS SERVICE SURVEY SERIES: PRELIMINARY ANALYSIS

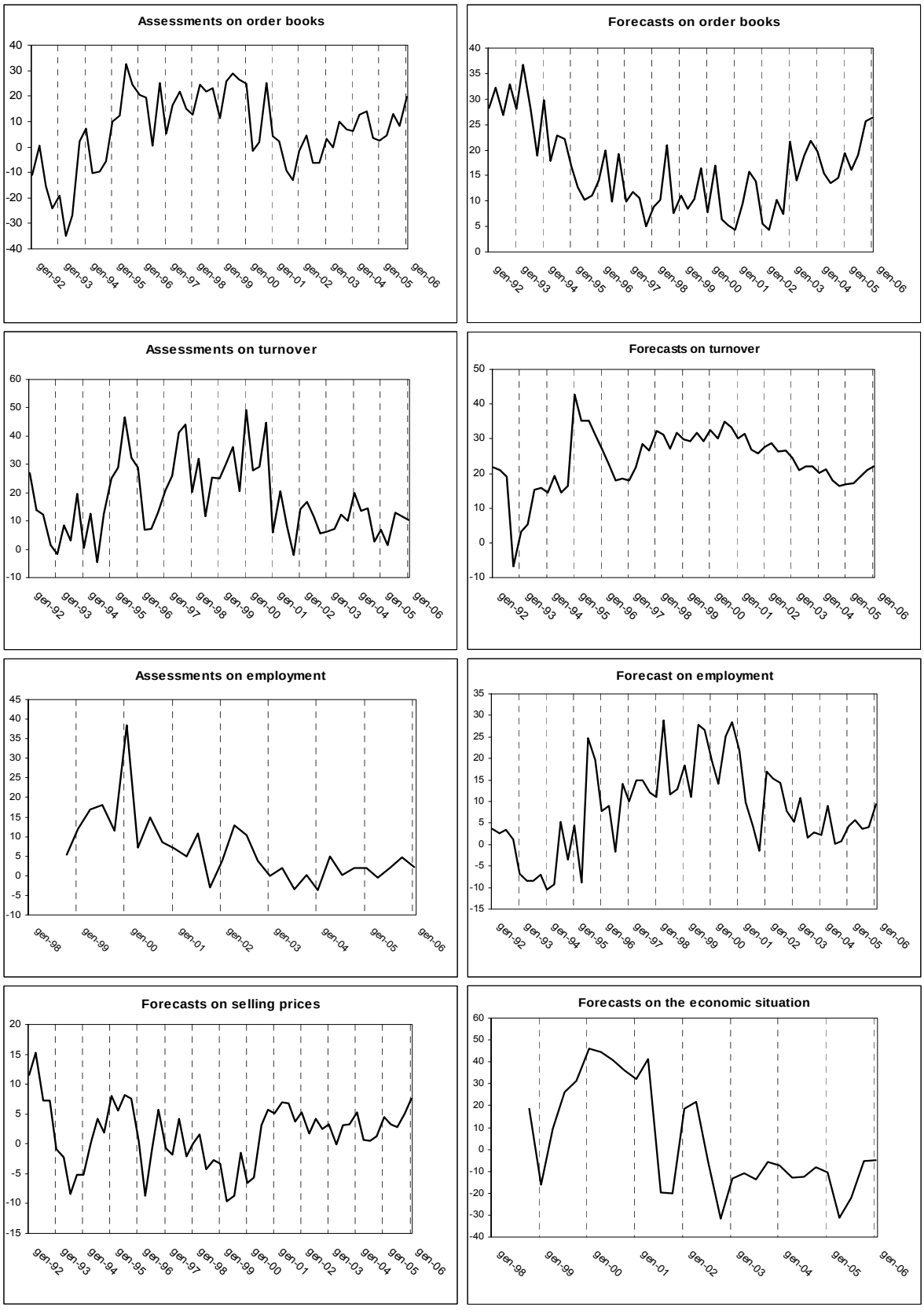
3.1 Testing unit roots

To begin with, the BS survey series are seasonal and working days are adjusted by adopting the Tramo – Seats methodology. However, since in most cases the BS survey series do not exhibit a specific seasonal pattern, for most of them the procedure only adjusts raw data for the presence of additive outliers, level shifts and transitory changes[4].

