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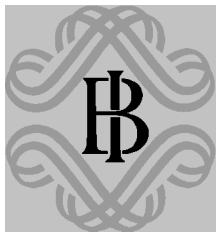

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WHAT IS THIS THING CALLED CONFIDENCE? A COMPARATIVE ANALYSIS OF CONSUMER CONFIDENCE INDICES IN EIGHT MAJOR COUNTRIES

by Roberto Golinelli* and Giuseppe Parigi**

Abstract

The paper examines the evolution of consumer confidence indices in Australia, Canada, France, Germany, Italy, Japan, the United Kingdom and the United States of America since the 1970s, by modelling them in a multivariate framework of common macroeconomic variables for each country. Results suggest that: (a) the main economic determinants of consumer confidence cannot be summarized only on the basis of some macroeconomic variables; (b) consumer confidence indices have some ability to forecast economic activity, provided that both their coincident nature is taken into account and that a number of data-coherent parameter restrictions are imposed. A number of analyses (both in-sample and out-of-sample) are devoted to assessing the robustness of previous findings.

JEL classification: C32, C51, C52, E32.
Keywords: consumer confidence determinants, GDP indicator, in-sample and out-of-sample forecasting ability.

Contents

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1. Introduction[1]

Ten years ago, in coincidence with the fortieth birthday of the Michigan index of consumer sentiment, Curtin wrote: "*Consumer sentiment is now the most closely watched and intensely debated indicator of future economic trends"* (Curtin, 1992, p. 22). On its fiftieth birthday this statement is still all the more valid and is the central topic of the debate on the usefulness of sentiment indices.

The sentiment index appeared on the economic scene almost by chance, as part of a survey devised by Katona to investigate the determinants of the financial decisions of households. However, its importance was immediately clear and grew over the years. Nowadays, these indices are very popular, being currently reported on the media and commented by economic analysts. This is essentially due to the fact that they are released very promptly and are the only source of information on the evolution of the economy for some time (a preliminary version of the Michigan consumer sentiment index is published during the reference month). In this context, the relationship between consumer sentiment and general economic activity (or output fluctuations) should be further explored so as to highlight the possible presence of coincident and/or leading links.

This article has two objectives. The first is to provide a comprehensive characterization of the consumer confidence-output relationship in eight countries – Australia, Canada, France, Germany, Italy, Japan, the UK and the USA – over a period of about thirty years, from the beginning of the 1970s to the first quarter of 2002. In doing so we review the literature on the role of consumer confidence in an attempt to resolve some of the disagreements.

A better understanding of the relationship requires a definition of consumer confidence in terms of economic determinants. Given the lack of a theory, an exhaustive answer to the question "what is this thing called confidence?" can be given only on empirical grounds. In this case, the potentially large number of variables that are supposed to influence both consumer confidence and output complicates the analysis. We try to avoid the limits and drawbacks of the single-

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equation approach used in most of the literature by modelling simultaneously output fluctuations, consumer confidence and other macroeconomic variables in the vector autoregression (VAR) framework. The empirical analysis is presented in Sections 2 and 3. The results of this analysis can be summarized as follows.

(1) The consumer confidence-output relationship presents significant differences across countries.

(2) Consumer confidence is related to a set of macroeconomic variables that changes over time.

These two findings support the view that consumer confidence is a more general concept that cannot be summarized only on the basis of some macroeconomic variables. Differences across countries and over time suggest that other factors (*e.g.* psychological) may be at work.

The second objective of this article is to provide new evidence on the forecasting power of consumer confidence. The literature is dominated by two sets of contradictory results: on one side, it has been suggested that consumer confidence has no forecasting power over that of other macroeconomic indicators; on the other side, consumer confidence has been shown to have good leading properties. In this last case some authors have shown that the role of the consumer confidence is greater when there are non-linearities of the business cycle, such as strong shocks and/or turning points.

