

SPECIAL ARTICLES*

An Analysis of the Potential of the European Commission Business and Consumer Surveys for Macroeconomic Forecasting

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An Empirical Analysis of Development Cycles in the Dublin Office Market 1976-2007

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AN ANALYSIS OF THE POTENTIAL OF THE EUROPEAN COMMISSION BUSINESS AND CONSUMER SURVEYS FOR MACROECONOMIC FORECASTING

Jean Goggin

Abstract

It is widely believed that survey-based confidence indicators provide a reasonably accurate picture of economic conditions. This paper examines whether data from the business and consumer surveys conducted for the European Commission might be useful for short-term macroeconomic forecasting. First, the internal consistency of the survey data is tested, to ascertain the extent to which reported outcomes from one month correspond to expectations data from previous months. The forecasting potential is then explored by comparing the survey data to their official data equivalents. The results from this analysis are mixed and suggest that the potential of the business survey data is limited. From these surveys only four variables produced findings that merit further investigation. The results from the consumer survey were more positive, and suggest that a number of statistical relationships exist between the survey series and the official data.

1. Introduction

Until April 2008, a number of regular surveys of households and enterprises were conducted for the European Commission, using methods that were coordinated across the EU so that comparable data was collected. The data were used by the Commission to generate indicators for Irish economic activity and as an input into indicators for the EU and Euro Area. Five surveys were conducted on a monthly basis: Consumer, Construction, Industry, Retail, and Services. The data from these surveys provided information on the conditions in each sector of the economy, and also on expectations about future performances. The results of the survey for a given month were usually available by the final week of the month following, and this timeliness ensures that surveys of this nature have a valuable information lead advantage over other sources of data, which typically have much lengthier publication lags. As such, their most obvious use is an input for macroeconomic forecasting. In spite of this, however, little use has been made of survey data for the purpose of forecasting, and there has not been extensive analysis of their potential predictive power.

The purpose of this paper is to provide a preliminary assessment of the potential usefulness of this type of survey for macroeconomic forecasting. Output and employment are assumed to be the forecasting priorities, and so the focus of this analysis will be these two variables. This assessment will consist of two stages: First, the internal consistency of the survey data will be checked. This procedure tests the extent to which survey predictions in one month forecast the results of following surveys. The results of this analysis are discussed in Section 5. In Section 6, an assessment of the comparability of the survey series with equivalent Central Statistics Office (CSO) series is undertaken. This test of external consistency demonstrates how capable the survey data are of tracking movements in the official statistics. Prior to running this series of testing procedures, a review of some of the relevant literature is provided in Section 2, as well as a brief history of the surveys in question in Section 3. Section 4 gives a brief description of the data.

2. Literature Review

Within Ireland, the industry component of the European Commission surveys has previously been assessed at a preliminary level. Kearney (1991) examined both the internal consistency of the industrial survey series and its comparability with equivalent quantitative statistics. A similar study was conducted by Merriman and O'Reardon (1995). Both of these papers presented reasonably positive results. The industrial survey data were shown to possess a satisfactory level of internal consistency. The results reported in both of these papers also suggest that statistical relationships exist between a number of the survey variables and their equivalent official statistics, although these relationships are arguably quite weak. This paper will re-examine the work of Kearney (1991) and Merriman and O'Reardon (1995), and extend their analysis to include the other three business surveys, and the consumer survey.

A number of studies have been conducted outside of Ireland using survey response data. Hüfner and Schröder (2002) analyse four economic sentiment indicators for Germany – the *Ifo* Business Climate Index (IFO), the European Commission's Economic Sentiment Indicator for Germany (ESIN), the Purchasing Managers' Index (PMI) and the ZEW Indicator of Economic Sentiment (ZEW). They test the forecasting capabilities of these indicators using the year-on-year growth rate of industrial production as a

reference. The results reveal that the IFO, PMI and ZEW all lead the growth rate of industrial production by five months, and as such, may be useful forecasting tools.

Brunco and Malgarini (2002) examined whether fluctuations in Italian economic activity might be predicted using indicators that gather information from business and household surveys. Using a dynamic factor model, they constructed a separate indicator for the manufacturing, construction and retail sectors, and also for household consumption. These indicators were then tested to evaluate their capacity to forecast the main cyclical features of a particular reference series. The indicator for the manufacturing sector was found to track industrial production reasonably well, and the indicator for household consumption also produced satisfactory results. The retail trade and construction sector indicators were found to be very poor predictors of retail sales and investment in production respectively.

The Statistical Office of the Slovak Republic (2005) also obtained successful results from industry survey data. It examined the relationship between the monthly industrial production index and lagged survey responses regarding expectations of output, and found a good degree of correlation. It also carried out an analysis of the construction and retail sectors, and while expectations regarding future construction activity were found to have a positive relationship with official output in the construction sector, no relationship existed between official retail sales and prior expectations about future retail trade receipts.

Santero and Westerlund (1996) explore the forecasting potential of business and consumer survey data in a number of countries.¹ First, they examine the cross-correlation coefficients of business and consumer confidence indicators with selected macroeconomic variables. These include two measures of output – GDP and industrial production, and two demand components – real business investment and real private consumption. They found that the US, Japan, France, Spain and Belgium showed high correlations of business confidence with both measures of output and with investment. In the UK and Canada, business sentiment is well correlated with both measures of output, but not with investment. The results for Germany suggest that business sentiment is very closely related with industrial production, but less so with GDP and investment. The consumer confidence indicators were not shown to have strong correlations, irrespective of the variable examined.

The literature on consumer sentiment and its forecasting capabilities is dominated by studies of the United States. Chopin and Darrat (2000) focus on the issue of whether or not consumer attitudes can forecast the macroeconomy in the United States, and they examine the relationship between The Conference Board's Index of Consumer Confidence² and several macro variables. They emphasise the idea that if changes in consumer attitude precede changes in consumer behaviour, then knowledge of these attitudes could help explain consumer spending and

¹ United States; Japan; Germany; France; Italy; United Kingdom; Canada; Belgium; Denmark; Netherlands; Spain.

² See www.conference-board.org. The *Consumer Confidence Survey* is based on a representative sample of 5,000 US households.

saving patterns. The authors use a flexible lag structure and a multivariate vector error correction model (VECM) to investigate the Granger-causal relationships among consumer attitudes and several macro variables, including retail sales, personal disposable income, inflation, stock prices and interest rates. The evidence that emerges suggests that the ICC can predict movements in personal disposable income, interest rates, and to some extent, also the DOW Jones Industrial Average. However, the ICC proves an unreliable predictor for retail sales or inflation.