After that, the BS series are tested to check for the presence of unit roots. Indeed, the series have to be stationary to properly extract cyclical components, particularly when dealing with the Hodrick – Prescott filter (Harvey and Jaeger, 1993). Actually, the survey series are bounded - the balance being calculated from percentages - and are often considered as being stationary. However, since we analyse only a sample realization of the stochastic process generating the time

[4] For a detailed analysis of seasonality in the ISAE Survey series, see Pappalardo (1998) and Crosilla (2006).

Graph 1 **Business service series**



series, the hypothesis of unit root could be consistent even with virtually limited series (Brunello *et al*., 2000).

The order of integration is tested by means of both the Augmented Dickey – Fuller (Dickey and Fuller, 1979; Said and Dickey,1984) and the Phillip – Perron test (Phillips and Perron, 1988).

The test results reported in Table 2 show that, according to the Augmented Dickey Fuller Test, all series – except for assessment on employment (LEMP), assessments on turnover (LTURN) and forecast on turnover (TTURN) - are stationary. However, for the LEMP, LTURN e TTURN series, the test is significant at the 10% level. Furthermore, the results for the Phillips – Perron test indicate that all the series but TTURN are stationary, even though for TTURN the hypothesis of stationarity cannot be refused at a 10% confidence level. Also, the graphical analysis of TTURN does not show any unit roots in the data (Graph 1). Thus, we assume that all the analysed series are stationary given that the discrepancies for LEMP, LTURN and TTURN taking place according to the alternative testing procedures could arise from the high variability of the series and their shortness, particularly the LEMP series for which data are available only since end of 1998.

Finally, the reference series – namely the GDP annual rate of growth - is considered as being difference stationary, since we apply logarithmic fourth differences on the original level data. The GDP level data is extracted from the Italian National Accounts and is seasonally and working days adjusted (ISTAT, 2005).

Tab. 2 Augment Dickey- Fuller and Phillips – Perron Test for the BS Series

	Dickey – Fuller test[(a)] (lags in parenthesis)	Phillips – Perron test[(a)]
LORD	-3.17* (0)	-3.08 *
LEMP[(b)]	-2.23*** (1)	-4.35*
LTURN	-2.16*** (4)	-4.31*
TORD	-3.32** (0)	-3.07**
TEMP	-3.61* (0)	-3.43**
TTURN	-2.79*** (0)	-2.79***
TPRIC	-3.59* (0)	-3.51**
TECON[(b)]	-3.16** (0)	-3.04**

(a) *** significant at 10%; * significant at 5%; ** significant at 1%.

(b) LEMP and TECON are available only since Q4 1998.

3.2 Extracting the BS series cyclical components

The trend component of the BS survey series was estimated by applying the Hodrick – Prescott filter (Hodrick and Prescott, 1980).

Graphs A – B in the Appendix show the trend-cycle decomposition of the BS Survey series. Given that the cyclical components is obtained by simply subtracting the trend from the original series, and above all the growth component is supposed to be smooth, they maintain much of the original variability. The standard deviation of both the original and the detrended BS Survey series is pretty high (Table 3) even though the Hodrick - Prescott filter is able to reduce it by a 24% on average (with a maximum of 43% for TORD and a minimum of 12% for TPRIC).

Tab. 3 BS Series Standard Deviation

Business Service Series HP

	LORD	LTURN	LEMP	TORD	TTURN	TEMP	TPRIC	TECON
Standard Deviation BS	14.98	13.06	8.40	8.00	8.48	10.20	5.21	24.16

Business Service Series HP smoothed

Standard Deviation BS-HP	10.36	10.71	7.05	4.56	6.19	7.12	4.57	18.34
Standard Deviation Ratio (a)	0.69	0.82	0.84	0.57	0.73	0.70	0.88	0.76

(a) Standard Deviation BS/ Standard Deviation BS-HP.

Actually, the series variability could arise from the high volatility of economic operators' assessment and forecasts themselves, that eventually increase the erratic component weight. Indeed, the presence of that component could influence both the turning point detection and the correlation analysis with the reference series.

4 COMPARING CHRONOLOGIES

To determine the BS series turning points, we apply the Bry –Boschan dating algorithm (Bry and Boschan, 1971; Schlitzer, 1993) on the seasonally adjusted series[5]. Since the detected chronology could be influenced by the detrending technique, the turning point analysis is performed on the series in level terms (Altissimo *et al.,* 2000).