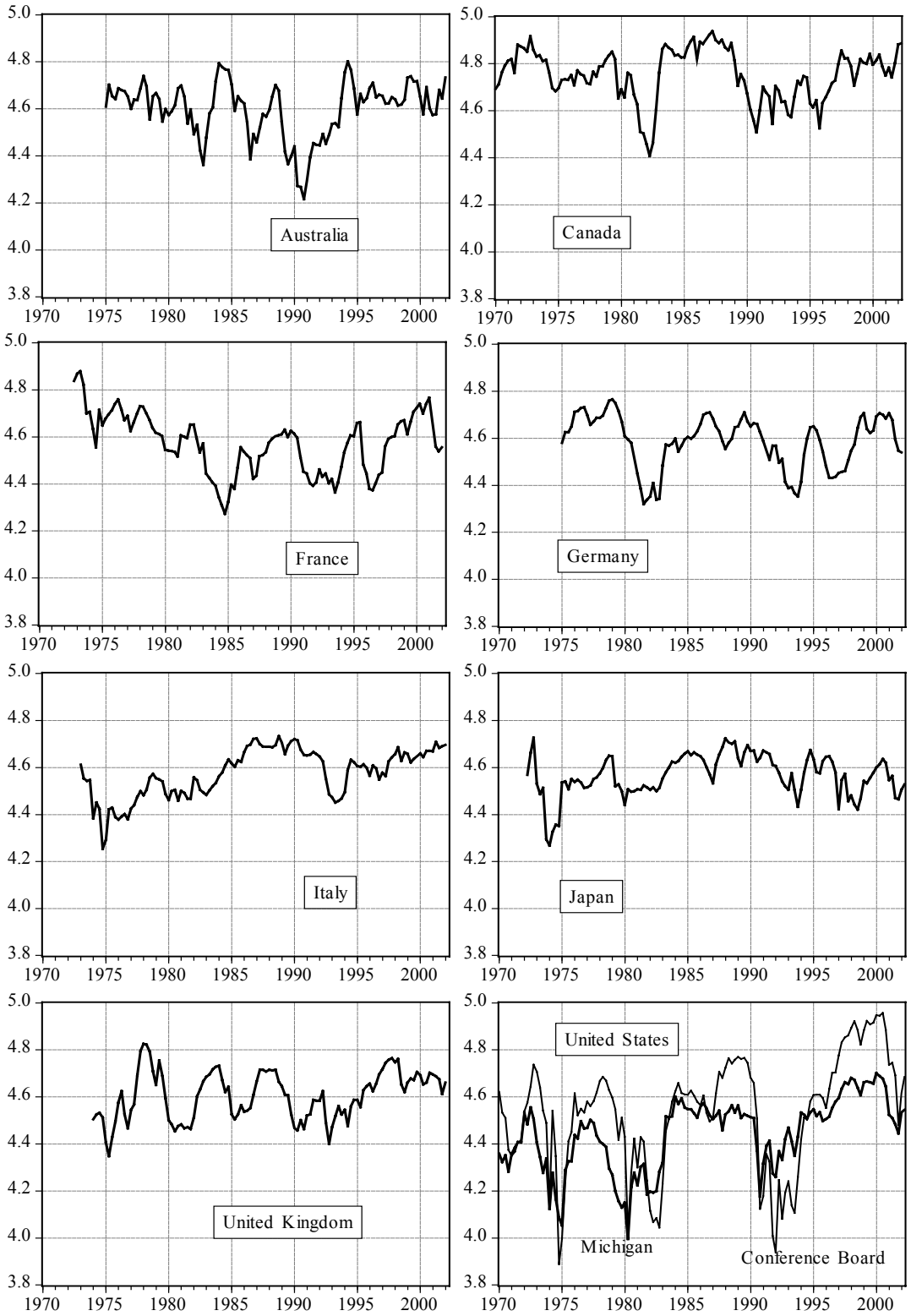
We tackle these issues in Section 4, where we show that consumer confidence has forecasting power over that of other macroeconomic variables. However, a crucial element, ignored in the literature, is its contemporaneous link with output fluctuations, particularly relevant for the USA. We also find mixed evidence for the role of confidence during exceptional periods of the cycle. Section 5 draws some conclusion.

2 The setting of the multivariate systems by country

Log-levels of the quarterly consumer sentiment or confidence index (CSI) of Australia, Canada, the four biggest European countries, Japan and the USA - in this case we use both the Michigan and the Conference Board indices - are plotted in Figure 1 for the period 1970.1-2002.1 (see the Appendix for data sources and definitions).

Fig. 1

CONSUMER SENTIMENT INDICES BY COUNTRY ([1])



([1]) Index (1995 = 100) log-levels.

From the analysis of the graphs in Figure 1 it emerges that the USA indices display the widest fluctuations, with a high degree of synchronization with the output cycle. For Australia, Canada, Germany, Japan and the UK the cyclical path is much smoother, while for France and Italy it presents only mild fluctuations.

All CSI series appear to be characterized by persistence and slow mean reversion, probably related to the evolution of potential explanatory variables (such as inflation, unemployment, and interest rates) and exacerbated by possible level shifts. We can safely dismiss the hypothesis that these features are a mechanical result of the methodologies used to calculate the indices, as they are fairly heterogeneous across countries. Although the Michigan survey has been the model for other surveys worldwide, each national institute has adapted the set of questions to national peculiarities, thus providing different measures of sentiment.

The mix of both statistical problems (near unit roots and possible shifts) and theoretical problems (absence of theory-based models) makes the task of measuring the relationships between consumer sentiment and economic activity particularly difficult. Indeed, the results in the literature are far from conclusive. Most of the analyses aimed at establishing whether CSIs had additional information content with respect to traditional macroeconomic variables - such as inflation, unemployment and output – often obtained contradictory results: in some cases it was shown that these indices could maintain an autonomous role in forecasting and as explanatory variables in the consumption function (see Mueller, 1963; Adams, 1964; Suits and Sparks, 1965; Fair, 1971a and 1971b; Adams and Klein, 1972); in others, that they could be seen as nothing more than a synthesis of macroeconomic indicators (see Friend and Adams, 1964; Adams and Green, 1965; Hymans, 1970; Juster and Wachtel, 1972a and 1972b; Shapiro, 1972; McNeil, 1974; Lovell, 1975).

The issue of the role of the CSI is still discussed, although the prevailing opinion now seems to be that it may help to predict the evolution of economic activity (see Garner, 1991; Fuhrer, 1993; Carrol *et al.*, 1994; Kumar *et al.*, 1995; Matsusaka and Sbordone, 1995; Eppright *et al*., 1998, Bram and Ludvigson, 1998; Delorme *et al*., 2001). In particular, it has been found that its forecasting power tends to be completely offset by other indicators during ordinary times, while it increases notably in the presence of unusual events (see Mishkin, 1978; Garner, 1991; Throop, 1992; Leeper, 1992; Fuhrer, 1993; Desroches and Gosselin, 2002). This confirms the original suggestion of Katona (1977) that the CSI is influenced by psychological factors which become particularly important in coincidence with special events, when people are more likely to

change their attitude. However, Howrey (2001) has shown that the Michigan CSI is characterised by extra forecasting power with respect to other indicators, not limited to exceptional periods (see also Garner, 2002). In any case, it should be stressed that even if the index were just a synthesis of traditional indicators, it could nevertheless maintain, given its timeliness, a great importance for short-term analysis.

The majority of the analyses on the role of the CSI in Europe seem to support the view that it has some autonomous forecasting power (see Van den Abeele, 1983; Praet and Vuchelen, 1984, 1988 and 1989; Praet, 1985; Strumpfel and Ziegler, 1988; Batchelor and Dua, 1992; Djerf and Takala, 1997, Nahuis, 2000). In particular, Acemoglu and Scott (1994), Belessiodis (1996), Berg and Bergstrom (1996), Parigi and Schlitzer (1997), Locarno and Parigi (1997) and Delorme *et al*. (2001) have shown that these indices may also be used to advantage in the specification and estimation of consumption functions. In other countries around the world the results are not clear-cut and tend to play down the importance of the CSI (see Santero and Westerlund, 1996, for a general overview of OECD countries; Coté and Johnson, 1998, for Canada, Fan and Wong, 1998, for Hong Kong; Roberts and Simon, 2001, for Australia; Utaka, 2003, for Japan).