Pain and Weale (2001) examine the information content of consumer surveys in the UK and the United States. The UK measure they use comes from the European Commission, and is also used by the OECD. The indicator combines replies to five separate survey questions relating to the current and expected financial condition of the household, the current and expected general economic situation and whether respondents are planning to make major purchases. The US index is the consumer sentiment indicator that has been compiled by the Survey Research Centre of the University of Michigan since 1952. The questions cover similar issues to those in the UK, relating to current and expected trends in personal finances and business conditions, and current buying conditions for durable goods. The authors run simple dynamic regressions of the growth in consumers' expenditure in the current quarter on lagged expenditure growth and current and lagged survey responses. In both countries, the results show that current surveys are significantly positively correlated with current expenditure. Periods of consumer optimism coincide with periods of comparatively high expenditure growth.

These empirical findings suggest that the potential use of business and household surveys as a forecasting tool is worth investigating. In particular, the literature highlights the success of industry and consumer survey data. While not all the results are positive, there certainly seems to be a consensus regarding the capability, albeit limited, of certain survey series to track official statistics on output and employment.

3. History of the European Commission Activity/ Sentiment

3.1 INDUSTRY SURVEY

This survey was established in Ireland in the early 1970s, post-EU membership, with IBEC as the main contractor at the time. Sectoral coverage for the survey was specified by the Commission, i.e. NACE 15-36. The sample was based on a panel of 650 firms. Approximately 250 questionnaires were returned monthly, representing a response rate of the order of 38 per cent. The data from the industry survey were re-weighted prior to sending results to the Commission. A total of 3 weights were derived for each round of the survey, based on sectoral turnover, employment and export levels. The population parameters upon which the weighting system was built were derived from the annual Census of Industrial Production produced by the CSO.

3.2 CONSTRUCTION INDUSTRY SURVEY

This survey started in the 1970s and was originally undertaken by the Construction Industry Federation (CIF). The sample for the construction survey was selected from lists prepared by the CIF, which contained all the main agents in the sector in Ireland. Selection was on a disproportionate stratified basis, ensuring that the largest possible share of the value of

construction work was captured. Approximately 80 forms were returned monthly and enhanced numbers were surveyed quarterly, generating around 130 responses. Re-weighting of the data was based on the value of business according to the following activities: site preparation; civil engineering; building installation; building completion; and renting of plant and machinery.

3.3 SERVICES SECTOR SURVEY

This survey was started in 1996. The sample was generated from population lists of businesses throughout Ireland, and the population parameters were devised from the Annual Services Enquiry, produced by the CSO. Approximately 230 questionnaires were returned monthly. The data were re-weighted using a ratio-weighting scheme based on number of enterprises within sector/size strata and the total number of employees within the same sector.

3.4 RETAIL SECTOR SURVEY

As with the services survey, this survey was started in 1996. The sample was generated from population lists of businesses throughout Ireland, and sectoral coverage was in the six broad sectors as requested by the Commission: food, beverages and tobacco; textiles, clothing and footwear; household electrical goods; household non-electrical goods; motor vehicles; large multiples; and remaining retail trade. Approximately 260 forms were returned monthly.

3.5 CONSUMER SURVEY

As an input to the EU-wide Consumer Survey, the ESRI conducted a nationally representative survey of households on a monthly basis. The primary objective of the survey was to record details on consumers' attitudes towards trends in the economy. A fresh national sample was used each month, and this sample is representative of the totality of persons living in private households in Ireland. The questions were based on four main themes – the general economic situation, their personal financial situation and capacity to save, intentions with regard to the purchase of durable consumer goods and housing intentions. At present, the monthly KBC Ireland/ESRI Consumer Sentiment Index is constructed using the responses to five of the questions that originally formed part of the Consumer Survey. The Consumer Sentiment Index uses the same methodology that is employed by the University of Michigan.³

4. The Data

The data for this analysis are taken from the five monthly surveys discussed above. The business surveys cover a variety of aspects of the company's operations, such as output, employment, exports, stocks and prices. The consumer survey asks for the respondent's opinions on economic issues such as unemployment, prices, the general economic situation, and their own personal expenditure. In most cases, respondents are asked one question regarding actual outcomes, and one question regarding expectations for future months. These types of questions produce a dataset of qualitative responses, and in order to be able to use

³ A detailed account of the methodology is available at http://www.esri.ie/docs/CSI_METHOD.PDF

this data in an analysis such as this one, the general practice is to calculate the weighted balance for each question. This balance is the difference between the weighted percentage of positives and the weighted percentage of negatives in the responses to each question. Data are generally available from the late 1990s, with a cut off point in early 2007.

Table 4.1: Data Availability by Sector⁴

Sector	Survey Frequency	Data Available	
		From	To
Construction	Monthly	January 1999	February 2007
Industry	Monthly	July 1999	February 2007
Retail	Monthly	March 1999	March 2007
Services	Monthly	March 1999	March 2007
Consumer	Monthly	February 1996	March 2007

5. Internal Consistency

Internal consistency testing involves comparing the responses concerning outcomes in a particular month to expectations expressed by respondents in previous months, and it shows how accurately the respondents predict their own future responses. The method of assessing internal consistency involves fitting a regression model in order to test the relationship between the reported trends in output and employment and the lagged expectations data on output and employment. In many cases, multiple lags were tested, due to the ambiguity of some of the expectations' questions in the surveys, and the potential lack of consistency across all respondents in their interpretation of the questions. In addition, the regression analysis was performed using both raw and smoothed survey data. The data were smoothed using three period moving averages, and the purpose of this is to reduce some of the inherent variability of responses in surveys of this nature.

While assessing these results, it should be noted that sentiment at time $t-1$ cannot be expected to fully predict outcomes at time t . As such, we should not expect the degree of fit to be exact. However, a certain level of consistency between expectations and realised observations is to be expected. Bearing this in mind, the most important points to note from the regression results are the sign and significance of the estimated coefficients, and the R^2 values. Unsuccessful results have been omitted.

⁴ For a number of the testing procedures as many as 90 observations were available. However, many of the official series used in the external consistency tests were only available as quarterly figures. This meant that the survey data had to be converted to quarterly figures, and this obviously reduced the number of observations. In some cases this number was less than 30.