Besides, the results of the Bry - Boschan routine were analysed to compare the BS series turning points with the ISAE official chronology based on the ISAE – Bank of Italy methodology (Altissimo *et al*., 2000). However, since the chronology indicates the last valid peak in December 2000, we add some more recent turning points on the basis of a preliminary analysis recently presented by ISAE (see ISAE Report, *Forecast on the Italian Economy*, July 2006).

Indeed, after the peak identified in December 2000, economic activity in Italy has been falling in the whole 2001, and stabilized on low levels thereafter. Actually, the economic activity had shown some first signs of resilience twice, at the beginning of 2002 and again in Summer 2003. However, those cyclical upswings were very modest and were followed by modest downswings; as a consequence, any official turning points for the overall economy is identified (ISAE, July 2006). Nevertheless, for our purposes, and limited to this exercise, we introduce in the chronology the July 2003 trough, the July 2004 peak and the February 2005 minimum.

The figures presented in Table 4 show that, generally speaking, the BS series share the same recession and recovery phases; however, the turning points are not perfectly synchronised since the selecting dates are leading or lagging by 1-2 quarters.

With regard to the synchronization between the BS series turning points and the official chronology, Table 3 shows that, on average, the ISAE series do not present a common pattern. Indeed, the BS series bulk shares 5 out of 7 turning points with the economic cycle. However, not all those points are exactly synchronised with the proposed chronology. In particular, TEMP poorly performs as compared to our chronology. In fact, for this variable, the Bry – Boschan algorithm only individuates 2 out of 7 turning points. In addition, LEMP and TECON only share 2 turning points with the chronology; indeed, those series are available only since the 1998 Q4.

Furthermore, the average lead/lag of the BS series with respect to the ISAE cyclical chronology shows that most BS series lead on average the proposed

5 The authors wish thank to Flora Fullone (ISAE) for adapting the original procedure for monthly data provided by the Bank of Italy to quarterly data.

aggregate turning points, except for LEMP that is coincident. In addition to that, we observe that TTURN and TPRIC series present the maximum values of leading turning points (5 out of 7).

Tab. 4 BS Series and ISAE Chronology Turning Points Synchronization (1992 Q1 – 2006 Q1)

	Economic Cycle Chronology	LORD	LTURN	LEMP (a)	TORD	TTURN	TEMP	TPRIC	TECON (a)
min	*1993Q2*	1993Q2	1993Q1			1992Q4		1993Q3	
max	*1995Q4*	1995Q3	1995Q3			1995Q1	1995Q3	1995Q3	
min	*1996Q4*	1996Q3	1996Q2		1997Q4	1996Q3	1996Q3	1996Q2	
max	*2000Q4*				2000Q2	2000Q3		2001Q2	2000Q1
min	*2003Q3*				2002Q2			2003Q2	2002Q4
max	*2004Q3*	2004Q3	2004Q1	2004Q2	2003Q4			2004Q1	
min	*2005Q1*	2005Q1	2005Q2	2005Q2	2004Q3	2004Q4		2004Q3	
Average lead/lag		-0.6	-1.2	0	-1.6	-1.8	-1	-0.6	-3.5
N. of turning point		3 (-)	4 (-)	1 (-)	4 (-)	5 (-)	2 (-)	5 (-)	1 (-)
synchronised with the		0 (+)	1 (+)	1 (+)	1 (+)	0 (+)	0 (+)	1 (+)	1 (+)
proposed chronology (b)		2 (=)	0 (=)	0 (=)	0 (=)	0 (=)	0 (=)	1 (=)	0 (=)

(a) Data for LEMP and TECON are available only since the Q4 1998.

(b) + lagging; - leading; = coincident.

5 CROSS CORRELATION ANALYSIS AND FORECASTING PERFORMANCES

As a next step, in order to check for the degree of synchronization among the ISAE series and a selected indicator of the economic activity, we calculate the cross correlation function between the GDP annual rate of growth and the cyclical component of each of the BS Survey series. Actually, the proper reference series should be the Business Service Gross Value Added. However, the ISTAT National Accounts series refer to aggregate values on the NACE Rev.1 J and K sections, thus including sectors that are not embraced in the BS aggregate (see Martelli and Rocchetti, 2006). For that reason, a more general indicator of the economic activity, rather than a not-properly-defined industry aggregate, is selected as reference series.

