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AN EVALUATION OF BUSINESS SURVEY DATA FOR CYPRUS

Adamos Andreou
Economics Research Centre

Nicoletta Pashourtidou
Economics Research Centre

Christos Papamichael
Economics Research Centre

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Executive Summary

This study provides an investigation of the properties of the business survey data for Cyprus at the aggregate level and at the individual firm level. At the aggregate level, we evaluate the ability of confidence indicators to track developments in the economy and to forecast relevant reference (quantitative) economic series. At the micro level we investigate the consistency of the firms' responses by comparing their expectations stated in a given month with the realisations reported by the same participants in subsequent surveys. In addition, we examine whether the probability of correct predictions (i.e. expectations that are in agreement with realisations) varies with firm-specific characteristics.

The results of the pseudo out-of-sample forecasting exercise show that the inclusion of confidence indicators or employment expectations series in the forecasting models does not lead to more accurate forecasts for aggregate output (GDP) or employment growth than those obtained from simple univariate models. Nevertheless, substantial gains are achieved in forecasting output growth one quarter ahead in construction, manufacturing and services. The use of employment expectations in construction and manufacturing also generate considerable forecasting gains one quarter ahead over the univariate models for employment growth. The results also show that for sub-categories of the services sector (non-financial services, financial services, retail trade, tourism), the models with survey series outperform univariate models in one quarter ahead forecasts.

No strong or specific patterns emerged from the analysis at the individual firm level with respect to the firm size, except in the case of services. The larger the size of a firm in the services sector the higher the probability of a correct prediction about the firm's activity. This finding however is reversed in the case of employment predictions with the probability being negatively affected by the firm size. Responses obtained by fax or email, as opposed to those collected over the phone, are found to be associated with higher probability of correct predictions about activity and employment. Hence the use of fax and email should be encouraged since such methods give more time to interviewees to reflect on their responses.

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ΑΞΙΟΛΟΓΗΣΗ ΤΩΝ ΣΤΟΙΧΕΙΩΝ ΕΡΕΥΝΩΝ ΟΙΚΟΝΟΜΙΚΗΣ ΣΥΓΚΥΡΙΑΣ ΕΠΙΧΕΙΡΗΣΕΩΝ

Α. Ανδρέου, Ν. Πασιουρτίδου και Χ. Παπαμιχαήλ

ΠΕΡΙΛΗΨΗ

Στόχος του Δοκιμίου είναι η αξιολόγηση των στοιχείων από τις Έρευνες Οικονομικής Συγκυρίας που διεξάγονται στην Κύπρο μεταξύ επιχειρήσεων. Η αξιολόγηση βασίζεται σε συνολικά στοιχεία της οικονομίας και τομέων, καθώς και σε ατομικά στοιχεία επιχειρήσεων. Τα αποτελέσματα δείχνουν ότι η συμπερίληψη δεικτών οικονομικού κλίματος ή μεταβλητών για τις προσδοκίες απασχόλησης στα μοντέλα πρόβλεψης δεν οδηγεί σε ακριβέστερες προβλέψεις για ρυθμό μεταβολής του ΑΕΠ ή της απασχόλησης από απλά μοντέλα. Παρά ταύτα, επιτυγχάνεται σημαντική βελτίωση στην ακρίβεια των προβλέψεων για το ρυθμό ανάπτυξης ένα τρίμηνο μπροστά στους τομείς των κατασκευών, μεταποίησης και υπηρεσιών. Η χρήση των σειρών για τις προσδοκίες απασχόληση στις κατασκευές και μεταποίηση οδηγεί, επίσης, σε βελτιωμένη ικανότητα πρόβλεψης των μοντέλων για το ρυθμό μεταβολής της απασχόλησης στους αντίστοιχους τομείς σε σχέση με απλά μοντέλα για ορίζοντα ενός τριμήνου. Επιπλέον, μοντέλα με πληροφορίες από τις Έρευνες για υποκατηγορίες του τομέα των υπηρεσιών (μη χρηματοοικονομικές υπηρεσίες, χρηματοοικονομικές υπηρεσίες, λιανικό εμπόριο, τουρισμός) υπερτερούν έναντι απλών μοντέλων για ορίζοντα ενός τριμήνου.

Η ανάλυση της πιθανότητας ορθής πρόβλεψης σε επίπεδο επιχείρησης δείχνει ότι δεν προκύπτει κάποια συστηματική σχέση με το μέγεθος της επιχείρησης. Εξαίρεση αποτελεί ο τομέας των υπηρεσιών όπου μεγαλύτερες επιχειρήσεις σχετίζονται με υψηλότερη πιθανότητα ορθής πρόβλεψης της ζήτησής τους αλλά το αντίθετο ισχύει στην περίπτωση των προβλέψεων για την απασχόληση. Απαντήσεις που συλλέγονται μέσω τηλεομοιότυπου ή ηλεκτρονικού ταχυδρομείου σχετίζονται με υψηλότερη πιθανότητα ορθής πρόβλεψης από αυτές που συλλέγονται τηλεφωνικώς. Συνεπώς η χρήση τέτοιων μεθόδων διεξαγωγής των ερευνών θα πρέπει να ενθαρρύνεται αφού δίνουν περισσότερο χρόνο στους συμμετέχοντες να σκεφτούν τις απαντήσεις τους.

Γενικά η παρούσα ανάλυση έδειξε ότι οι Έρευνες Οικονομικής Συγκυρίας Επιχειρήσεων περιέχουν χρήσιμες πληροφορίες για τις μεταβολές στην οικονομική δραστηριότητα και απασχόληση στους τομείς των κατασκευών, μεταποίησης και υπηρεσιών, καθώς και σε υποκατηγορίες των υπηρεσιών. Η συμπερίληψη πληροφοριών από τις Έρευνες για σκοπούς βραχυπρόθεσμης πρόβλεψης βελτιώνει σημαντικά την ακρίβεια των προβλέψεων σε επίπεδο τομέων της οικονομίας. Οι προβλέψεις αυτές μπορούν να παρέχουν αρκετά νωρίς ενδείξεις για την πορεία των τομέων της οικονομίας καθώς και για τους τομείς που θα συνεισφέρουν σε μελλοντική ανάπτυξη. Ως εκ τούτου, τέτοιες προβλέψεις μπορούν να αποτελέσουν χρήσιμο εργαλείο (α) για φορείς χάραξης πολιτικής στην εισαγωγή νέων πολιτικών και ρυθμιστικών πλαισίων σε συγκεκριμένους τομείς και (β) για ιδιώτες για σκοπούς διευκόλυνσης επενδυτικών αποφάσεων.