Almost all the analyses above use a single-equation approach, with only partial (or without any) account for multivariate links between the CSI and macroeconomic variables. Insufficient attention is paid to the behaviour of the index in different periods and in different countries and no account is given of the effects of the idiosyncratic characteristics of consumers (*i.e.* income, wealth and education levels, see Souleles, 2001; the CSI may also be influenced by elusive factors such as the feeling of happiness, as explained by Graham in the discussion of Howrey's, paper, 2001: "People's answer to questions about their well-being seem to depend mainly on how they are faring economically relative to their neighbours, whether they themselves have had a bad day, or some noteworthy event in the news", p. 214).

Given the absence of theoretical guidance, we have chosen to model the CSI/output relationship in a VAR framework, by considering a common set of variables for all countries. This enables us to consider the effects of different definitions of the index, different cyclical patterns and some characteristics of households. In the latter case the behaviour (or the psychology) of the households of a country as a whole is assumed to present some specific features, probably related to particular events that occurred far in the past (like the hyperinflation in Germany) or in more recent times (as the sharp deterioration in public finances in Italy and Japan). The relationship between consumer sentiment and macroeconomic variables may also

reflect the characteristics of the economic environment, such as the degree of competition of the markets, the flexibility of the economy (especially the labour market), the nature of the welfare state, the strength of political and economic institutions (see Acemoglu et *al.,* 2002).

The list of the variables to be modelled has been defined mostly on the basis of other empirical analyses. More specifically, besides the CSI our information set includes the following variables: GDP growth, output gap, the ratio of the public sector borrowing requirement (PSBR) to GDP, the employment rate for the population aged between 15 and 64, foreign confidence indices, interest rates, stock price changes, and the rates of inflation and of unemployment. The sum of the last two, called the "discomfort index", was proposed by Okun (1962) and was originally related to the CSI by Lovell (1975) and Lovell and Tien (2000). In the empirical literature on happiness it is shown (see Clarck and Oswald, 1994, and Oswald, 1997) that the relative weight of the unemployment rate is much higher than is implicit in the discomfort index.

Table 1

COUNTRY-SPECIFIC VAR SETTINGS

	Included variables ([1])	Excluded variables ([1])	GNC ([2])	Period	Lags
Australia	CSI, DLY, DP, R, DSP	CU, N, U	0.084	1975.4-2001.4	2
Canada	CSI, DLY, DP, R, DSP, CSI*	U, EX	0.024	1970.1-2002.1	3
France	CSI, DLY, DP, R, U	CU, DSP	0.028	1973.3-2002.1	3
Germany	CSI, DLY, DP, CU, CSI**	R, DSP	0.028	1975.4-2002.1	3
Italy	CSI, DLY, DP, N	CU, R, DSP	0.344	1973.3-2002.1	3
Japan	CSI, DLY, DP, DSP, U	EX, R	0.026	1973.1-2002.1	3
UK	CSI, DLY, DP, DSP, U	CU, R	0.120	1974.3-2002.1	2
Michigan	CSI, DLY, DP, DSP, U	CU, R	0.027	1971.2-2002.1	4
Conference	CSI, DLY, DP, DSP, U	CU, R	0.045	1971.2-2002.1	4

([1]) Labels: CSI, consumer sentiment index; DLY, GDP quarterly growth; DP, annualized CPI inflation rate; R, nominal interest rate; DSP, quarterly change in stock prices; U, unemployment rate; CU, output gap; CSI*, US Michigan index; CSI**, average of the French and Italian CSIs; N, employment-population ratio; EX, exchange rate against the US dollar. Data sources and definitions are in the Appendix. ([2]) P-values of the degrees of freedom adjusted Toda-Yamamoto test.

We focus only on a subset of variables since most of them can be seen as different measures of basically the same phenomena. In a VAR context, the exclusion of some variables is

an inherently difficult task that we have accomplished on the basis of country peculiarities and of the empirical literature, and validated by the Toda and Yamamoto (1995) test for Granger non causality (GNC).

The second column of Table 1 lists the country-specific subsets of variables that are used in our empirical analysis. In order to reduce the risk that wrong marginalizations might affect our findings, the robustness of outcomes to alternative sets of variables has been checked in Section 3.

The sample periods, slightly different across countries, are fairly long and generally start in the first half of the 1970s. The VAR lag length (minus one, because all the series are at most first-order integrated) was selected on the basis of both the AIC criterion and residual diagnostics. The consumer sentiment index, GDP growth and the inflation rate appear in all eight VAR models, while the stock price change is not present only in the VAR of France, Germany and Italy, where fewer households invest in stocks and when they do it is a smaller share of their wealth. The unemployment rate is included in four out of eight countries: it does not enter in the models for Australia and Canada (where financial indicators seem to prevail), Italy (where the employment-population ratio is used as the labour market indicator), and Germany (where cyclical movements seem to be better captured by the output gap). Granger non-causality tests of the variables reported in the third column of Table 1 support our choices: p-values (in the fourth column) are sometimes 5 per cent but never 1per significant.

3. Within-country consumer confidence determinants

The identification of the economic determinants of consumer confidence comes from the hypothesis that slow CSIs mean reversions may be the outcome of persistent macroeconomic driving forces. Stationary relationships between the CSI and its "determinants" may be tested through cointegrated VAR techniques which are the main modelling approach, given the statistical properties of the data, at most first-order integrated (Table 2).