Firstly, the correlation between each pair of the BS series is analyzed[6]. In fact, as already seen in Section 4 above, the ISAE series turning points seem to be moderately synchronised; thus the series are expected to be also correlated (that is, they share the same expansion and recession phases). Table 5 shows that all series but TORD and TPRIC are moderately synchronised. This provides fair evidence that the BS series present a common cyclical profile and, accordingly, they are likely to be sensitive to business cycle fluctuations. However, the degree of correlation is low (the maximum being 0.57) due, probably, to the shortness and high variability of the series.

With reference to the correlation between each ISAE series and the GDP annual rate of growth, Table 6 reports both the correlation at lag 0 – as a proxy of the degree of contemporaneous synchronization – and the maximum value of the function of cross-correlation at lag *k*, with the corresponding lag at which it occurs[7].

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6 We use the standard formula $\rho\ (x,y) = Cov(x,y) / StDev(x) \cdot StDev(y)$ where

$$Cov(x,y) = \sum_{t=1}^{T} \left[\left(x_t - \mu_x \right) \left(y_{t+k} - \mu_y \right) \right] / T$$

where μ_x and μ_y are the mean of x and y respectively.

7 For this purpose, we use the usual formula $\rho_k(x,y) = Cov_k(x,y) / StDev(x) \cdot StDev(y)$ where

$$Cov_k(x,y) = \sum_{t=1}^{T-k} \left[\left(x_t - \mu_x \right) \left(y_{t+k} - \mu_y \right) \right] / T$$

per $k = 0,1,2,...,24$ and $Cov_k(x,y) = \sum_{t=1}^{T+k} \left[\left(y_t - \mu_y \right) \left(x_{t-k} - \mu_x \right) \right] / T$ per $k = 0,-1,-2,...,-24$, where

μ_x and μ_y are the mean of x and y respectively.

Tab. 5 Correlation Analysis among the BS Series (1992 Q1 – 2006 Q1)

	LORD	LTURN	LEMP	TORD	TTURN	TEMP	TPRIC	TECON
LORD	1	0.57	0.38	-0.16	0.48	0.50	0.17	0.37
LTURN		1	0.57	-0.40	0.55	0.46	0.21	0.56
LEMP (a)			1	-0.20	0.38	0.40	-0.46	0.36
TORD				1	-0.37	-0.24	-0.23	-0.12
TTURN					1	0.31	0.40	0.54
TEMP						1	0.38	0.53
TPRIC							1	0.00
TECON (a)								1

(a) LEMP and TECON are available only since Q4 1998.

Tab. 6 Cross Correlation – Reference Series: GDP Annual Rate of Growth (1992 Q1 – 2006 Q1)

Business Service series	ρ (0)	ρ(k) max [lead (-)/lag(+)]
LORD	0.30	0.30 (-1)
LEMP (a)	0.22	0.34 (-2)
LTURN	0.44	0.46 (-1)
TORD	*-0.23 (b)*	*0.34 (-5) (b)*
TEMP	0.29	0.31 (-1)
TTURN	0.52	0.55 (+1)
TPRIC	0.27	0.49 (+2)
TECON (a)	0.36	0.42 (-1)

(a) LEMP and TECON are available only since Q4 1998.

(b) The autocorrelation coefficient for TORD is not significant at 5%.

In detail, the lag at which the maximum value of correlation between two series occurs might confirm whether the selected BS series could be considered a leading or lagging with respect to the reference one. The data reveals that the BS series show a modest degree of correlation with the GDP annual rate of growth, both at lag 0 and when considering the past and future observations. The highest degree of contemporaneous correlation is referred to TTURN (ρ=0.52); the lowest is registered for LEMP, probably due to the shortness of the series. Furthermore, TORD shows a negative, though low, correlation (ρ=-0.23) with the GDP annual rate of growth; however, the correlation coefficient for TORD is not significant at 5%.

Actually, the presence of cross correlations between series does not necessarily assure causation that is it does not guarantee that one of the economic variables can help forecasting the other. Hence, in order to verify the presence of causation, we apply the approach proposed by Granger (1969).