1. INTRODUCTION

Business and Consumer Surveys (BCS) aim at gathering information regarding firms' and consumers' perceptions and expectations about their current and future economic conditions and about the economy as a whole. Moreover, the Surveys record perceptions and expectations about various firm- or household-specific economic variables such as prices, employment, production, demand, sales, savings, purchase of durables, etc. BCS data collected during a month are released at the end of each particular month, hence they are available long before the official publication of economic activity data, for example the Gross Domestic Product (GDP). Consequently, the usefulness of BCS data lies in the timeliness of the information they contain about future developments in macroeconomic series. This fast availability of the results along with the wide range of variables covered have made business and consumer surveys very useful for monitoring the current state of the economy by policy makers and businesses. Nevertheless, their usefulness for forecasting macroeconomic developments is not so clear, although such data are used for the construction of short-term forecasts for a number of economic series, for instance the growth rate of GDP.

In this study the focus is on the examination of the properties of the business survey data for Cyprus at the aggregate level and at the individual firm level. Numerous studies have investigated the influence of confidence indicators on various economic variables. Santero and Westerlund (1996) used mostly graphical and correlation analysis to explore the relationship between confidence indicators and output components. Their main findings suggest that business sentiment is an important tool for the assessment of the economic situation and for forecasting. They also found that consumer confidence indicators are much less useful than business confidence indicators for economic analysis due to their much looser relationship with output movements. Bodo et al (2010) proposed a number of forecasting models, ranging from simple univariate to more complex cointegrated systems and conditional models, to forecast the industrial production index in the euro area. The inclusion of the business confidence indicator along with the US industrial production index in the framework of a conditional error correction model provides the best explanation for movements in industrial production.

Lui et al. (2011) evaluate the ability of qualitative data to predict the firm level quantitative data in the UK business sector. They use data from the Industrial Trends Survey (ITS); the relevant quantitative data were collected from the Monthly Production Inquiry (MPI) of the UK Office for National Statistics. Their results suggest that qualitative data are related to quantitative data but they have little role to play as indicators of growth. Moreover, Mitchell et al. (2005) use a panel data set of firm level survey responses in order to construct disaggregate forecasts for output growth. They do so by using ordered discrete choice models that attempt to link the categorical

responses from the survey to the quantitative official data. Their results suggest that such an effort gives better predictions for the economic behaviour of the UK manufacturing output.

Kauppi et al. (1996) used variables from the business surveys in order to assess short-term forecasting models for industrial production during the Finnish recession in the early 90s. Their results suggest that during the recession there was an improvement in the predictive power of survey data. Mourougane and Roma (2003) investigate the usefulness of Economic Sentiment Indicator (ESI) and Industrial Confidence Indicator (ICI) for forecasting real GDP growth rates in the short run in selected euro area countries (Belgium, Spain, Germany, France, Italy and the Netherlands). They find that confidence indicators are important for the forecasting performance of GDP growth, except in the case of Spain, where their results are less satisfactory. Horvath (2012) examines whether confidence indicators improve the forecasts of economic activity in the case of Czech Republic by using a canonical VAR model. He concludes that confidence indicators do not accurately forecast future economic activity, although they are well correlated with GDP growth rates. Klein and Ozmuur (2010) use data for European countries to assess the use of survey results in forecasting. They use an AR model for manufacturing and found that surveys improve the forecasting performance. They also suggest using not just the headline index but also production expectations or the ESI for more accurate predictions. Claveria et al (2007) examine whether survey data improve the forecasts for some selected macroeconomic variables for the euro area and concluded that the inclusion of BCS data in the forecasting procedure has improved the performance of the models only in a limited number of cases.

For the practitioner who employs survey indicators regularly, a number of questions arise in relation to their quality. Do these data reflect adequately the developments in the economy as a whole, as well as the changes at a sector-specific level? Are the survey data useful for short-term forecasting of macroeconomic variables? Are any departures of expectations from realisations recorded in the surveys random, or do they vary systematically with respondent-specific characteristics? These are questions which we attempt to address in evaluating the quality of the Cyprus Business Survey data in this study.

The Economics Research Centre of the University of Cyprus as an institute that carries out these surveys, assesses on a regular basis the quality of these data and their usefulness in tracking movements in relevant reference series. The Centre has published various studies regarding the evaluation of BCS data (see Kontolemis et al; 2010, Pashourtidou and Tsiaklis; 2010a, 2010b, 2011). In general, the results showed that there is a strong link between the ESI and GDP growth rate in Cyprus and that BCS data capture quite well different trends both in the economy as a whole and in specific sectors. This study is conducted as part of the systematic assessment of the information content of the Cyprus Business Survey data at the aggregate and firm level. At the aggregate level, we evaluate the ability of confidence indicators to track

developments in the economy and to forecast relevant reference (quantitative) economic series. The analysis at the micro level aims at investigating the consistency of the firms' responses by comparing their expectations stated in a given month with the realisations reported by the same participants in subsequent surveys. In addition, we examine how the probability of correct predictions (i.e. expectations that are in agreement with realisations) relates to firm-specific characteristics.

The structure of the paper is as follows. Section 2 provides a description of the data and a preliminary analysis. Section 3 presents a forecasting exercise. Section 4 discusses the results of the analysis at the individual firm level. Section 5 provides some concluding remarks.

2. DATA AND PRELIMINARY ANALYSIS

2.1 Data

The data for this study are drawn from the Cyprus Business Surveys and from the Statistical Service of Cyprus. For the analysis at the aggregate level, we use quarterly data covering the period 2001Q2-2012Q4, as well as series at a monthly frequency over the period May 2001-December 2012.² For the analysis at the firm level, the dataset covers the period from May 2008 to December 2012.³

Typically, data collection for the Business Surveys is carried out between the first and third week of each month, through interviews with managers/directors of firms in services, retail trade, construction and industry. The sampling method assigns higher probability of selection to firms of larger size, so as to limit the inclusion in the selected sample of many small-size firms that are often associated with high non-response rates and, in some cases, noisy information, which is less relevant for the assessment of the overall economic activity.⁴ To the extent possible the aim is to interview the same firms every month.