Table 5.1: Tests for Internal Consistency

Sector	Dependent Variable	Independent Variable
Construction	Current work (CWORK)	Contracts in hand (ORDER)
Industry	Volume of production (PRODL)	Expected production (PRODE)
	Volume of production (PRODL)	Total order book (ORTOT)
	Volume of production (PRODL)	Total new orders (ORNEW)
	Number of employees (REMPI)	Expected number of employees (EEMPI)
Retail	Current business/sales (CBUSR)	Expected business/sales (EBUSR)
	Current stock levels (CSTOCKR)	Expected orders (EORDRR)
	Number of employees (REMPR)	Expected number of employees (EEMPR)
Services	Current business (CBUSS)	Expected business (EBUSS)
	Recent business (RBUSS)	Expected business (EBUSS)
	Number of employees (REMP)	Expected number of employees (EEMPS)
Consumer	Economic situation (ECSITL)	Expected economic situation (ECSITE)
	Financial situation (FINSITL)	Expected financial situation (FINSITE)
	Prices (PRICEL)	Expected prices (PRICEE)

5.1 CONSTRUCTION

The variable CWORK refers to the question in which respondents are asked to describe how their level of work in the past month compares to that of the previous month. The variable ORDER is constructed using responses regarding work in progress and contracts in hand during the past month. This question is not an expectations' question, however, we can use the data to examine the consistency between responses regarding contracts in hand and the subsequently reported work levels.⁵ One- and two-period lags were tested, and while the estimated coefficients were positive and significant, the R² values were unacceptably low.

5.2 INDUSTRY

The results of the industry survey tests are the most encouraging. Looking first at production, the variables PRODL and PRODE describe the volume of production in the past month, and expectations about production over the next three months, respectively. In spite of the wording of the question, the one- and two-period lag tests are the most successful, and these are displayed below. All four coefficient estimates are statistically significant, and while the correlation coefficients are higher for the smoothed data, the R² values are more impressive for the raw data, having corrected for first-order autocorrelation where appropriate. Figure 5.1 plots the raw data for PRODL and PRODE(-1), and it can be seen that, in general, there is a consistent relationship between the two. The consistency between production levels and total orders in previous months was also tested, although again this did not involve testing the performance of expectations variables. Nonetheless, the results were good – positive and significant coefficient estimates, and satisfactory R² values, which again are slightly higher in the cases of the raw data, as shown below.

Turning to employment, the variable REMPI refers to responses regarding the number of people employed by the firm in the past month,

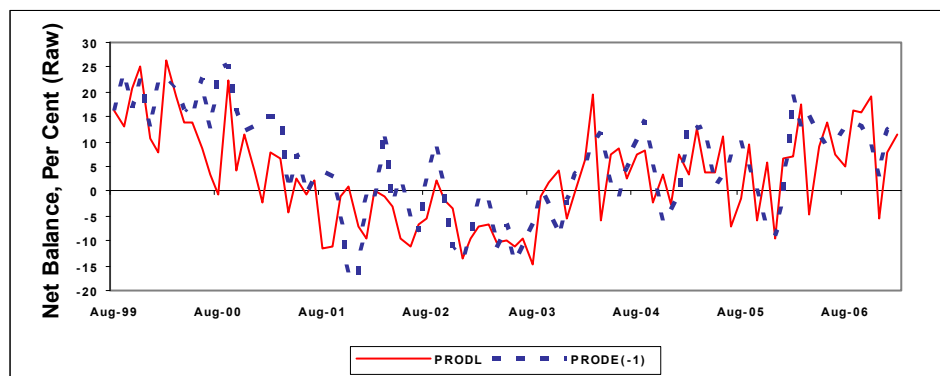
⁵ There is no output expectations question in this survey.

compared with that of the previous month, while EEMPI refers to expectations for employment over the next three months. Again, the best results came from a one-period lag test. In this case, although both coefficient estimates are significant, the R^2 values were disappointing.

Table 5.2: Internal Consistency Results – Industry Survey

Dependent Variable	Independent Variable	β_1 Estimate ⁶	t-stat	R^2	Rho
PRODL Smoothed data	PRODE(-1)	0.62*	8.69	0.46	----
		0.36*	4.38	0.2	0.81
PRODL Smoothed data	PRODE(-2)	0.62*	8.63	0.46	----
		0.44*	5.47	0.28	0.8
PRODL Smoothed data	ORTOT(-1)	0.47*	8.00	0.42	----
		0.64*	6.53	0.34	0.66
PRODL Smoothed data	ORNEW	0.76*	13.65	0.67	----
		0.74*	10.89	0.58	0.68

Figure 5.1: Survey Response Variables, PRODL and PRODE(-1)



5.3 RETAIL

The variable CBUSR describes the responses regarding the retail company's current business position. Respondents are also asked to predict their business trend over the next six months. Multiple lags were tested, however, once again contrary to the wording of the expectations question, the best results were obtained when there was a one- or two-period lag on the expectations variable. Beyond a three-period lag, the coefficient estimates become negative. Looking at the one-period lag test results below, both coefficients are positive and significant, however, the R^2 value in the case of the smoothed data is very low.

These poor results are mirrored throughout the retail survey. Extremely low R^2 values reported in the remaining tests indicate that no relationship exists between reported stock levels and expected future orders placed on

⁶ β_1 refers to the coefficient on the independent variable

suppliers, or between current employment and expected future employment.

Table 5.3: Internal Consistency Results – Retail Survey

Dependent Variable	Independent Variable	β_1 Estimate	t-stat	R ²	Rho
CBUSR	EBUSR(-1)	0.53*	5.87	0.27	0.42
Smoothed data		0.26*	2.88	0.08	0.95

5.4 SERVICES

The services survey asks respondents to consider both their current and recent business position, CBUSS and RBUSS respectively. As in the other surveys, they are also asked about their expectations regarding their level of business during the next few months. Multiple lags were tested, however, the results obtained were poor. Although a number of positive coefficients were estimated, not all of these were significant, and once again the R² statistics were poor. Furthermore, many of the reported Rho values were extremely high, suggesting the presence of unit roots. The employment variables produced similar disappointing results. Once again, although the coefficients were significant and correctly signed, the R² values indicate a lack of consistency between employment levels and prior expectations about employment, particularly in the case of the raw data. The R² value was slightly more encouraging in the case of the smoothed data, however, once again the Rho value was extremely high. It must be concluded that, overall, the services survey responses perform badly in the internal consistency testing procedure.

5.5 CONSUMER

The variable ECSITL refers to the responses on how the general economic situation in this country has changed over the last twelve months. The variable ECSITE asks how they think the general economic situation will develop over the next twelve months. Similarly, respondents are asked about the change in their financial situation over the last twelve months (FINSITL) and the expected change in their financial situation over the coming twelve months (FINSITE). In spite of the wording of the questions, it cannot be assumed that all survey participants base their responses on a full twelve month period, and so multiple lags were tested. The most superior results did in fact come from the tests in which the expectations variables were lagged by twelve periods. However, these results still proved disappointing. Although all four coefficients were correctly signed, and three of these were statistically significant, the R² values were poor, and the Rho values extremely high. Internal consistency tests were also performed on the responses regarding prices, again using a twelve period lag on the expectations variable. In the case of both the raw and smoothed data, the coefficients were not statistically significant, and the R² values were zero.