The Granger causality test consists of using the usual Wald test (based on the F-statistic) to verify whether lagged information on a variable y gives any statistically significant information about a variable x, as compared to the lagged values of x. In details, it consists of estimating the following equations:

$$y_t = \alpha_0 + \sum_{j=1}^{k} \alpha_j y_{t-j} + \sum_{j=1}^{k} \beta_j x_{t-j} + \varepsilon_t \quad (1)$$

$$x_t = \alpha_0 + \sum_{j=1}^{k} \alpha_j x_{t-j} + \sum_{j=1}^{k} \beta_j y_{t-j} + u_t \quad (2)$$

and testing the null hypothesis $\beta_1 = \beta_2 = ... = \beta_k = 0$ for each equation. If the F-test fails in equation (1) we reject the null hypothesis that x does not Granger – cause y; moreover, if the F-test fails in equation (2) the null hypothesis that y does not Granger – cause x is rejected. We choose $k = 4$, as usually done for quarterly data.

The results presented in Table 7 indicate that LTURN and TEMP both cause the GDP annual rate of growth; however they are also caused by the GDP. Furthermore, TPRIC is caused by the GDP annual rate of growth at a 10% confidence level. Moreover, the causality tests on (1) and (2), fail for both LORD and TECON (even is TECON could be considered as caused by the GDP annual rate of growth at 10% level). In addition, TORD causes the GDP annual rate of growth but only if 4 lags are considered; on the contrary, the hypothesis of causation fails for $k = 3$.

Tab. 7 Granger Causality Test – Reference Series: GDP Annual Rate of Growth (1992 Q1 – 2006 Q1)

Business Service series HP smoothed	Probability values (a)	
	Ho: GDP annual rate of growth DOES NOT Granger cause BS Series	Ho: BS Series DOES NOT Granger cause GDP annual rate of growth
LORD	0.46	0.16
LEMP (b)	0.10	0.64
LTURN	0.04	0.05
TORD	0.42	0.03
TEMP	0.03	0.04
TTURN	0.11	0.73
TPRIC	0.27	0.07
TECON (b)	0.08	0.21

(a) Given a confidence level α , probability values > α ---> accept Ho; probability values <= α ---> Granger causality.

(b) LEMP and TECON are available only since Q4 1998.

6 CONFIDENCE CLIMATE ANALYSIS

The above-presented analysis shows that the bulk of BS series is moderately correlated with the GDP annual rate of growth; also, they are able to signal – though with lead or lag - most of the proposed chronology turning points.

The computation of a synthetic indicator guarantees that signals arising from each specific series are summarised to provide an indication of the state of the economy (or of a sector). For this purpose, ISAE usually calculates the Confidence Climate (CLIMA) as the weighted average of LORD, TORD and, since the Q4 1998, of TECON as well.

However, the analysis shows that, amongst the variables included in the CLIMA calculation, TORD presents poor signalling features. Indeed, TORD shows a negative, low correlation with the GDP annual rate of growth (Table 6); furthermore, it doesn't help in forecasting the GDP (Table 7). Quite the reverse, the TTURN series anticipates the proposed chronology turning points (Table 4) and shows a higher degree of correlation with the reference series (Table 6). However, TTURN is not able to help in forecasting the GDP annual rate of growth, while more reliable forecasting properties characterize LTURN and TEMP (Table 7).

Following upon those concerns, the properties of the confidence indicator usually calculated by ISAE (CLIMA) are compared with the performances of

alternative confidence indicators, both in terms of turning point synchronization and in-sample forecasting properties.

The following indexes are computed:

- CLIMA 2 computed as (LTURN + TTURN +TECON)/3
- CLIMA 3 computed as (LORD + TTURN +TECON)/3
- CLIMA 4 computed as (LORD + TEMP +TECON)/3
- CLIMA 5 computed as (LTURN + TEMP +TECON)/3

With reference to the turning point synchronization, Table 8 indicates that the ISAE CLIMA presents 4 (out of 7) leading turning points compared to the proposed chronology. However, the fact that the ISAE CLIMA fails in correctly identifying the 1996 Q4 trough, lowers the leading properties of the series (the average lead/lag being -1.14).