The Survey asks participating firms to assess the recent trends in production, orders and stock of finished products (industry), the business activity in the past three months (construction, retail trade and services), their order books (construction), stocks (retail trade), turnover and employment (services), as well as to state their expectations about production (industry),

² Business survey data for Cyprus are available since May 2002 for construction, services and retail trade and since May 2001 for industry.

³ Since May 2008 the Economics Research Centre, in collaboration with RAI Consultants Ltd, has been conducting the Business and Consumer Surveys in Cyprus as part of the Joint Harmonised European Union Programme of Business and Consumer Surveys. Thus, the individual firm data are available since May 2008.

⁴ The monthly sample consists of 600 firms distributed as follows: 200, 200, 100 and 100 over services, retail trade, construction and industry respectively.

business activities (retail trade and services), orders to suppliers (retail trade), turnover (services), selling prices and employment. Individual data therefore, are in the form of qualitative responses. Aggregate survey data are given by the percentages of firms that provided positive or negative replies. Net balances, used as aggregate variables in the analysis, are defined as the difference between the proportions of positive from negative responses. These balances are employed in the calculation of the monthly confidence indicators.

The evaluation of the quality of survey data at the aggregate level requires comparisons with relevant quantitative economic series published by the Statistical Service. Here we focus on quarterly data from National Accounts such the Gross Domestic Product (GDP) and the Gross Value Added (GVA) of various sectors of the economy (in constant 2005 prices), as well as quarterly data from Employment Statistics (total and by sector). Moreover, as part of the assessment we also employ monthly indicators obtained from the Statistical Service and converted into quarterly frequency such as tourist arrivals and the value index of retail trade.

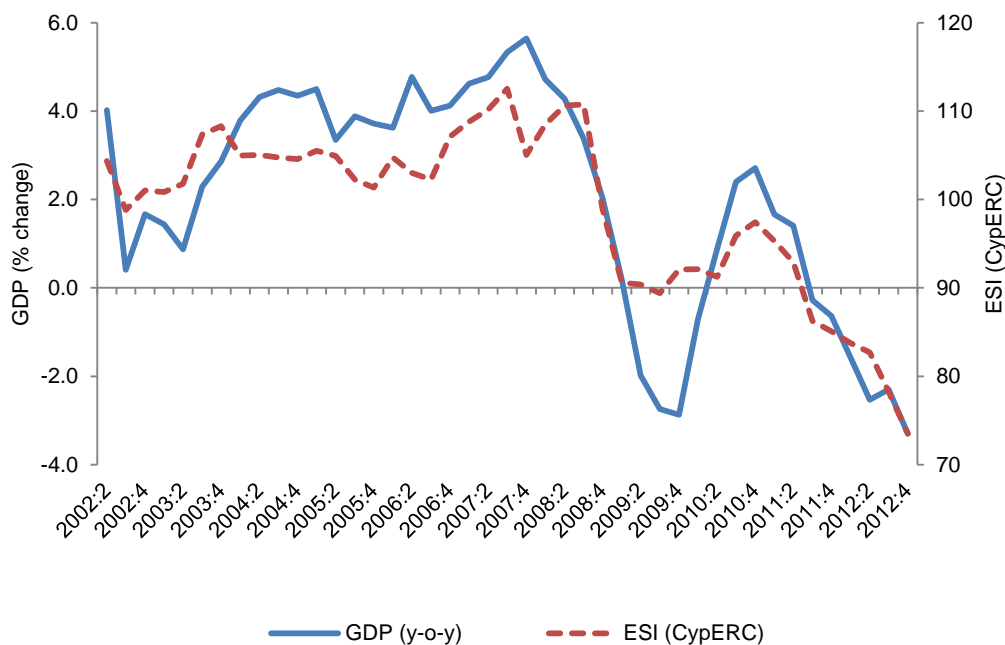
2.2 Business survey data vs. hard data: a preliminary analysis

In order to study the usefulness of business survey data regarding their ability to lead developments in macroeconomic series, first we check via a descriptive analysis the link between output growth and the corresponding confidence indicators from the surveys.

Figure 1 shows the growth rate of GDP along with the Economic Sentiment Indicator (ESI). ESI summarises firms' and consumers' perceptions and expectations about economic conditions collected via the Business and Consumer Surveys and it is a widely used indicator of firms' and households' confidence in the economy.⁵ It appears that there is a rather close link in the evolution of the two series over time. From the third quarter of 2002 until the beginning of 2008 ESI was evolving rather steadily with most of its peaks preceding those of GDP. During 2008 ESI started to fall as a result of the international financial crisis; the sharp drop in ESI was followed by the decline in GDP in 2009. After a small increase in ESI in 2010 tracking the short-lived economic recovery, a continuous decline has begun marking a period of economic downturn, increased uncertainty and low economic confidence.

⁵ The weights used in the calculation of ESI constructed by the Economics Research Centre (ESI CypERC) reflect the contribution of each sector to the GDP of Cyprus. For details about the construction of ESI see European Commission (2007).

Figure 1: GDP growth vs. ESI



Next we focus on specific sectors of the economy to investigate the extent of the association between Business Survey data and the Gross Value Added (GVA) of sectors published by the Statistical Service. Figure 2 presents the growth rate of GVA in the sectors of construction, manufacturing, services (excluding financial and insurance) and financial activities, together with the corresponding confidence indicators.^{6,7} Sector-specific confidence indicators are constructed from survey questions on firms' activity perceptions and expectations.⁸ The use of the sectors here is guided by the availability of both National Accounts and Business Survey data. For example the Retail Trade Survey results in the construction of the Retail Trade Confidence Indicator. However, the GVA published in the National Accounts covers wholesale and retail trade as well as some sectors (accommodation and food services, transport, information and communications) covered under the Services Survey. Thus, here we examine separately non-