Because of the exclusion of some variables and of the conditioning of others, VAR models in Table 2 differ from unrestricted VARs in Table 1 in both number of lags and sample periods. In addition, as stock price changes appear to be major CSI determinants while CSI *levels* do not feedback to stock prices (but CSI *differences* do), we can impose weak exogeneity of stock price changes (similar results are obtained by Otoo, 1999, for the USA, and Jansen and Nahuis, 2003, for Europe). Rank tests and over-identifying restrictions are reported in Table 2.

Both the hypothesis of rank two and the parameter restrictions are data admissible and hence support two stationary relationships: one for GDP growth (the simple difference stationary model, except Okun's law in France, Germany and Japan), and the other for CSI levels, whose estimates are reported in Table 3.

Table 2

COINTEGRATED VAR ANALYSIS BY COUNTRY

	Sample period	Lag length	Variables in VAR	Exogenous series ([1])	Cointegration rank ([2])	Over-identification ([3])
Australia	76.1-01.4	3	4	DSP	2**	0.609 [3]
Canada	70.1-02.1	3	5	DSP	2*	0.09 [5] ([4])
France	73.3-02.1	3	5	-	2***	0.140 [4]
Germany	75.4-02.1	3	5	-	2*	0.35 [5]([4])
Italy	74.1-02.1	5	4	-	2**	0.674 [2]
Japan	73.2-02.1	4	4	DSP	2**	0.755 [2]
United Kingdom	74.4-02.1	3	4	DSP	2*	0.258 [3]
US Michigan ([5])	71.1-02.1	3	4	DSP	2**	0.104 [3]

([1]) DSP, quarterly change in stock prices. ([2]) First two statistics of the Johansen (1995) trace test (with the intercept restricted to lie in the cointegration space): *** both statistics are 1% significant; ** the first is 1% and the second is 5% significant; * the first is 1% and the second is 10% significant. ([3]) Over-identifying restriction p-values (number of restrictions in squared brackets) of the two relationships. ([4]) Two weak exogeneity restrictions for foreign CSIs are included. ([5]) US Conference index results are not reported because identical, apart from the p-value of the 3 over-identifying restrictions = 0.067.

The CSI is related to the real interest rate in Australia and in France; to the real interest rate and to the US Michigan sentiment in Canada, to the inflation rate and to the European CSI in Germany (US Michigan and European CSIs act respectively as proxies of foreign effects on Canadian and German households); to the discomfort index in Japan and in the United States; to the unemployment rate in the United Kingdom; to the employment-population ratio and to the inflation rate in Italy.

The robustness of previous findings has been checked over different sub-samples. In particular, three 10 year sub-samples have been considered for Australia, Canada, Japan, and the United States: the “troubled 1970s” (1971-1980), the Reagan era (1981-1992), and the Clinton

era (1993-2002). For the other four countries two sub-samples have been considered: the EMS period (1978-1991) and the last ten years. While for Canada, the UK and the USA we do not detect any significant change in the estimates, for Australia after 1993 the inflation coefficient shows a negative sign and the role of interest rates loses significance. In the case of continental Europe results appear to be fairly stable over the EMS period 1978-1991, while afterwards the economic discomfort index becomes the main CSI explanatory variable in France and Germany. In the same period, the real interest rate and the PSBR to GDP ratio become significant in Italy. In 1980-2002, the Japanese CSI is driven by the unemployment rate and the PSBR to GDP ratio.

Table 3

IDENTIFIED CSI LEVEL RELATIONSHIPS ([1])

	Country-specific explanatory variables ([2]):							
	DP	DLY	R	U	CU	CSI*/CSI**	N	intercept
Australia	2.587	0.0	-2.587	-	-	-	-	4.706
	(0.632)	(-)	(0.632)	-	-	-	-	(0.039)
Canada	12.98	0.0	-12.98	-	-	1	-	0.615
	(3.218)	(-)	(3.218)	-	-	(-)	-	(0.141)
France	3.052	0.0	-3.052	0.0	-	-	-	4.676
	(0.492)	(-)	(0.492)	(-)	-	-	-	(0.022)
Germany	-2.959	0.0	-	-	0.0	0.928	-	0.400
	(0.882)	(-)	-	-	(-)	(0.253)	-	(1.157)
Italy	-0.482	0.0	-	-	-	-	5.959	2.209
	(0.206)	(-)	-	-	-	-	(0.854)	(0.355)
Japan	-1.094	0.0	-	-1.094	-	-	-	4.656
	(0.193)	(-)	-	(0.193)	-	-	-	(0.015)
United Kingdom	0.0	0.0	-	-1.986	-	-	-	4.713
	(-)	(-)	-	(0.824)	-	-	-	(0.059)
US Michigan	-2.318	0.0	-	-2.318	-	-	-	4.756
	(0.531)	(-)	-	(0.531)	-	-	-	(0.063)
US Conference	-2.399	0.0	-	-2.399	-	-	-	4.730
	(0.966)	(-)	-	(0.966)	-	-	-	(0.114)

([1]) Standard errors in brackets. ([2]) Labels are in note 1 of Table 1; - means "not included in the corresponding country-VAR".

These changes suggest that the set of CSI determinants may vary over time according to some possibly country-specific events, though in small samples the results are less clear-cut: less information can allow for different explanations of CSI levels. In any case, the recursive

analysis, with an initial sample of about 6 years, confirms parameter stability findings, and rarely 1 per cent rejects the over-identifying restrictions for all countries.