5.6 INTERNAL CONSISTENCY: CONCLUDING REMARKS

The results from this section are mixed. The industry survey performs well, particularly on the output side. The data for the production variables indicate a significant degree of consistency between expectations and subsequent realisations. Elsewhere, the results are less promising. The construction survey results produced very poor R^2 values, although as mentioned previously, the independent variable is not an expectations variable, and as such, we cannot conclude that this survey has failed a true test of internal consistency. The results for both the retail and services surveys, however, are undeniably poor. With very few exceptions, the R^2 statistics are unacceptably low, and it must be concluded from this that there is no consistency between the respondents' expectations about future output or employment, and their subsequently reported outcomes.

Unsatisfactory results in the internal consistency tests do not preclude the use of data from these surveys in the subsequent analysis of external consistency. The rationale for performing these tests is that if the survey expectations variable is found to be consistent with the survey outcome variable, and this outcome variable is subsequently found to be consistent with the official data, then the survey *expectations* variable can be used in short-term forecasting. Expectations variables have a very significant information time lead over official statistics. However, if the expectations variable fails the internal consistency test, the survey outcomes may still be useful forecasting tools, given the timeliness of their release.

One important point that has emerged from the different lag tests performed on the business survey responses is that the expectations expressed by the respondents seem to represent a very short future time horizon. The one- and two-period lag results dominate in all tests, even when respondents are asked to consider a longer time period. Kearney (1991) drew the same conclusions in her internal consistency testing, and suggested that perhaps the reason respondents only consider a very short future time horizon is that they complete the same questionnaire each month.

The consumer survey performs particularly badly in the internal consistency tests, although perhaps this is not altogether surprising. The average consumer may not be as capable of responding accurately to some of their own survey questions as a recipient of one of the business surveys might be of answering their own questions. A consumer cannot be expected to know as much about the general economic situation as an industry survey respondent knows about production levels in his own company, for example. Furthermore, these issues may be worsened by the fact that the questions in the consumer survey are based over a longer time period. It is therefore not unreasonable to suggest that the views expressed by consumers a year ago, regarding the economic situation over the next year, may not match their current responses regarding the change in the economic situation over the previous year.

6. External Consistency

The forecasting potential of the survey data is best explored by testing the external consistency. This involves comparing the survey data on outcomes with a range of official data series. The survey data has a publication lag of approximately four weeks, and therefore has an important advantage over the official quantitative series, which typically have much lengthier publication lags. The aim of this analysis, therefore, is to ascertain whether or not this advantage may be exploited for the purpose of short-term forecasting, by testing the consistency between the survey data and the equivalent official series.

The relationships tested are listed in Table 6.1. Many of the official series used were only available as quarterly statistics. In these cases, the independent variables were compiled as the average of the three monthly responses relating to each quarter. Where monthly series are used, three month moving averages were also tested as dependent and independent variables. All of the dependent variables in the business survey tests are expressed either as percentage monthly changes or percentage quarterly changes, depending on the frequency of the official series in question. The dependent variables in the consumer survey are expressed as annual percentage changes.⁷ In spite of the fact that the business surveys ask respondents to discount seasonal effects, previous studies have detected a problem of seasonality in the survey responses (Conniffe, 1985). Ideally, the survey responses should be compared to the de-seasonalised official data, as it is the intention of these surveys to predict de-seasonalised trends. However, given the previous findings of seasonality in the survey responses, where possible, tests were conducted using both raw and de-seasonalised official series.

Finally, due to the ambiguous wording of some of the survey questions, different leads and lags were tested. Only the results deemed most informative are reported – all others have been omitted⁸. While assessing the results, it must be noted that we are testing relationships between qualitative and quantitative variables. As such, we are asking that the respondents' sentiment explain observed outcomes in production and employment, and so we cannot expect very impressive R^2 statistics.

⁷ The dependent variables are all expressed as percentage changes because all survey questions ask respondents to compare across time periods, i.e. the response will be 'higher', 'same' or 'lower'. Unlike the other surveys, the consumer survey asks respondents to compare current conditions with those of twelve months ago, and so the official statistics are expressed as annual percentage changes.

⁸ The most superior set of results for each of the 19 tests outlined in Table 6.1 have been reported in the Appendix. Any additional results that showed negative coefficient estimates and low R^2 values were deemed worthless, and were omitted from this report.

Table 6.1: Tests for External Consistency⁹

Sector	Dependent Variable¹⁰	Independent Variable
Construction	Index of Total Production (ITPC) Monthly Index of Employment (MIEC) QNHS Employment (QNHSC)	Current work, quarterly (CWORKQ) Expected employment (EEMPC(-1)) Expected employment, quarterly (EEMPCQ(-1))
Industry	Monthly Industrial Prod. Index (MIPI) No. of Employees in Industry (EMPI) QNHS Employment (QNHSI)	Volume of production (PRODL) Number of employees, quarterly (REMPIQ) Number of employees, quarterly (REMPIQ)
Retail	Expenditure on Consumer Goods (PECG) Monthly Retail Sales Index (MRSI) QNHS Employment (QNHSR)	Current business, quarterly (CBUSRQ) Current business, quarterly (CBUSRQ) Number of employees, quarterly (REMPRQ)
Services	Services sector GDP (GDPS) QNHS Employment (QNHSS)	Current business, quarterly (CBUSSQ) Number of employees, quarterly (REMPSS)
Consumer	Gross Domestic Product (GDP) Expenditure on Consumer Goods (PECG) Expenditure on Consumer Goods (PECG) Expenditure on Consumer Goods (PECG) Expenditure on Consumer Goods (PECG) Consumer Price Index (CPI) QNHS Unemployment (QNHSSU) Gross Domestic Product (GDP) Expenditure on Consumer Goods (PECG) Monthly Retail Sales Index (MRSI)	Economic situation, quarterly (ECSITLQ) Economic situation, quarterly (ECSITLQ) Expected economic situation, quarterly (ECSITEQ) Financial situation, quarterly (FINSITLQ) Expected financial situation, quarterly (FINSITEQ) Prices (PRICEL) Expected unemployment, quarterly (UEMPEQ) Consumer Sentiment Index, quarterly (CSIQ) Consumer Sentiment Index, quarterly (CSIQ) Consumer Sentiment Index, quarterly (CSIQ)

6.1 CONSUMER

A number of tests were performed using the data from the consumer survey. GDP data were used to test the external consistency of the survey variable relating to responses on how the general economic situation has changed over the last twelve months. Responses regarding expectation for unemployment levels were tested against the official unemployment statistics from the QNHS, using the appropriate lag on the survey expectations variable.¹¹ The third external consistency test compared responses to the question regarding prices with the official Consumer Price Index. These data are available monthly, and so the tests were performed

⁹ As these variables appear in the results tables, an additional ‘M’ in front of the variable indicates that three-period moving averages have been calculated. ‘Q’ indicates that it has been converted to a quarterly variable. ‘S’ indicates that the variable has been seasonally adjusted.