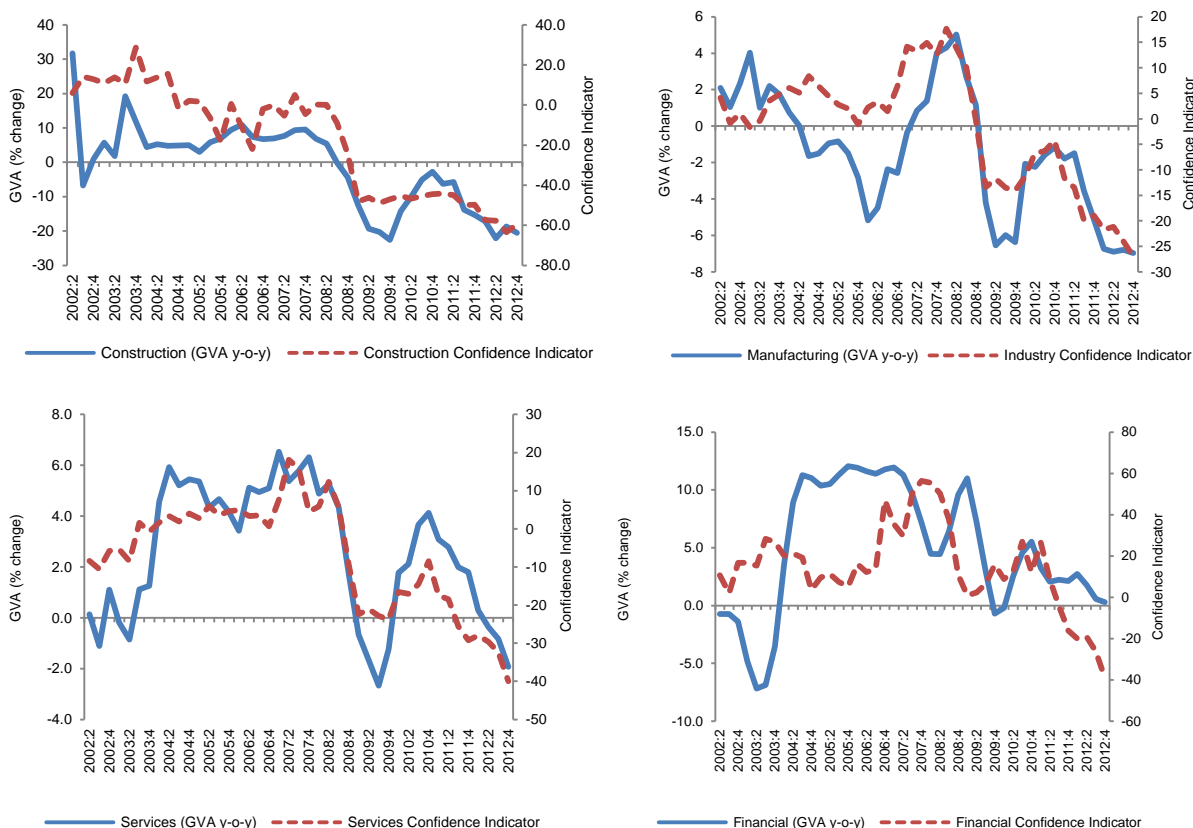
⁶ The services sector covers the following, with the NACE code in parentheses: Wholesale and retail trade (G), Transport, storage and communication (H), Accommodation and food service activities (I), Information and communications (J), Real estate activities (L), Professional, scientific and technical activities (M), Administrative and support service activities (N), Arts, entertainment and recreation (R), Other service activities (S, T).

⁷ The definition of the services confidence indicator here is different than that used by the European Commission (DG-ECFIN) as it combines the results from sub-sectors of the Services Survey (excluding financial and insurance activities and services auxiliary to financial and insurance activities) with those from the Retail Trade Survey in a new confidence indicator to represent the service sector defined above.

⁸ For details on the components of sector-specific confidence indicators see European Commission (2007).

services and services sectors singling out the financial services due to their importance in the economy.

Figure 2: Gross Value Added growth vs. Confidence Indicators



Note: Services excluding financial activities.

The GVA growth and the confidence indicator move closely together in the case of construction, manufacturing and services; the relation between the two series in financial services is less clear especially prior to 2007. The slowdown in output growth in construction at the end of 2008 which continued during 2009 was captured by the large drop in the confidence indicator during that period; ever since the confidence indicator has been registering negative values indicating the continuous deterioration in the activity of the sector. For manufacturing we observe a co-movement between GVA growth and the confidence indicator especially after 2005, with the latter providing leading signs of the turning points in manufacturing activity. The evolution of confidence indicator in services is closely linked to that of the GVA growth mainly after 2007, with the turning points of the two series in 2009 and 2010 being almost coincident. In the case of the financial sector the confidence indicator does not seem to track adequately activity, especially before 2007. Although the confidence indicator is quite volatile due to the small sample of firms surveyed every month, the steeper decline of confidence compared to the

slowdown in GVA over the period 2011-2012 has been signalling the distressing circumstances in the financial sector.

In order to quantify the degree of co-movement between survey variables and hard data we compute the pairwise correlation coefficients between the two sets of series. We extend the investigation beyond activity measures/indicators to examine also the relation between employment in the different sectors and employment expectations, as well as the association between monthly indicators (e.g. cement sales, tourist arrivals, etc.) and survey variables. Although the monthly indicators are hard data with leading properties with respect to National Accounts data, they are published much later than the survey indicators. A close relationship between monthly indicators and survey data can be useful in providing indications about future movements in activity.

Table 1 shows the correlation coefficient between GVA growth in the different sectors (construction, manufacturing, services and financial services) and the corresponding confidence indicators at various leads and lags. We obtain high positive correlations between GVA growth and confidence indicators in construction, manufacturing and services, while the correlations computed in the case of financial services are rather low. For construction, manufacturing and services, correlations reach their highest value between the first lag and current value indicating that the confidence indicators provide leading information about activity in these sectors. In the case of construction there is also high correlation at the first couple of leads casting doubt on the property of the confidence indicator to lead GVA growth. For the financial sector there is some weak evidence that the confidence indicator can offer some early signs (about three quarters in advance) about activity developments in the sector.