An important issue concerns the validity of the specification search conducted for each country. To this end we test whether the specification of a country may be accepted by the data of other countries: in this case the country-specific CSI determinants reported above cannot be considered unique (and the corresponding specification is not robust). Since there are seven alternative specifications (the Japanese and American CSI determinants are the same) and eight country-databases, the analysis generates 56 outcomes. In each case we ask the following four questions: (1) Is the number of stationary relationships at least equal to 2? (2) Are the identification restrictions not rejected? (3) Are the CSI determinants significant, and are their signs in line with *a priori* assumptions? (4) Are the short-run CSI dynamics influenced by the estimated CSI-level relationship? The outcomes of this exercise suggest the uniqueness of the relationships reported in Table 3, since at least one answer in four supports the idea that each country-dataset cannot be explained by any of the other six models. More importantly, they do not support the hypothesis that there is a single model valid for all countries. The evolution of the CSI seems to rest on a country-specific and probably (as in the case of Italy and Japan) time-specific set of few determinants. Cyclical and structural factors are at work, reflecting both the historical evolution of the single countries (see, for instance, the relevance of the inflation and unemployment rates for Germany and the UK, respectively) and the particular economic environment (the short-run effects of stock market prices in the English-speaking countries and Japan). Finally, note that these findings are coherent with the different nature of the CSI surveys in each country (details are in the Appendix).

4. The ability of consumer confidence to predict GDP

Though there is no consensus view in the literature, one set of results supports the idea that the CSI is a leading indicator of the evolution of economic activity. Our contribution to this debate is based on both in-sample and out-of-sample analyses.

In-sample analysis tests for the significance of the *direct* and the *indirect* effects of the CSI on GDP growth. Direct effects can in turn be separated into *lagged* and *simultaneous* effects: if lagged effects are significant, the CSI is a leading GDP indicator; if simultaneous effects are significant, the CSI is a coincident GDP indicator. The latter result has some interesting empirical implications: if the CSI simultaneously causes GDP, early GDP estimates

may exploit the timeliness of CSI data releases. On the other hand, CSI indirect effects on GDP pass-through the influence of CSI shocks on non-CSI regressors in the GDP equation.

In all the previous analyses simultaneity among variables was confined to the variance-covariance matrix of the residuals. In principle, it is possible that assessing CSI simultaneous direct effects on GDP growth may alter the characteristics of the CSI-GDP relationship.

Simultaneity issues may be dealt with using conditional VAR models, where short-run dynamics are identified. In our case, the results concerning the significance of the CSI in explaining the simultaneous GDP growth come from the following short-run identification assumptions: (a) in the short run, the weakly exogenous variables have a simultaneous effect on the CSI (*i.e.* consumer sentiment immediately reacts to news about inflation, interest rates, or stock prices); (b) the exogenous variables have no simultaneous effect on GDP (*i.e.* output dynamics are smoothed by the macroeconomic transmission mechanism of shocks); (c) consumer sentiment embodies simultaneous information on GDP changes.

Table 4

CSI IN-SAMPLE PREDICTIVE POWER OF GDP IN CONDITIONAL VAR MODELS

	Over-identifying restrictions ([1])	Conditioning variables ([2])	Residual correlation ([3])	Short-run restrictions ([4])	Coincident indicator ([5])	Leading indicator ([6])
Australia	0.733 [7]	DSP, R	0.2095	0.448 [5]	0.818	0.048
Canada	0.098 [9]	DSP, CSI*	0.1658	0.608 [9]	0.175	0.032
France	0.384 [7]	-	0.0708	0.971 [6]	0.877	0.064
Germany	0.458 [7]	CSI**, DP	0.3264	0.873 [8]	0.037	0.005
Italy	0.88 [13]	-	0.0899	0.88 [15]	0.895	0.005
Japan	0.755 [2]	DSP	0.0255	0.365 [3]	0.363	0.000
United Kingdom	0.408 [5]	DSP, DP	0.2479	0.218 [6]	0.001	0.001
US Michigan	0.347 [8]	DSP, DP	0.4196	0.174 [7]	0.007	0.103
US Conference	0.089 [8]	DSP, DP	0.4807	0.106 [7]	0.000	0.006

([1]) P-values of the restrictions on the parameters of both level relationships and loadings (number of restrictions in squared brackets). ([2]) See the labels in Table 1. ([3]) Correlation between the residuals of CSI and GDP equations in the conditional VAR. ([4]) Short-run over-identifying parameter restriction p-values (number of restrictions in squared brackets). ([5]) P-value of the null that the simultaneous CSI parameter in the GDP equation is zero. ([6]) P-value of the null that all lagged CSI parameters in the GDP equation are jointly zero.

Given the VAR results in the previous Section, further weak exogeneity restrictions seem to be reasonable for the interest rate in Australia, the inflation rate in Germany, in the United Kingdom and in the US. The estimates of the new conditional VAR models (see Table 4; the

conditioning variables of each model are listed in the third column) do not show major differences with respect to those of the previous Section, residuals are well behaved, and the p-values of the over-identifying restriction tests in the second column of Table 4 are larger than (or equal to) those in the last column of Table 2. In some cases, the high and positive correlation between the GDP and CSI equation residuals (fourth column) supports hypothesis (c) above. Even though assumptions (a)-(c) are not the only way to identify the short-run propagation mechanism of the shocks, the corresponding over-identifying restrictions are testable for data-admissibility and are never rejected (fifth column).

From the results in the sixth column of Table 4, it can be argued that the CSI is a coincident indicator (its short-run information significantly explains simultaneous GDP changes) in Germany, in the UK and in the US. The outcome of the significance tests in the last two columns of Table 4 suggests that the CSI can also be seen as a predictor of GDP evolution. The importance of a proper treatment of simultaneity effects is particularly evident in the case of the US: in the models of the previous Section, no significant lagged effect of the CSI for both the Michigan and the Conference Board indices could be found.

The significance tests conducted so far are in-sample tests of the ability of the CSI to forecast GDP, based on the comparison of the predictive content of two nested models subject to estimation uncertainty (the restricted model acts as the benchmark). Inoue and Kilian (2002) argue that such in-sample tests of predictability have more power than out-of-sample tests in some practical cases.

Insignificant parameters of models in Table 4 are restricted to zero and the resulting models are henceforth labelled structural. The analysis with structural models of GDP responses to a 1 per cent CSI impulse is, at the same time, an in-sample test of GDP predictability and an estimate of both direct and indirect effects of the CSI on GDP. The results in Table 5 show that in all countries the CSI has a significant (based on Monte Carlo standard errors) effect on GDP with some qualifications: (i) for Australia, Canada, France, Italy and Japan GDP responses are significantly different from zero only after one-two periods; (ii) in the remaining countries the simultaneous effect is clearly evident (more for the UK and Germany, less for the USA).