¹⁰ All of the official series were obtained on the Central Statistics Office website: www.cso.ie

¹¹ The employment expectations variable was transformed into a quarterly variable, so that it could be compared with the data from the QNHS. Given that the question asks respondents about expectations for the next twelve months, the appropriate lag on the variable is four periods, as shown in Table 6.2a.

using both raw and smoothed data. The results are presented in Table 6.2a below. All of the coefficient estimates are positive and significant, and the degree of fit is good.

Table 6.2a: External Consistency Results – Survey Responses and Their Official Data Equivalents

Dependent Variable	Independent Variable	β_1 Estimate	t-stat	R ²	Rho
GDP	ECSITLQ	0.04	3.92	0.31	----
GDP(S)	ECSITLQ	0.04	3.88	0.31	----
QNHSU	UEMPEQ(-4)	0.17	2.20	0.15	0.77
(M)CPI	(M)PRICEL	0.04	5.91	0.21	0.68

While these tests compared the survey responses with their official data equivalents, a number of other tests were conducted which examined the theory that the sentiment expressed by the average consumer may influence the behaviour of the average consumer. The first of these tests compares the ECSITL variable with the official statistics for personal expenditure. For example, if the average consumer reports that the general economic situation has got a lot better over the last twelve months, is this mirrored by an increase in the average consumer's personal expenditure over that time period? The variable relating to expectations about the economic situation (ECSITE) was also tested against personal expenditure, in order to explore the possible relationship between the two. If the average consumer expects the economic situation to improve or worsen over the coming year, is this reflected in average expenditure patterns? The responses regarding the survey participant's own personal finances were also tested against personal expenditure in a similar manner.¹² Finally, the overall Consumer Sentiment Index was used in tests with GDP, personal expenditure, and the Monthly Retail Sales Index.

With the exception of the final test, all the coefficients estimates are positive and significant, and the R² values are good. The results of these successful tests are provided in Table 6.2b. Looking first at personal expenditure, the results suggest that when the average consumer believes that the economic situation has improved over the last twelve months, the personal expenditure of the average consumer has also increased over the last twelve months. A similar correlation is apparent between the consumer's financial situation and personal expenditure. The tests conducted using the expectations variables examine the relationship between the consumer's predictions for the future and their personal expenditure. Multiple lags were tested, and the most superior results were found when the expectations variables were lagged by two quarters. Finally, the examination of the correlation between the overall Consumer Sentiment Index and both GDP and personal expenditure produced good results, particularly in the latter case.

Table 6.2b: External Consistency Results – Consumer Sentiment and Consumer Behaviour

PECG	ECSITLQ	0.04	6.93	0.59	----
PECG(S)	ECSITLQ	0.04	6.92	0.58	----
PECG	ECSITEQ(-2)	0.06	7.01	0.60	----
PECG(S)	ECSITEQ(-2)	0.06	7.18	0.60	----
PECG	FINSITL	0.11	5.34	0.46	----
PECG(S)	FINSITL	0.11	5.36	0.46	----
PECG	FINSITE(-2)	0.12	5.34	0.46	----
PECG(S)	FINSITE(-2)	0.12	5.32	0.45	----
GDP	CSIQ	0.09	3.91	0.31	----
GDP(S)	CSIQ	0.08	3.85	0.31	----
PECG	CSIQ	0.08	6.61	0.56	----
PECG(S)	CSIQ	0.08	6.60	0.56	----

These results suggest that the consumer survey data may possess some forecasting potential. In particular, personal expenditure is highly correlated with consumer sentiment regarding the recent and future economic situation, and their own financial situation. Unfortunately, the graphs of these variables¹³ suggest that the data are incapable of predicting turning points in the official series, but merely the overall trend.

6.2 INDUSTRY

The Monthly Industrial Production Index, provided by the CSO, was selected as an appropriate official series for the purpose of testing the external consistency of the survey data. The monthly change in this index was used as the dependent variable, in order to test the usefulness of the PRODL variable derived from Question 1 on the industry survey. Again, both the official series and the survey data were smoothed using three period moving averages, because of the volatility of monthly series. Seasonally adjusted data for the Industrial Production Index were also tested. Two different official measures of employment were used to test the external consistency of the survey responses regarding employment. The first, EMPI, is a measure of the number of employees in manufacturing, and this is a quarterly statistic. The second is the Quarterly National Household Survey figure for employment in industry, and this was available in the form of both raw and seasonally adjusted data.

With regard to output, the results from the external consistency tests are very disappointing. While all but one of the estimated coefficients are correctly signed, only one of these estimates is significant at the 5 per cent level. Furthermore, the degree of fit is extremely low. Therefore, we must conclude that there is no consistency between the official statistics and the survey responses on industrial production levels.

In light of these poor results, the Industrial Production Index weighted by the wage bill was also tested as a dependent variable. The rationale for this test is the dominance of high-tech firms in the standard Index of Industrial Production. In order to test for the existence of a superior

¹³ A selection of graphs is shown in the Appendix.

relationship between the weighted Industrial Production Index and the survey responses regarding output, the PRODL variable had to be converted to a quarterly series. These results did, in fact, prove superior to the results of the tests using the unweighted index. Table 6.3 shows that for both tests the coefficients are positive and statistically significant, and, while not spectacular, the R^2 values are a vast improvement on those from the unweighted IPI tests.

Table 6.3: CSO Industrial Production Index Weighted by the Wage Bill, and Survey Responses Regarding Industrial Output

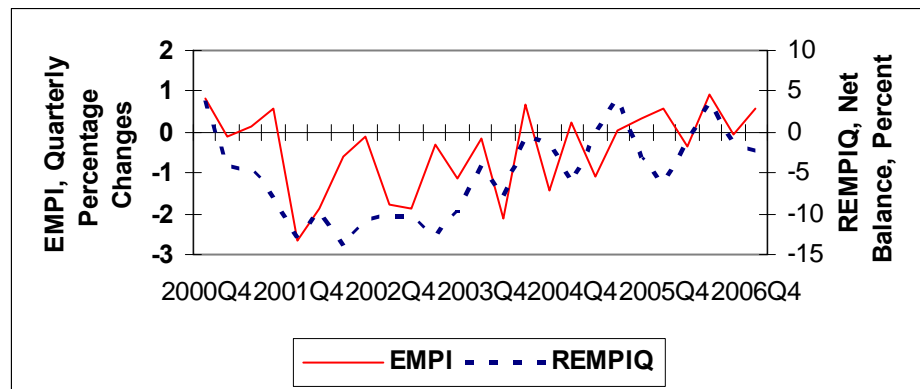
Dependent Variable	Independent Variable	β_1 Estimate	t-stat	R^2	Rho
IPIWQ	PRODLQ	0.14	2.05	0.15	-0.81
IPIWQ	PRODLQ(+1)	0.16	2.37	0.19	-0.84

The employment results are more encouraging. In particular, a good relationship was found between the number of employees in manufacturing (EMPI) and survey responses on industrial employment levels. These results are shown in Table 6.4. The estimated coefficient on the independent variable is positive and statistically significant, and the R^2 value of 0.3 is one of the highest reported in this section. However, looking at Figure 6.1, the survey variable fails to track a number of turning points in the official series.