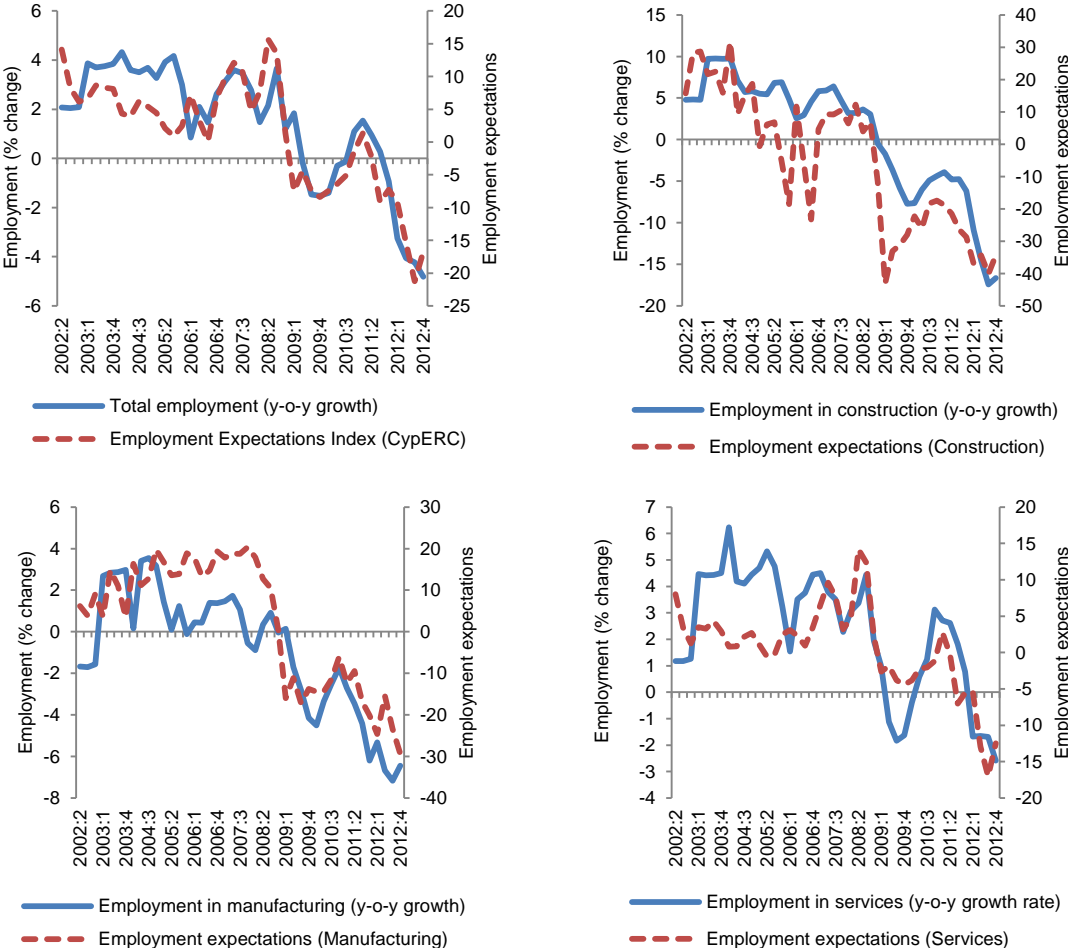
Table 1: Correlations between GVA growth and Confidence Indicators

GVA growth	Survey variable (lags/leads)								
	-4	-3	-2	-1	0	1	2	3	4
	Construction Confidence Indicator								
Construction	0.66***	0.74***	0.80***	0.83***	0.83***	0.83***	0.79***	0.74***	0.68***
	Industry Confidence Indicator								
Manufacturing	0.42***	0.60***	0.72***	0.80***	0.78***	0.67***	0.53***	0.33**	0.13
	Services Confidence Indicator								
Services	0.45***	0.61***	0.72***	0.77***	0.80***	0.68***	0.56***	0.44***	0.32*
	Services Confidence Indicator (excl. financial)								
Services (excl. financial)	0.38**	0.54***	0.69***	0.75***	0.78***	0.70***	0.57***	0.44***	0.28*
	Financial Services Confidence Indicator								
Financial activities	0.29*	0.32**	0.28*	0.22	0.19	0.19	0.20	0.25	0.31*

Note: The symbols ***, ** and * denote statistical significance at 1%, 5% and 10% respectively.

Employment expectations as stated in the business surveys appear to move closely together with employment growth in the economy as a whole as well as in different sectors. The relationship between firms' employment expectations and actual employment seems to be stronger during the slowdown of the economy as depicted in Figure 3.

Figure 3: Employment growth vs. Employment expectations



Note: Services including financial activities.

Table 2 presents the correlation between the number of employees and the firms' expectations of future employment as given in the surveys; it also shows the correlation between the total number of employees in the economy and an employment expectations indicator constructed as a weighted average of employment expectations in the different sectors surveyed. Employment is expressed in growth rates compared to the same quarter of the previous year.

Apart from the financial sector, the correlations are high, significant and with the right sign. In construction the highest correlation is observed at the first lag with correlation values at other leads/lags also being quite high. High correlations are also obtained for manufacturing with the

value peaking at the first lead. In services the strongest correlations are found at the first lag and current value. In the financial sector the correlations are insignificant and in most cases with the wrong sign. This is probably due to the small number of firms from the financial sector participating in the Services Survey. Moreover in the financial sector demand for labour might be less elastic to changes in output than in other sectors.

Total employment growth is positively and significantly correlated with the employment expectations indicator; the maximum correlation is found at the first lag and current value. The high and significant correlations found at various leads both for total employment and for sectors could undermine the desirable leading properties of expectations data.

We also computed correlations between various monthly economic variables representing hard data and business survey indicators (Table A1). Correlations are quite high with the maximum value usually obtained at current values (i.e. zero lag/lead). In the case of retail trade and manufacturing, confidence indicators yield higher correlations with the relevant series than firms' responses on perceptions and expectations. Relatively lower correlations are computed between the growth rate of tourist arrivals and a confidence indicator calculated for accommodation and food services.

Table 2: Correlations between employment growth and employment expectations

Employment growth	Survey variable (lags/leads)									
	-4	-3	-2	-1	0	1	2	3	4	
	CypERC Employment Index									
Total	0.53***	0.65***	0.78***	0.86***	0.86***	0.81***	0.73***	0.63***	0.52***	
	Construction Employment Expectations									
Construction	0.73***	0.80***	0.84***	0.85***	0.83***	0.80***	0.78***	0.74***	0.67***	
	Industry Employment Expectations									
Industry	0.75***	0.80***	0.80***	0.83***	0.82***	0.84***	0.77***	0.73***	0.73***	
	Services Employment Expectations									
Services	0.15	0.32**	0.51***	0.63***	0.67***	0.63***	0.55***	0.40**	0.26	
	Services Employment Expectations (excl. financial)									
Services (excl. financial)	0.31*	0.48***	0.64***	0.72***	0.73***	0.66***	0.55***	0.39**	0.29*	
	Financial Employment Expectations									
Financial	-0.31*	-0.41***	-0.22	-0.12	-0.02	0.11	0.07	0.17	0.17	

Note: The symbols ***, ** and * denote statistical significance at 1%, 5% and 10% respectively

In this section we found high and significant correlations between activity growth and confidence indicators as well as between employment growth and employment expectations. The findings suggest that business survey data could form useful predictors of output and employment

growth for the economy and/or for some sectors. In the next section we investigate whether business survey indicators improve the forecasting performance of simple dynamic models for activity and employment.