Results of Tables 4 and 5 could be essentially due to the intrinsic non-linear nature of the link between consumer attitudes and economic activity (Katona, 1977): while in ordinary times the importance of the CSI can be hidden by other variables, it may become significant in exceptional periods (characterized by shocks potentially capable of altering consumer

behaviour). Throop (1992) shows that a small structural model for the USA, where the CSI is well explained in normal times by inflation, unemployment and short-term interest rates, breaks down at exceptional points, such as the Gulf War (similar results are found by Ivanova and Lahiri, 2001, but not by Howrey, 2001).

In order to account for this kind of non-linearity, we checked whether our results might depend on the occurrence of particularly strong shocks in the sample. More specifically we considered six "exceptional" periods, both one at a time and all together (to circumvent the problem of the very short average length of these periods): (1) the first oil shock (from 1973.3 to 1974.2); (2) the second oil shock (from 1979.1 to 1979.3); (3) the stock market crash of October 1987 (from 1987.4 to 1988.1); (4) the Gulf war (from 1990.3 to 1991.1); (5) the EMS crisis (from 1992.3 to 1993.2); (6) the September 11 terrorist attack (from 2001.3 to 2002.1). Since previous findings remain unchanged when these periods are excluded from the estimation sample by using impulse dummy variables, we can tentatively say that the importance of the role

Table 5

STRUCTURAL MODELS' ACCUMULATED GDP RESPONSES OVER T+h TO A 1% CSI IMPULSE IN T ([1]) ([2])

h (quarters) =	0	1	2	3	4	8	12
Australia	0.00	0.02	0.03	0.05	0.06	0.09	0.10
	(-)	(0.01)	(0.01)	(0.02)	(0.02)	(0.04)	(0.05)
Canada	0.00	0.03	0.08	0.07	0.06	0.04	0.02
	(-)	(0.01)	(0.02)	(0.02)	(0.02)	(0.04)	(0.05)
France	0.00	0.00	0.02	0.02	0.03	0.02	0.02
	(-)	(-)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Germany	0.12	0.17	0.22	0.25	0.28	0.38	0.45
	(0.03)	(0.04)	(0.05)	(0.07)	(0.08)	(0.14)	(0.20)
Italy	0.00	0.08	0.09	0.09	0.12	0.14	0.17
	(-)	(0.02)	(0.03)	(0.03)	(0.04)	(0.06)	(0.08)
Japan	0.00	0.10	0.12	0.15	0.18	0.20	0.20
	-	(0.02)	(0.02)	(0.03)	(0.03)	(0.06)	0.07
United Kingdom	0.14	0.14	0.18	0.25	0.27	0.36	0.42
	(0.03)	(0.04)	(0.04)	(0.05)	(0.06)	(0.10)	(0.14)
US Michigan	0.05	0.07	0.09	0.09	0.09	0.08	0.07
	(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)
US Conference	0.06	0.07	0.08	0.08	0.08	0.07	0.05
	(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.05)

([1]) % Differences between GDP levels. ([2]) Standard errors in parentheses (from Monte Carlo experiments with 10,000 replications).

of the CSI cannot be attributed to the effects of exceptional periods only, in line with the findings of Howrey (2001) and Garner (2002).

It is widely known (*e.g.* see Granger, 1990, pp. 3-4) that significant in-sample evidence of predictability does not guarantee significant out-of-sample predictability. The danger with in-sample tests is to detect spurious GDP predictability (*i.e.* through overfitting) due to the application of particular specification search procedures.

Hence, an alternative way to test for the importance of CSIs in predicting GDP is through an out-of-sample forecasting exercise at different horizons (1, 2 and 4 steps ahead). Table 6 reports the results of GDP forecasts obtained with both structural models (*with* a CSI), and unrestricted VAR (UVAR) models *without* a CSI. The forecasting performance is evaluated by the comparison of their root mean square error (RMSE) recursively computed from an initial window of 60 quarters. The exogenous variables in the structural models are forecast by simple AR(4) models in differences (nothing substantially changes if either AR(5) on levels or random walk models are used; on this point see, among the others, Baffigi *et al.*, 2003).

Overall, the results show that the forecasting power of the CSI extends at most to 2 steps: the 4-steps-ahead forecast RMSEs (as well as that for 3-steps-ahead, not reported) of structural models are generally higher than those obtained with UVAR models without the CSI. We will therefore concentrate on the results for 1- and 2-steps-ahead forecasts. The reduction of the RMSE when the CSI is used is substantial (see the columns 5 and 6) and significant in all countries, with the exception of Japan and the US where, although the results are quantitatively comparable to those of other countries, they are not significant. The outcome of the in-sample analysis seems therefore to be broadly confirmed.

Some interesting findings concern the effect of the CSI during the "exceptional" (shock) periods: the results in columns 8 and 9 seem to support Katona's hypothesis for France, Japan and the USA. The forecasting power of the French CSI (as shown in column 6) is entirely due to its importance in shock periods: the reduction of the RMSE is greater than 20 per cent and 5 per cent significant.