Table 6.4: CSO Data on the Number of Employees in Manufacturing, and Survey Responses on Industrial Employment

Dependent Variable	Independent Variable	β_1 Estimate	t-stat	R^2	Rho
EMPI	REMPIQ	0.11	3.18	0.30	---

Figure 6.1: Official Number of Employees in Manufacturing and Survey Responses on Industrial Employment



6.3 RETAIL

The Monthly Retail Sales Index was selected as an appropriate series for comparison with responses regarding current business. Three-period moving averages were calculated for both the retail sales index and the survey response data. Personal Expenditure on Consumer Goods was also used as an official statistic, against which the survey responses on current

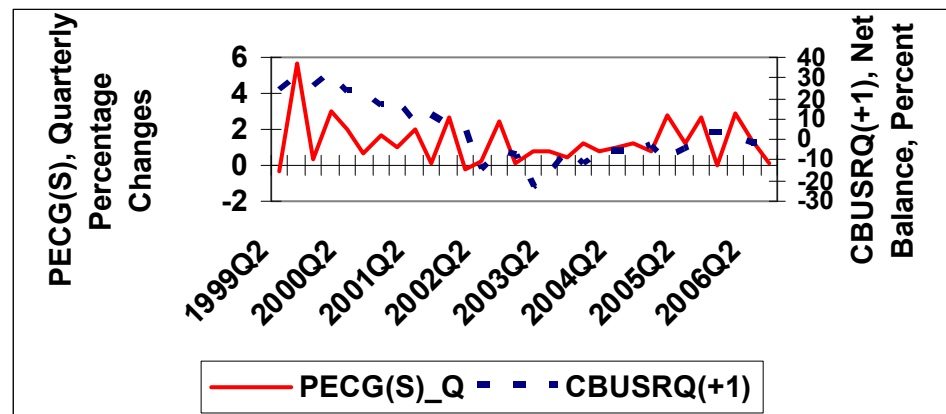
business could be compared. Once again, the official measure of employment used was QNHS employment data for the retail sector.

The results for the retail sector overall are poor, and indicate that there is no relationship between monthly retail sales and survey responses regarding current business, or between QNHS employment and survey responses regarding current employment levels. There is, however, a good statistical relationship between seasonally adjusted expenditure on consumer goods, and the current business/sales position reported by survey respondents, especially when tested with a one-period lag on the current business variable. These results are shown in Table 6.5. However, a graph of this relationship shows that, while the general trend is the same, the survey variable misses a number of turning points in the official series, as shown in Figure 6.2.

Table 6.5: Personal Consumption (Seasonally Adjusted) and Survey Responses on Current Business

Dependent Variable	Independent Variable	β_1 Estimate	t-stat	R ²	Rho
PECG(S)	CBUSRQ	0.02	2.61	0.26	-0.55
PECG(S)	CBUSRQ(+1)	0.03	3.44	0.36	-0.6

Figure 6.2: Personal Consumption and Survey Responses on Current Business/Sales



6.4 SERVICES

GDP in the services sector was used as an official series, and tests were undertaken to check the consistency between this variable, and the survey response variable relating to current work. GDP is supplied as a quarterly series, and so the survey responses were averaged over the three months in each quarter. Tests were conducted using the quarterly percentage changes in both the raw and seasonally adjusted GDP series. The dependent variable in the employment tests was once again the quarterly percentage change in QNHS employment.

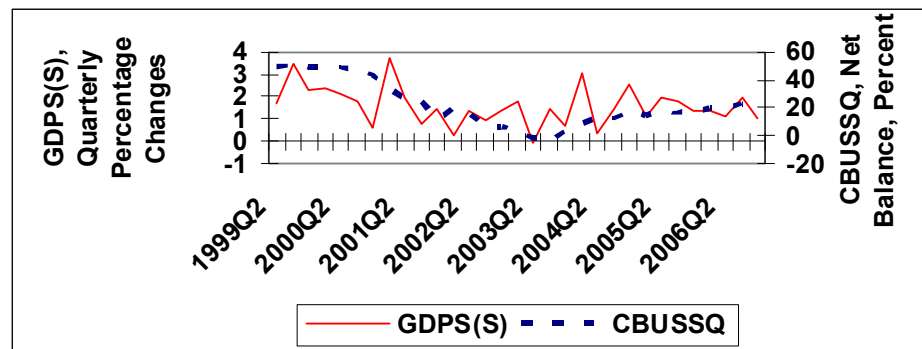
A good relationship was reported between seasonally adjusted GDP and the “current business” variable. (See Table 6.6.) The estimated coefficient is positive and significant, and the R² is the highest reported in this section. However, the graph indicates that this variable is incapable of tracking the turning points in GDP. The employment tests did not yield positive results.

While the two estimated coefficients were correctly signed, neither was statistically significant, and so we must conclude that there is no relationship between the QNHS employment series and the employment levels reported by survey respondents.

Table 6.6: Service Sector GDP (Seasonally Adjusted) and Survey Responses on Current Business

Dependent Variable	Independent Variable	β_1 Estimate	t-stat	R ²	Rho
GDPS(S)	CBUSSQ	0.02	4.02	0.37	-0.39

Figure 6.3: Services Sector GDP and Survey Responses on Current Business



6.5 CONSTRUCTION

In relation to production, the Index of Total Production in Building and Construction (ITPC) was selected as an appropriate series with which current work levels expressed in the survey could be compared. The ITPC is a quarterly series, and so it is expressed as quarterly percentage changes here. With regard to employment, two official series were selected for testing. The first is the Monthly Index of Employment in Building and Construction (MIEC), and the second is the employment series from the Quarterly National Household Survey (QNHS). Tests were conducted using the quarterly percentage changes in both the raw and seasonally adjusted QNHS series. The independent variable used in the employment tests was expectations of future employment expressed by survey respondents, due to the fact that the actual observed employment response data were unavailable. The results of all of these tests are provided in the Appendix.