Tab. 8 The Confidence Climate Series and ISAE Chronology
Turning Point Synchronization
(1992 Q1 – 2006 Q1)

	Economic Cycle Chronology	CLIMA	CLIMA 2	CLIMA 3	CLIMA 4	CLIMA 5
Confidence climate components		LORD, TORD, TECON (a)	LTURN, TTURN, TECON (a)	LORD, TTURN, TECON (a)	LORD, TEMP, TECON (a)	LTURN, TEMP, TECON (a)
min	*1993Q3*	1993Q3	1992Q4	1992Q4	1993Q2	1994Q1
max	*1995Q4*	1995Q3	1995Q3	1995Q3	1995Q3	1995Q3
min	*1996Q4*	1998Q1	1996Q3	1996Q3	1996Q3	1996Q3
max	*2000Q4*	2000Q1	2000Q1	1997Q3	1997Q3	2000Q1
min	*2003Q3*	2001Q4	2001Q4	2001Q4	2001Q4	2001Q4
max	*2004Q3*	2003Q4	2004Q1	2004Q3	2004Q2	2004Q1
min	*2005Q1*	2005Q2	2005Q2	2005Q2	2005Q2	2005Q2
Average lead/lag		-1.14	-2.29	-3.43	-3.29	-1.57
Average lead/lag dropping 2000 Q4 max and 2003 Q3 min		0.4	-1.2	-0.8	-0.6	-0.2
N. of turning point synchronised with the proposed chronology (b)		4 (-) 2 (+) 1 (=)	6 (-) 1 (+) 0 (=)	5 (-) 1 (+) 1 (=)	6 (-) 1 (+) 0 (=)	5 (-) 2 (+) 0 (=)

(a) TECON is available only since the Q4 1998.

(b) + lagging; - leading; = coincident.

The analysis indicates that replacing the assessment on order books (LORD) with those on turnover (LTURN), and substituting the forecast on turnover (TTURN), or those on employment (TEMP), for those on order books (TORD), leads to a further leading of the series with respect to the turning point of 1996 Q4 and 2000 Q4, thus making the series even more leading as compared to the proposed chronology.

However, both the 2000 Q4 and 2003 Q3 turning points could be only linked to sector-specific cyclical events; thus we further compute the average lead and lag by removing from the computation the 2000 Q4 peak and the 2003 Q3 trough. As a result, the average lead and lag shows that CLIMA 2 presents the strongest leading properties respect to the ISAE chronology.

Following those consideration, we apply the cross correlation analysis and Granger causality test on CLIMA and CLIMA 2 to verify whether the proposed composite indicators perform better than CLIMA in forecasting economic cyclical fluctuations. The results, presented in Table 9, show that replacing assessments and forecasts on order book with those on turnover considerably improves the degree of cross correlation both at lag 0 (from 0.38 to 0.56) and -1 (from 0.43 to 0.57).

Tab. 9 Cross Correlation – Reference Series: GDP Annual Rate of Growth (1992 Q1 – 2006 Q1)

	Confidence climate components	ρ (0)	ρ(k) max [lead (-)/lag(+)]
CLIMA	LORD, TORD, TECON (a)	0.38	0.43 (-1)
CLIMA 2	LTURN, TTURN, TECON (a)	0.56	0.57 (-1)

(a) TECON is available only since the Q4 1998.

With reference to the figures for the Granger causality test, Table 10 indicates that both CLIMA and CLIMA 2 help in forecasting the GDP annual rate of growth,

Tab. 10 Granger Causality test – Reference Series: GDP Annual Rate of Growth (1992 Q1 – 2006 Q1)

	Confidence climate components	Probability values (a)	
		Ho: GDP annual rate of growth DOES NOT Granger cause CLIMA	Ho: CLIMA DOES NOT Granger cause GDP annual rate of growth
CLIMA	LORD, TORD, TECON (b)	0.05	0.01
CLIMA 2	LTURN, TTURN, TECON (b)	0.03	0.03

(a) Probability > 0.05 ---> accept Ho; probability <= 0.05 ---> Granger causality.

(b) TECON is available only since the Q4 1998.

despite of their different components and, above all, the results presented above on each BS series (Table 6); however, they are also caused by the GDP annual rate of growth.

7 CONCLUDING REMARKS

To summarise the results presented in Sections 3-5, the analysis shows that the BS series are, in the main, in phase with the proposed economic cycle chronology. Furthermore, the bulk of the BS series share 5 out of 7 turning points with the economic cycle, with the exception of TEMP, which poorly performs as compared to our economy chronology (5 out of 7 turning points). Moreover, the average lead/lag of the BS series with respect to the ISAE cyclical chronology shows that, on average, most BS series lead the proposed aggregate turning points.