Table 6

RMSE OF GDP OUT-OF-SAMPLE FORECASTS FROM ALTERNATIVE MODELS ([1])

	Structural model RMSE ([2])			Ratio ([3]) of structural on UVAR without CSI ([4])			Ratio of structural on UVAR without CSI models: shock periods ([5])	
	1-step	2-steps	4-steps	1-step	2-steps	4-steps	1-step ([6])	2-steps
Australia	0.64	0.93	1.47	0.79*	0.76*	0.84	0.97	1.12
Canada	0.63	1.02	1.85	0.91	0.82*	1.27	0.76	0.77
France	0.45	0.73	1.42	1.02	0.90**	1.66	1.02	0.78**
Germany	0.80	1.29	2.20	0.80**	0.87	1.09	0.79 (0.88)	0.82
Italy	0.59	0.96	1.95	0.92*	0.96	1.03	0.96	0.75
Japan	1.01	1.28	1.52	0.92	1.01	1.15	0.51**	0.92
United Kingdom	0.47	0.76	1.33	0.80**	0.82*	1.45	0.85 (1.00)	1.15
US Michigan	0.60	0.92	1.46	0.86	0.86	0.92	0.56* (0.48*)	0.62
US Conference	0.63	0.97	1.68	0.91	0.90	1.07	0.66 (0.49*)	0.60

([1]) Forecast horizons: 1990.1-2002.1 for Australia and Germany; 1984.1-2002.1 for Canada; 1988.1-2002.1 for France; 1989.1-2002.1 for Italy and the UK; 1987.3-2002.1 for Japan; 1985.3-2002.1 for the USA. ([2]) Conditional VAR models with over-identification restrictions also used in impulse-response exercises of Table 5. ([3]) *, ** Mean that the ratio is 10 % and 5 % significantly lower than 1 according to the Harvey *et al.* (1997) testing procedure. ([4]) The list of the variables in each UVAR model is that of the second column of Table 1, except the CSI; UVAR lag length (on the basis of the AIC criterion.): 4 for Australia, 2 for Canada, France, and the UK, 3 for Germany and the USA, 4 for Japan, and 5 for Italy. ([5]) The shock periods are: 1987.4-1988.1 (the stock market crash of October 1987) for Canada, Japan and the USA only; 1990.3-1991.1 (the Gulf war); 1992.3-1993.2 (the EMS crisis) for the European countries only; 2001.3-2002.1 (September 11 attack). ([6]) In parentheses the results when the CSI is assumed to be known over the forecasting period.

For the USA, the reduction is quantitatively large (and significant) especially for the Michigan index. This is more so for the 1-step-ahead exercise when the CSI is assumed to be known over the forecasting horizon: the RMSE for both the Conference and the Michigan index is halved. This is a further indication of the coincident nature of the US index. In other cases, the very small number of forecast periods may affect the results; for example, the reduction of the RMSE in Canada is very substantial, but not significant.

In a forecasting context, Clements and Hendry (2002, p. 321) suggest that, in practice, a forecaster has three main modelling alternatives: (a) using a general unrestricted model; (b) imposing *a priori* restrictions; (c) following a sequential testing procedure. In our case, the UVAR model without the CSI is a model with *a priori* restrictions, while the structural model is a model obtained from the general-to-specific strategy. In order to complete the picture drawn by Clements' and Hendry's paper, we can also define the UVAR model with the CSI as the general unrestricted model. The results from the comparison of the RMSEs of structural and general

models (both including the CSI) are qualitatively similar to those above, and the lower RMSEs of structural models can be interpreted as an indication of the importance of reducing the huge number of parameters of the UVAR model.

The outcome of both in-sample and out-of-sample analysis confirms the predicting power of the CSI, as a leading and as a coincident GDP indicator depending on the country: in Australia, Canada and Europe the index seems to be characterized by leading properties of one-two quarters, while for Japan and the USA the indices appear to be particularly useful (and coincident for the US case) in shock periods.

5. Concluding remarks

Despite the large number of papers in the literature, the question: "What is this thing called confidence?" still awaits a proper answer. In this paper we tackle this issue in a systematic way by considering a long period of time (from the beginning of the 1970s to the beginning of 2002) and eight countries with fairly different cyclical patterns and economic environments.

Our results, based on the estimation of simultaneous models, do not suggest that a single set of variables determines the CSI across countries: "classical" variables, such as the rates of inflation and unemployment, are relevant for some countries but not for others. The set of CSI determinants may also change over time. Consider the results for Italy: until the end of the 1980s the evolution of the CSI was driven by inflation and labour market variables. In the last part of the sample the deteriorating state of public finances (the debt to GDP ratio rose over 100 per cent at the beginning of the 1990s) became one of the determinants of the CSI at the expense of the inflation rate (which in the meantime had slowed down to below 10 per cent). A similar description applies to the Japanese case, where the change of the ratio of public debt to GDP becomes significant over the 1980s (again at the expense of the inflation rate). This could imply that the situation of public finances may have an increasing influence of on households' confidence in those countries (such as France and Germany) where there is an intense political debate on the reform of the welfare state.

Our best answer to the question: "What is this thing called confidence?" is therefore: "It depends". It depends on the history of the country, on the characteristics of its economic system, on the period of time. However, the evolutionary nature of confidence does not preclude that differences across countries disappear as economies tend to become more similar: the results for

France and Germany in the 1990s do in fact suggest that convergence may matter also for concepts like consumer confidence.

The next step of our analysis concerned the role of the CSI in explaining and predicting the evolution of economic activity evolution. Had we found a satisfactory and comprehensive explanation of consumer confidence, its utility would be confined only to the actual assessment of the cycle. In this case, output fluctuations could be forecast on the basis of the CSI determinants. Our results, however, suggest that consumer confidence is a concept that cannot easily be approximated by a (linear) combination of macroeconomic variables.

By exploiting different statistical techniques (in-sample Granger non-causality tests and impulse-response analyses, and out-of-sample forecasting ability) we have highlighted some properties of the CSI with some original findings: a) CSIs have a significant and quantitatively relevant effect on the evolution of GDP; b) CSIs lead GDP independently from other macroeconomic variables; c) in some countries the leading property of the CSIs emerges only after taking into account their simultaneous link with GDP. This helps to explain the often contradictory results found in the literature: for the US, ignoring the simultaneity effect might lead to the mistaken conclusion that the CSI has no forecasting power (especially if the Michigan index is used).