3. FORECASTING PERFORMANCE

We conduct a simple pseudo out-of-sample forecasting exercise to evaluate the ability of business survey data to predict output and employment growth for the economy as a whole as well as for specific sectors. We employ quarterly data covering the period 2001Q2-2012Q4 as output and employment series are in quarterly frequency and because survey data are available from 2001Q2 onwards. All data used in the forecasting exercise are seasonally adjusted. The forecasts computed are h -step ahead for a horizon of one to four quarters.

The variable to be forecasted is defined as $y_t = \ln Z_t - \ln Z_{t-1}$ where Z_t can be the level of GDP, the level of GVA in construction, manufacturing or services, or the level of total employment, or employment in the aforementioned sectors.⁹ The candidate predictors denoted by x_t can be either the level or the first difference of a business survey variable/indicator.¹⁰ Moreover in the forecasting models the variable of interest is expressed at annual rate and as a function of the forecasting horizon, h . Specifically, $y_{t+h}^h = (400/h)(\ln Z_{t+h} - \ln Z_t)$ for $h = 1,2,3,4$ which denotes annualised output or employment growth over the next h quarters. The h -step ahead regression model used for computing the forecasts for $h = 1,2,3,4$ is given by

$$y_{t+h}^h = \alpha + \sum_{i=0}^p \beta_i x_{t-i} + \sum_{i=0}^q \gamma_i y_{t-i} + e_{t+h}^h \quad (1)$$

where e_{t+h}^h is the error term. The estimation of the parameters and the selection of the number of lags (p, q) in (1) is carried out in a pseudo out-of-sample setup using recursive OLS and recursive determination of the lag length based on the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). The forecast constructed at date t for period $t+h$ is computed using data up to date t , thus no additional projections for predictors are required (see e.g. Stock and Watson 2004). The choice of the number of lags for predictor x_t is between one and three and for the dependent variable y_t between zero and three. The model in (1) is known

⁹ In the Appendix we also give the results in the case where the series to be forecasted is the growth rate of GVA in services (excluding financial activities) and in financial services as well as the growth rate of retail trade value index and of tourist arrivals.

¹⁰ The transformations applied to business surveys series in the literature vary as some studies use such indicators in levels i.e. no transformation (e.g. Banerjee et al. 2005, Stock and Watson 2002), while others transform these series in first differences (e.g. Angelini et al. 2008, Ludvigson and Ng 2009). The use of levels is based on the fact that survey variables are constructed as the difference between the percentages of “positive” and “negative” replies. However, stationarity tests can indicate the presence of non-stationarity in the business survey variables hence the first difference transformation can render the series stationary.

as an Autoregressive Distributed Lag (ADL) model. For comparison purposes we also estimate simple univariate models such as the random walk for output and employment (i.e. $\ln Z_t$) and the autoregressive model (AR) of various orders e.g. one, four, or the order chosen by AIC and BIC. The random walk (RW) model is obtained from equation (1) by setting $\beta_i = 0, i = 1, \dots, p$ and $\gamma_i = 0, i = 1, \dots, q$. The AR model of order q is obtained by setting $\beta_i = 0, i = 1, \dots, p$ in (1); the maximum number of lags q is four.

The models are estimated using the first T_0 observations of the sample (in our exercise $T_0 = 24$) and the first pseudo out-of-sample forecast is computed in period $t = T_0 + h$. The recursive procedure requires increasing the sample size by one observation, re-estimating the models and computing the forecast in period $t = T_0 + h + 1$. The procedure is repeated up to the end of the sample period, T , so that the pseudo out-of-sample forecast computed in period $t = T - h$ refers to period T which is the last date for which we have observed data. The h -quarter ahead forecast for y_{t+h}^h computed in period t is given by $\hat{y}_{t+h|t}^h$. Then the Mean Squared Forecast Error (MSFE) used in evaluating the forecasting performance of each model at horizon h is given by

$$MSFE = \frac{1}{(T-h)-(T_0+h)} \sum_{T_0}^{T-h} (y_{t+h}^h - \hat{y}_{t+h|t}^h)^2 \quad (2)$$

where T here denotes the number of observations in the sample (in our exercise $T = 42$).¹¹ Then the square root of the MSFE (RMSFE) computed from each model m is divided by the RMSFE of the random walk model to obtain the relative RMSFE (relRMSFE) for model m i.e.

$$relRMSFE_m = \frac{RMSFE_m}{RMSFE_{RW}} \quad (3)$$

Thus the performance of each model in terms of forecast error is compared to that of a simple model. If the relRMSFE for model m is less than unity, then model m outperforms the random walk as it yields lower forecast error on average than the simple random walk. If the relRMSFE for model m is greater than unity then the forecasting performance of model m is inferior to that of the random walk.

Table 3 shows the relRMSFE associated with the different models used in the forecasting exercise for the growth rate of output (GDP and GVA of construction, manufacturing and services including financial activities) with the random walk model being the benchmark. The three sectors covered by the forecasting exercise represent two thirds of GDP with the services sector accounting for 51% of GDP; the shares of construction and manufacturing over the period under examination are 9% and 7% respectively.

¹¹ The sample period spans 2001Q2-2012Q4 hence 47 observations; the dependent variables however are in q-o-q growth rates and at most four lags are allowed in the univariate models leaving 42 available observations for estimation.

Table 3: Forecasting performance (RMSFE) of univariate and ADL models relative to random walk, output growth