Furthermore, the analysis shows that the BS series are moderately correlated with the GDP annual rate of growth (i.e. they share recession and expansion phases with the GDP ones). On the top of it, they are able to signal – though with lead or lag - most of the reference turning points. However, amongst the variables included in the ISAE CLIMA calculation, TORD presents a poor signalling feature as compared to the GDP cyclical fluctuations; on the contrary the TTURN series anticipates the turning points of the proposed chronology and shows a higher degree of correlation with the GDP. On the other hand, TTURN cannot help forecasting the GDP annual rate of growth, while more reliable forecasting properties characterize LTURN and TEMP.

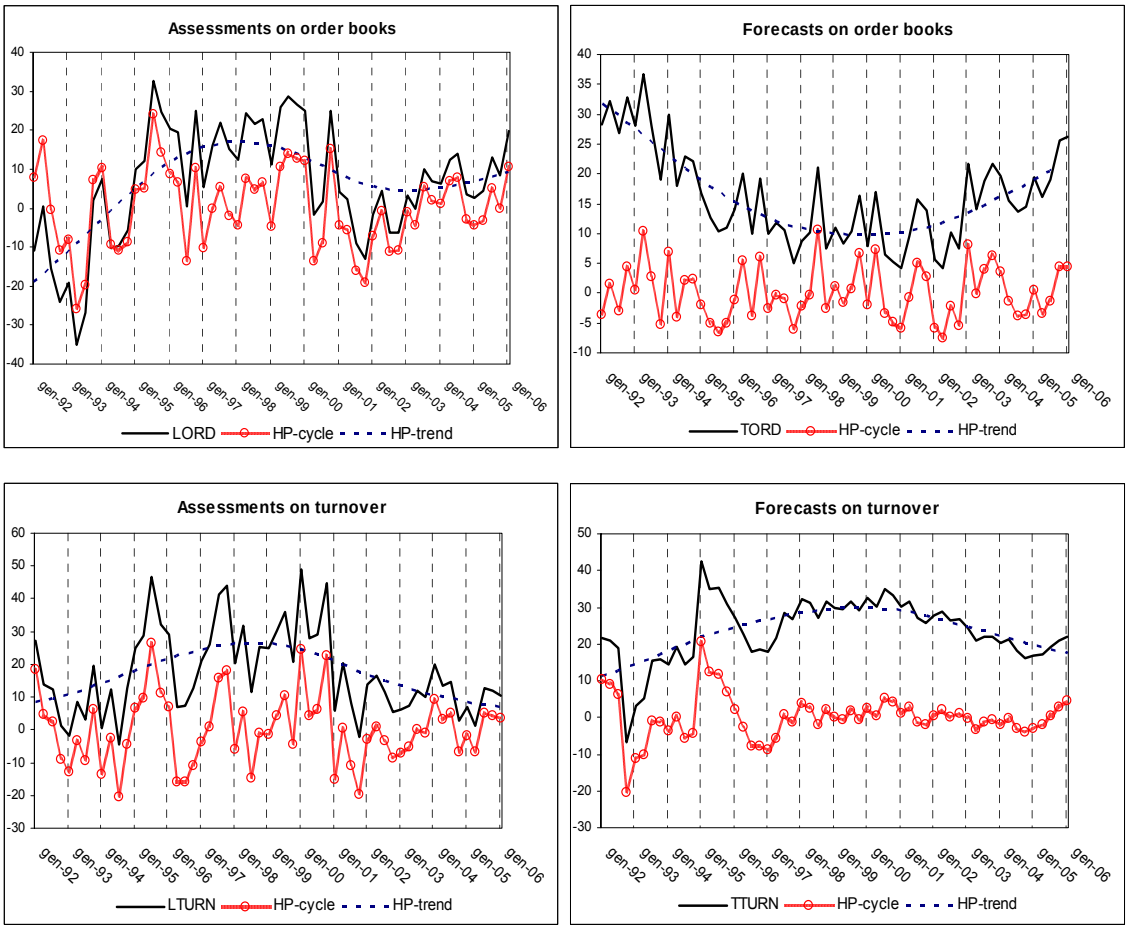
Hence, we calculate alternative Confidence Climate indexes by replacing LORD with LTURN and TORD with TTURN and TEMP. The comparison between those different index properties shows that, while the usually calculated ISAE CLIMA figures have in common 4 (out of 7) leading turning points with the proposed chronology (with an average distance of -1.14), the composite indicator obtained by replacing assessments and forecasts on order book with those on turnover (CLIMA 2) shows on average a better performance in predicting turning points. Also, CLIMA 2 has a higher degree of cross correlation with the GDP annual rate of growth both at lag 0 and -1.