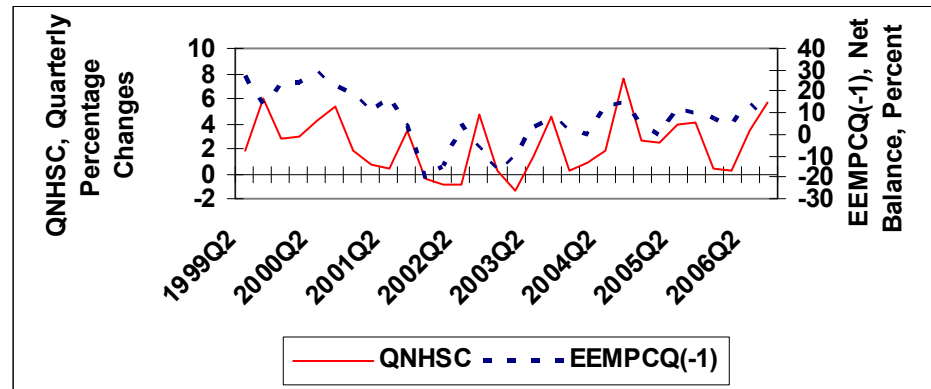
Looking first at output, the relationship between the Index of Total Production and the survey responses regarding work levels was weak, with a reported R² value of just 0.12. The results of the monthly employment series were equally poor. None of the reported R² values exceeded 0.1, and so no relationship exists between the Monthly Index of Employment, and survey respondents' expectations about employment. In spite of the prior expectation that the survey series might be more capable of predicting the seasonally adjusted official series, the best results in this sector come from the comparison between the raw QNHS series and lagged employment expectations. The results are presented in Table 6.7. While the R² value of 0.23 is not overly impressive, Figure 6.4 indicates a good degree of consistency between the QNHS series and survey respondents'

employment expectations over the time period studied. This is particularly apparent from 2003 Q1 onwards. During this period, the survey variable tracks the turning points in the official series very well.

Table 6.7: QNHS (Unadjusted) and Survey Respondents' Employment Expectations

Dependent Variable	Independent Variable	β_1 Estimate	t-stat	R ²	Rho
QNHSC	EEMPCQ(-1)	0.09	2.91	0.23	----

Figure 6.4: QNHS Employment and Survey Respondent's Employment Expectations



6.6 EXTERNAL CONSISTENCY: CONCLUDING REMARKS

As mentioned, this testing procedure compares sentiment data and official quantitative statistics, and as such, is extremely demanding of the survey series. The results in this section suggest that many of the survey variables have little or no predictive power. The vast majority of the tests conducted resulted in R² values lower than 0.1, and while it was stressed that we should not expect the R² values to be impressive, these statistics are unacceptably low.

With regard to the business survey data, four good relationships between the survey series and the official series were reported in this section – one for each of the four surveys. These preliminary findings suggest that the four survey variables used in these tests may possess some forecasting potential. The graphical analysis indicates that the employment data from the construction survey are capable of tracking the seasonally unadjusted QNHS employment series. This is an important result, and the relationship between these variables certainly merits further investigation. Unfortunately, the graphs of the three other statistical relationships did not display such promising results. In each of these cases, the survey variables missed a number of the turning points in the official series.

The consumer survey produced some promising results. The statistical relationships between the survey variables and their official equivalents were good, with the exception of the relationship between the overall Consumer Sentiment Index and the Retail Sales Index. The most impressive results were produced when a selection of the survey response variables were compared with data on personal expenditure. The results suggest that survey data on the overall economic situation and on personal finances are highly correlated with the official data on personal expenditure, and this relationship could perhaps be exploited for the

purposes of forecasting. Unfortunately, the graphs suggest that the survey variables may not be capable of tracking turning points in the official series, but merely the overall trend in that series.

7. Conclusion

The findings in this analysis suggest that the potential of the survey data is limited. This verdict is based on the results of both the internal and external consistency testing procedures. First, only the industry survey provides variables that fully satisfy the internal consistency condition. Although the results from the construction survey are somewhat inconclusive, the retail, services and consumer results are unquestionably poor. It was argued, however, that the disappointing results from the consumer survey were not altogether surprising. In any case, unsatisfactory results in the internal consistency tests do not preclude the use of data from these surveys in the subsequent analysis of external consistency. They do, however, imply that the survey expectations variables may be unreliable indicators, and may not be useful for short-term forecasting purposes. The survey outcomes variables may still be useful forecasting tools, given the timeliness of their release.

The external consistency testing procedure is extremely demanding of the survey variables. In spite of this admission, a number of the reported R^2 values were unacceptably low, and lead to the unavoidable conclusion that the associated variables are worthless, in terms of forecasting. With regard to the business surveys, four survey variables produced results that, at the very least, make these variables worthy of further examination.¹⁴ The test results from the consumer survey were far superior to those from any other survey. With the exception of the relationship between the Consumer Sentiment Index and the Retail Sales Index, all of the tests conducted found positive and significant coefficients, suggesting that a number of statistical relationships exist between the survey series and the official data, and that these relationships could perhaps be exploited for the purposes of forecasting.

Several areas of this analysis merit additional attention. In some of the tests performed, the sample size was very small. An increased sample might strengthen the results from these testing procedures. An extension of this study might examine the business survey series at a disaggregated level. Kearney (1991) argued that the heterogeneity of the firms in the different sectors and sub-sectors cannot be adequately captured by the weighting procedures used. In addition, there is a question mark over the representativeness of the surveys, and it is likely that this is more satisfactory in some areas than others. This certainly merits further investigation, in order to ascertain the extent of the issue, and how it may be improved. Furthermore, the ambiguous wording of some of the survey questions may need to be addressed. While multiple lags may be tested during the internal consistency testing in order to obtain the best relationship, it must still be assumed in this analysis that all firms interpret the questions in the same way. This is clearly an invalid assumption, and more accurate phrasing of survey questions might eliminate this problem to a certain extent. Specifically, it would appear that responses seem to

¹⁴ These variables were: employment expectations in the construction survey (EEMPCQ), observed employment in the industry survey (REMPIQ), current business/sales in the retail survey (CBUSRQ), and current business in the services survey (CBUSSQ).

represent only one or two future time periods, regardless of the wording of the question. As such, questions that require respondents to consider three or more periods ahead should be revised.