Horizon	GDP growth				GVA growth, Construction				GVA growth, Manufacturing				GVA growth, Services			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RMSFE: Random Walk	0.67	1.45	2.43	2.79	11.28	11.31	12.89	13.15	3.09	3.29	3.58	3.59	1.38	1.39	2.02	2.33
Models																
<u>Univariate</u>																
Random Walk Benchmark	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AR(1)	1.24	1.39	1.26	0.94	1.00	1.19	1.28	1.09	1.02	0.89	0.91	0.91	1.08	1.28	1.05	0.95
AR(4)	1.29	1.53	1.24	1.01	0.99	1.35	1.56	1.29	1.03	0.95	0.94	1.03	1.05	1.42	1.18	0.96
AR(AIC)	1.34	1.78	1.43	1.05	0.99	1.30	1.31	1.05	0.98	0.89	1.01	0.97	1.08	1.35	1.05	0.95
AR(BIC)	1.64	1.50	1.37	0.94	1.00	1.32	1.29	1.09	1.00	0.93	1.05	0.97	1.08	1.28	1.05	0.99
<u>ADL (AIC)</u>																
<u>Predictors, levels</u>																
ESI (CypERC)	1.20	1.25	1.46	1.92	-	-	-	-	-	-	-	-	-	-	-	-
Construction Conf. Ind.	1.34	1.44	1.50	1.02	0.41	1.00	1.21	0.98	-	-	-	-	-	-	-	-
Industry Conf. Ind.	1.14	1.26	1.46	1.86	-	-	-	-	0.44	0.81	0.77	1.33	-	-	-	-
Services Conf. Ind.	1.13	1.34	1.33	1.66	-	-	-	-	-	-	-	-	0.62	1.43	0.95	1.98
Employment expectations ¹	1.53	1.48	1.69	1.84	0.43	1.00	1.22	1.10	0.46	0.73	1.01	1.06	0.72	1.43	1.62	2.27
Activity perceptions ²	-	-	-	-	0.49	1.04	1.25	0.99	0.51	0.80	1.10	1.22	0.67	1.53	1.04	1.82
Activity expectations ³	-	-	-	-	-	-	-	-	0.47	0.86	0.87	1.13	0.54	1.32	1.52	1.99
<u>ADL (BIC)</u>																
<u>Predictors, levels</u>																
ESI (CypERC)	1.20	1.28	1.46	1.92	-	-	-	-	-	-	-	-	-	-	-	-
Construction Conf. Ind.	1.39	1.52	1.40	1.01	0.35	1.00	1.13	0.84	-	-	-	-	-	-	-	-
Industry Conf. Ind.	1.20	1.36	1.54	1.84	-	-	-	-	0.42	0.78	0.76	1.21	-	-	-	-
Services Conf. Ind.	1.13	1.33	1.35	1.42	-	-	-	-	-	-	-	-	0.65	1.34	0.97	1.85
Employment expectations ¹	1.48	1.76	1.73	1.70	0.38	1.00	1.14	0.98	0.46	0.72	0.91	0.97	0.71	1.45	1.57	2.31
Activity perceptions ²	-	-	-	-	0.43	1.04	1.15	0.93	0.51	0.88	1.12	1.20	0.68	1.54	1.21	1.36
Activity expectations ³	-	-	-	-	-	-	-	-	0.47	0.81	0.82	1.03	0.54	1.26	1.45	1.96
<u>ADL (BIC)</u>																
<u>Predictors, first diff.</u>																
ESI (CypERC)	1.16	1.23	1.03	0.97	-	-	-	-	-	-	-	-	-	-	-	-
Construction Conf. Ind.	1.24	1.22	1.31	1.07	0.51	1.09	1.38	1.30	-	-	-	-	-	-	-	-
Industry Conf. Ind.	1.22	1.20	1.22	1.14	-	-	-	-	0.45	0.73	0.74	1.10	-	-	-	-
Services Conf. Ind.	1.07	1.21	1.01	0.93	-	-	-	-	-	-	-	-	0.61	1.43	1.22	1.40
Employment expectations ¹	1.38	1.42	1.41	1.04	0.50	1.10	1.34	1.23	0.52	0.96	0.97	1.09	0.71	1.10	0.95	1.00
Activity perceptions ²	-	-	-	-	0.54	1.13	1.37	1.25	0.53	0.76	1.10	1.08	0.64	1.50	1.21	1.23
Activity expectations ³	-	-	-	-	-	-	-	-	0.47	0.63	0.79	1.11	0.60	1.17	0.94	1.18
<u>ADL (BIC)</u>																
<u>Predictors, first diff.</u>																
ESI (CypERC)	1.24	1.29	0.98	1.04	-	-	-	-	-	-	-	-	-	-	-	-
Construction Conf. Ind.	1.29	1.36	1.29	1.07	0.50	1.13	1.34	1.29	-	-	-	-	-	-	-	-
Industry Conf. Ind.	1.38	1.35	1.27	1.13	-	-	-	-	0.44	0.74	0.74	1.09	-	-	-	-
Services Conf. Ind.	1.18	1.27	1.00	0.94	-	-	-	-	-	-	-	-	0.62	1.44	1.21	1.39
Employment expectations ¹	1.48	1.49	1.36	1.04	0.51	1.14	1.29	1.29	0.51	0.89	0.97	1.10	0.57	1.07	0.95	1.01
Activity perceptions ²	-	-	-	-	0.53	1.14	1.39	1.35	0.53	0.85	1.10	1.08	0.63	1.49	1.21	1.21
Activity expectations ³	-	-	-	-	-	-	-	-	0.49	0.72	0.83	1.08	0.62	1.16	0.97	1.04

Notes:¹ In the model for GDP growth employment expectations cover all sectors considered in business surveys (construction, manufacturing and services including retail trade), while in the models for sector-specific GVA growth employment expectations refer to the corresponding sector.

² Activity perceptions refer to firms' assessment about their building activity, production and turnover/demand in the last three months in the sectors of construction, manufacturing and services respectively.

³ Activity expectations refer to firms' expectations about developments in their production and turnover/demand in the last three months in the sectors of manufacturing and services respectively. Firms in the construction sector are not explicitly asked about their activity expectations.

The results of Table 3 suggest that the use of business survey data as predictors in the construction of short-run forecasts for GDP growth does not yield any gains relative to the simple random walk model or relative to other univariate models. Nevertheless, the forecasting exercise reveals that business survey data can substantially improve on the forecasting performance of univariate models for the GVA growth of sectors especially one quarter ahead.

When the business survey data are used in levels, the models with the Construction Confidence Indicator outperform both the univariate models and models with individual survey questions (e.g. activity perceptions) in forecasting the GVA growth in the construction sector for the one-quarter horizon. Employment expectations in construction also generate considerable gains in forecasting the output growth of the sector one quarter ahead. In the case of the manufacturing sector business survey data are found to be useful for forecasting beyond the one-quarter horizon. For one and three quarters ahead the Industry Confidence Indicator seems to be the best predictor for the sector GVA growth; for two quarters ahead manufacturing firms' employment expectations are associated with the best forecasting performance. The use of individual survey questions (turnover expectations) can lead to more accurate forecasts about the growth rate of the GVA of services one quarter ahead than the use of the Services Confidence Indicator.