Finally, our analysis indicates that the predictive capacity of the ISAE Business Services CLIMA could be improved replacing assessments and forecasts on order books with those on turnover. However, being the time series short and highly variable, our results are not conclusive. Actually, to support our preliminary findings,

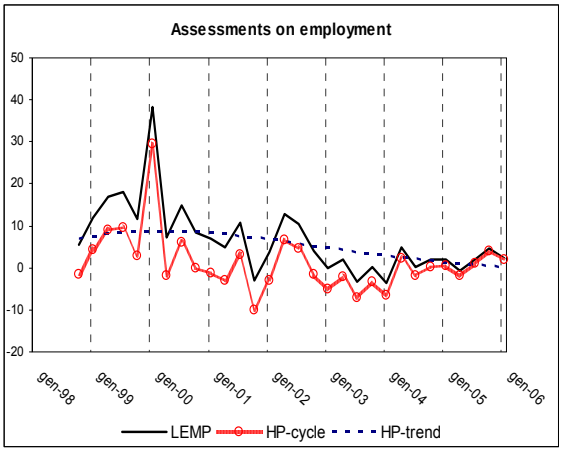
we should apply more sophisticated techniques to longer time series. For example, following Gayer and Genet (2006), we could apply factor analysis to select more efficiently the components to be included in the confidence index. Also, as suggested in Marcellino (2006), we could select variables prior to factor extraction on the basis of their correlation with the reference series.

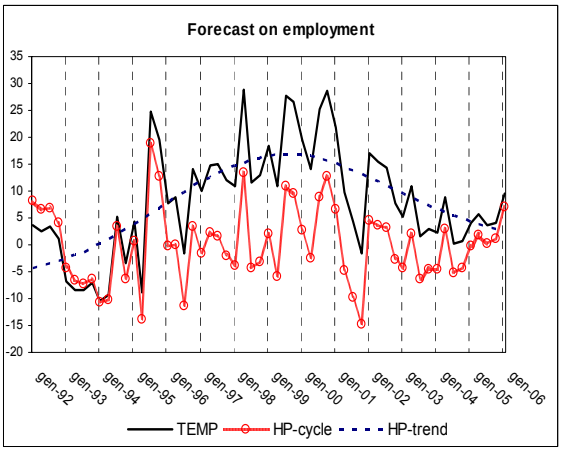
APPENDIX

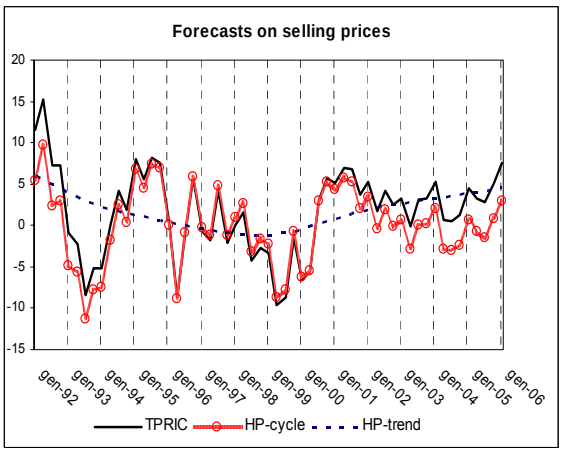
Graph A BS Confidence Climate and its components: cycle and trend estimated

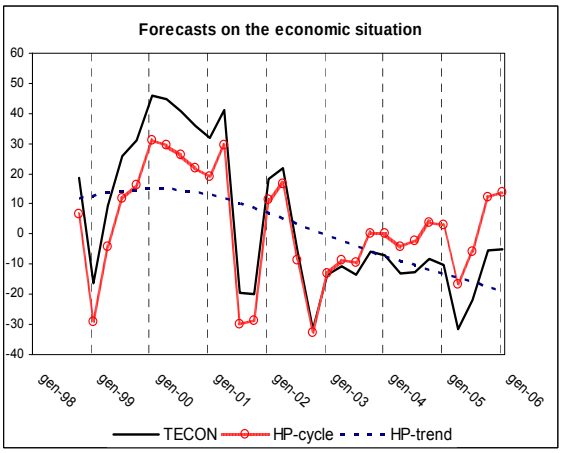


Graph B BS Confidence Climate and its components: cycle and trend estimated









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