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APPENDIX

External Consistency Results

Dependent Variable	Independent Variable	β_1 Estimate	t-stat	R ²	Rho
ITPC	CWORKQ	0.24	1.82	0.12	----
MIEC	EEMPC(-1)	0.04	1.61	0.03	----
MIEC	(M)EEMPC(-1)	0.05	1.90	0.04	----
(M)MIEC	EEMPC(-1)	0.03*	1.99	0.04	0.43
(M)MIEC	(M)EEMPC(-1)	0.05*	2.11	0.05	0.44
MIEC	EEMPC	0.07*	2.72	0.07	----
MIEC	(M)EEMPC	0.04*	2.41	0.06	----
(M)MIEC	EEMPC	0.07*	2.74	0.08	0.40
(M)MIEC	(M)EEMPC	0.09*	3.26	0.10	0.44
QNHSC	EEMPCQ(-1)	0.09*	2.91	0.23	----
QNHSC(S)	EEMPCQ(-1)	0.12	0.86	0.05	0.59
MIPI	PRODL	0.16	1.81	0.04	-0.29
MIPI	(M)PRODL	0.14	1.28	0.02	-0.26
(M)MIPI	PRODL	0.10*	2.05	0.05	0.30
(M)MIPI	(M)PRODL	0.14	1.80	0.04	0.32
MIPI(S)	PRODL	-0.01	-0.22	0.00	-0.49
MIPI(S)	(M)PRODL	0.02	0.31	0.00	-0.49
(M)MIPI(S)	PRODL	-0.0006	-0.02	0.00	----
(M)MIPI(S)	(M)PRODL	0.02	0.5	0.00	----
EMPI	REMPIQ	0.11*	3.18	0.30	----
QNHSI	REMPIQ	0.06	1.54	0.08	-0.32
QNHSI(S)	REMPIQ	0.05*	2.14	0.14	----
PECG	CBUSRQ	0.03	0.68	0.02	-0.46
PECG(S)	CBUSRQ	0.02*	2.61	0.26	-0.55
PECG	CBUSRQ(+1)	0.05	1.29	0.06	-0.48
PECG(S)	CBUSRQ(+1)	0.03*	3.44	0.36	-0.6
MRSI	CBUSR	-0.3	-0.65	0.004	-0.34
MRSI	(M)CBUSR	-0.02	-0.38	0.002	-0.34
(M)MRSI	CBUSR	-0.02	-0.30	0.001	0.28
(M)MRSI	(M)CBUSR	-0.004	-0.57	0.004	0.28
MRSI(S)	CBUSR	-0.009	-0.51	0.00	-0.49
MRSI(S)	(M)CBUSR	-0.001	-1.10	0.01	-0.53
(M)MRSI(S)	CBUSR	-0.001	-0.21	0.005	0.22
(M)MRSI(S)	(M)CBUSR	-0.006	-0.89	0.02	0.21
QNHSR	REMPRQ	-0.02	-0.08	0.00	-0.57
QNHSR(S)	REMPRQ	0.0004	0.00	0.00	----

* Significant at 5 per cent level.

Rho values indicate that corrections have been made for AR(1).

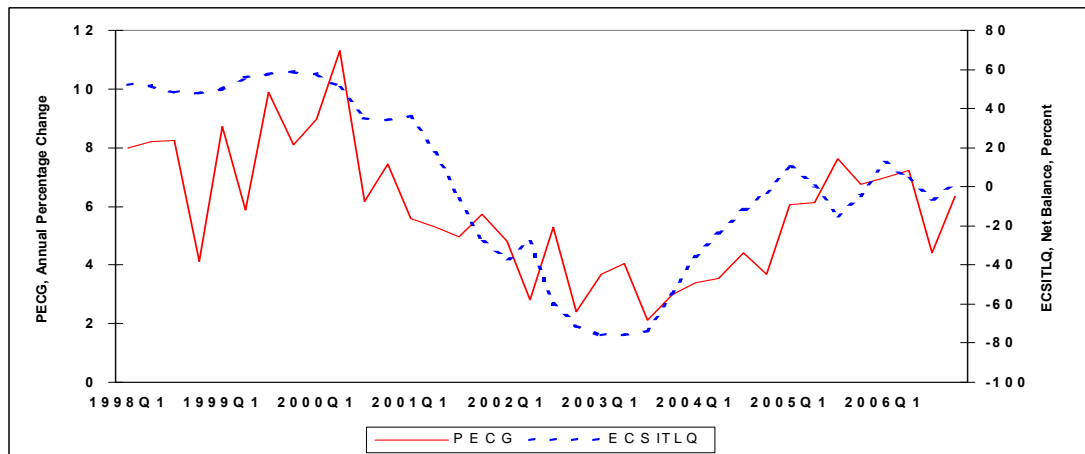
Lags are indicated between parentheses.

All dependent variables are expressed as monthly or quarterly percentage changes. (Annual percentage changes in the case of the consumer survey.)

An additional 'M' in parentheses in front of a variable indicates that three-period moving averages have been calculated. 'S' in parentheses following a variable indicates that it is seasonally adjusted.

Dependent Variable	Independent Variable	β_1 Estimate	t-stat	R ²	Rho
GDP	CBUSSQ	0.03	1.13	0.04	----
GDP(S)	CBUSSQ	0.02*	4.02	0.37	-0.39
QNHSS	REMP SQ	0.06	1.29	0.05	----
QNHSS(S)	REMP SQ	0.02	1.56	0.08	----
GDP	ECSITLQ	0.04*	3.92	0.31	----
GDP(S)	ECSITLQ	0.04*	3.88	0.31	----
QNHSSU	UEMPEQ(-4)	0.17*	2.20	0.15	0.77
MCPI	MPRICE L	0.04*	5.91	0.21	0.68
PECG	ECSITLQ	0.04*	6.93	0.59	----
PECG(S)	ECSITLQ	0.04*	6.92	0.58	----
PECG	ECSITEQ(-2)	0.06*	7.01	0.60	----
PECG(S)	ECSITEQ(-2)	0.06*	7.18	0.60	----
PECG	FINSITL	0.11*	5.34	0.46	----
PECG(S)	FINSITL	0.11*	5.36	0.46	----
PECG	FINSITE(-2)	0.12*	5.34	0.46	----
PECG(S)	FINSITE(-2)	0.12*	5.32	0.45	----
GDP	CSIQ	0.09*	3.91	0.31	----
GDP(S)	CSIQ	0.08*	3.85	0.31	----
PECG	CSIQ	0.08*	6.61	0.56	----
PECG(S)	CSIQ	0.08*	6.60	0.56	----
MRSI	CSIQ	0.02	0.61	0.00	0.92
MRSI(S)	CSIQ	0.02	0.57	0.00	0.93

Personal Expenditure and Survey Responses Regarding the Economic Situation



Personal Expenditure and the Overall Consumer Sentiment Index