The findings of our paper seem to confirm the view of Katona that confidence indices are influenced by economic as well as other factors. This justifies the use of the CSI in the construction of reliable indicators (coincident as well as leading) of the business cycle. The analysis of the main shocks of the last fifteen years has shown that consumer confidence has maintained a fairly stable relationship with output, except in France and the USA where the role of the index becomes more important. Given these results, further and careful attention should be paid to the modelling of non-linearities. Another important issue for further research is the economic interpretation of the link between CSIs and economic activity: some analyses of consumption have suggested that CSIs may capture the effects of uncertainty, herd behaviour and/or psychological factors. These findings appear still to be very tentative and further research is needed to shed more light on the nature of the CSI.

Appendix: Data sources and definitions

Label	Definition	Source
CSI	Consumer sentiment (confidence) index	see below
DLY	GDP quarterly growth	$\log(GDP/GDP_{-1})$
GDP	Gross Domestic Product at constant prices	National Accounts (quarterly); national statistical offices.
DP	Annualized quarterly inflation rate	$4*\log(P/P_{-1})$
P	Consumer price index	OECD, Main Economic Indicators
R	Short-term interest rate	OECD, Main Economic Indicators
DSP	Quarterly change in stock prices	$\log(SP/SP_{-1})$
SP	Stock price index	OECD, Main Economic Indicators
EX	Exchange rate against the US dollar	OECD, Main Economic Indicators
CU	Rate of capacity utilization	OECD, Main Economic Indicators
N	Employment-population ratio	OECD, Main Economic Indicators
U	Unemployment rate	OECD, Main Economic Indicators

Detailed sources of consumer sentiment

Australia. The Westpac-Melbourne Index of Consumer Sentiment is obtained from a monthly telephone survey of 1200-1400 households (the survey began in 1973 and was quarterly until 1976; since then it was conducted every 6 weeks until 1986 and monthly afterwards). The index is calculated by adding 100 to the arithmetic average of the net balances of positive minus negative responses to five questions on: (1) personal financial conditions over the past year; (2) anticipated personal financial conditions over the coming year; (3) anticipated economic conditions over the coming year; (4) anticipated economic conditions over the next five years; (5) whether now is a good or bad time to buy major household items. The final version of the (seasonally adjusted) index is obtained as a ratio to the base-period level.

Canada. For Canada we use the Index of Consumer Attitudes computed from the Conference Board's survey of a random sample of Canadian households. The survey began in 1960 on a quarterly basis (monthly starting in 2001). The index is computed as the arithmetic average of the (seasonally adjusted) net balances of positive minus negative responses to four questions on: 1) the financial condition of the household in the past six months; 2) the financial condition of the household in the next six months; 3) the short-term (next six months) employment outlook; 4) the convenience of making an outlay for items such as home, car or other major item. The final version of the index is obtained as a ratio to the 1991 level.

France, Germany, Italy and the UK. In all countries monthly telephone surveys (along the lines suggested in European Commission, 1997) of about 2000 households are conducted by INSEE, GFK, ISAE and GFK for France, Germany, Italy and the UK, respectively. In all countries the surveys began in the early 1970s and were conducted three times a year until 1980 for the UK, 1981 for Germany, 1982 for Italy and 1985 for France; the missing summer quarter was obtained as the average of the second and the fourth quarter. For Italy a monthly series from 1973 to 1981 was calculated by Locarno and Parigi (1997).

For France, Germany and the UK we have used the European Commission version of the index, which is computed as the arithmetic average of the (seasonally adjusted) net balances of positive minus negative responses to four questions on: (1) anticipated personal financial conditions over the coming year; (2) anticipated economic conditions over the coming year; (3) anticipated job availability conditions; (4) whether now is a good or bad time to save. The index we use is the ratio to its 1995 level.

For Italy we have used the national version of the index which is based on 9 questions, the previous 4 plus 5 new ones on: (5) personal financial conditions over the past year; (6) economic conditions over the past year; (7) personal opinion regarding the household's budget; (8) personal saving possibilities over the coming year; (9) whether now is a good or bad time to buy major household items. 100 is added to the arithmetic average of the balances and the (non-seasonally adjusted) index is computed by ISAE as a ratio to the 1980 level.

Japan. The consumer sentiment index has been computed by the Department of Business and Statistics of the Economic and Social Research Institute (ESRI) cabinet office since the beginning of the 1970s. The ESRI conducts a quarterly survey of a stratified random sample of 5040 Japanese households (excluding single-person and foreign households) through mail

questionnaires. The households are asked to evaluate what they consider to be the prospects over the next six months for: overall livelihood; income growth; prices; employment; willingness to buy durable goods. A weighted average of answers to each question (improve, +1, improve slightly, +.75; no change, +0.5; worsen slightly, +.25; worsen, 0) is used to compile each index (50 is neutral) and the overall consumer sentiment is obtained as the simple average of the five components and then seasonally adjusted.

United States of America. The University of Michigan's Consumer Sentiment Index is computed from the replies to the questions of a monthly telephone survey of at least 500 households conducted by the Survey Research Centre at the University of Michigan. The index is calculated by adding 100 to the arithmetic average of the net balances of positive minus negative responses to five questions on: (1) personal financial conditions over the past year; (2) anticipated personal financial conditions over the coming year; (3) anticipated economic conditions over the coming year; (4) anticipated economic conditions over the next five years; (5) whether now is a good or bad time to buy major household items. The final version of the (non-seasonally adjusted) index is obtained as a ratio to the base-period level.

The Conference Board Consumer Confidence Index is obtained from a monthly survey, which the Conference Board mails to 5000 households, receiving about 3,500 responses. The index is calculated by adding 100 to the ratio of positive responses to the sum of positive and negative responses to five questions on: (1) present general business conditions in the area; (2) present job availability conditions in the area; (3) anticipated business conditions in the area over the coming six months; (4) anticipated job conditions over the coming six months; (5) anticipated personal financial conditions over the coming six months. The final version of the (seasonally adjusted) index is obtained as a ratio to the base-period level.

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