When the predictors are transformed into first differences prior to estimation and forecasting the pattern of the results is similar to that discussed above in the case where the predictors are used in the models in levels. In particular the inclusion of business survey variables does not seem to improve the forecasting performance in the case of GDP growth (all horizons) or in the case of GVA growth in construction and services for horizons beyond the first quarter. However, substantial gains are achieved in forecasting GVA growth in construction, manufacturing and services one quarter ahead. The gains are of about the same magnitude as in the case where the survey variables in levels are used as predictors. Moreover, in the case of the manufacturing sector the inclusion of survey information and in particular of the Industry Confidence Indicator and production expectations can lead to more accurate forecasts for horizons of two and three quarters ahead than those obtained from simple univariate models.

Table 4 presents the results of the forecasting exercise for employment growth. In forecasting the growth rate of employment the results show that business survey data do not improve upon the forecasting ability of simple univariate models in the case of total employment and employment in services.

Table 4: Forecasting performance (RMSFE) of univariate and ADL models relative to random walk, employment growth

	Economy				Construction				Manufacturing				Services			
Horizon	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RMSFE: Random walk	1.36	1.41	2.54	3.61	5.89	6.39	8.57	10.47	2.81	2.84	3.41	4.05	1.02	1.13	2.14	2.96
Models																
<i>Univariate</i>																
Random walk: Benchmark	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AR(1)	0.99	1.18	1.22	1.01	1.00	0.81	0.84	0.76	0.96	0.97	1.14	1.03	1.06	1.99	1.73	1.12
AR(4)	1.07	1.17	1.21	1.03	0.98	0.82	0.87	0.82	0.95	0.91	1.11	0.93	1.14	2.15	1.91	1.19
AR(AIC)	0.99	1.15	1.13	0.94	1.01	0.85	0.88	0.78	0.95	0.98	1.20	1.01	1.00	2.10	1.75	1.07
AR(BIC)	0.99	1.04	1.20	1.05	1.01	0.85	0.92	0.80	0.95	0.99	1.24	1.08	1.00	1.54	1.66	1.09
<i>ADL (AIC)</i>																
Employment expectations ¹																
Level	1.22	2.30	1.65	1.05	0.35	0.77	0.81	0.82	0.47	1.09	1.47	1.69	2.20	4.15	2.64	1.49
First difference	1.58	2.47	1.67	1.15	0.37	0.76	0.94	0.85	0.66	1.11	1.34	1.39	2.27	3.61	2.47	1.16
<i>ADL (BIC)</i>																
Employment expectations																
Level	1.25	2.26	1.63	1.03	0.36	0.78	0.85	0.85	0.48	1.01	1.47	1.52	2.09	4.04	2.78	1.47
First difference	1.51	2.47	1.70	1.15	0.38	0.78	0.95	0.91	0.70	1.21	1.42	1.41	2.11	3.52	2.77	1.16

Note: ¹ In the model for employment growth for the total economy the employment expectations variable covers the sectors considered in the business surveys (construction, manufacturing and services including retail trade), while in the models for sector-specific employment growth the employment expectations series for the corresponding sector is used.

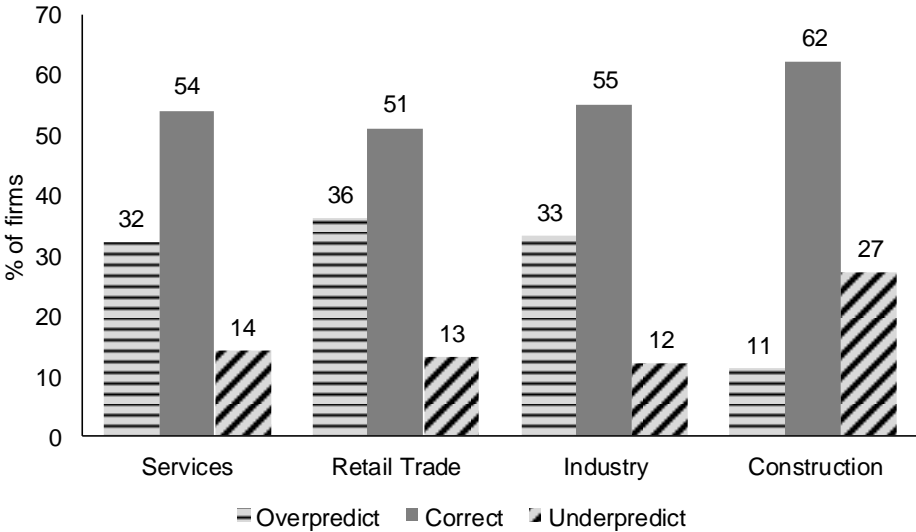
The use of employment expectations in construction and manufacturing expressed in levels or differences generate considerable forecasting gains over the univariate models for employment growth in the corresponding sectors one quarter ahead. In the construction sector employment expectations can improve to a limited extent the forecasting ability of traditional benchmark models for a two-quarter ahead horizon.

Examining in more detail sub-categories of the services sector, which is the largest sector under examination, we find that models with survey data outperform univariate models in forecasting one quarter ahead. In particular this is found for the GVA growth in non-financial and financial services as well as for the percentage change of retail sales (value index) and tourist arrivals. The most noticeable gains relate to the financial services where the use of survey information can lower forecast errors by up to 60%. Moreover, ESI(CypERC) is found to be a useful predictor of tourist arrivals growth for forecasting two and three quarters ahead. The detailed results are given in the Appendix (Table A3).

4. ANALYSIS OF INDIVIDUAL FIRM DATA

It is of great importance to examine whether firms can correctly assess the future trends in economic activity and employment. In order to achieve that we conduct a more detailed analysis of individual data to compute the percentages of firms that offered correct predictions, i.e. their expectations matched their realisations. We use an unbalanced panel dataset from May 2008 to December 2012, in order to examine whether expectations stated in a particular month are consistent with realisations registered by the surveys in following months. Our analysis focuses on economic activity variables (i.e. demand in services, sales in retail trade, production in manufacturing and order books in construction) and employment¹². In most cases, respondents are asked one question regarding actual outcomes over the past three months, and another question regarding expectations over the next three months. Thus, we compare the responses concerning outcomes in a particular month (e.g. August 2008) to expectations expressed by respondents three months ago (e.g. May 2008). This comparison can reveal the extent to which expectations stated by respondents are realised, or, in other words, how accurately they can predict their future economic activity and employment.

Figure 4: Percentage of firms that provided correct (incorrect) predictions, economic activity

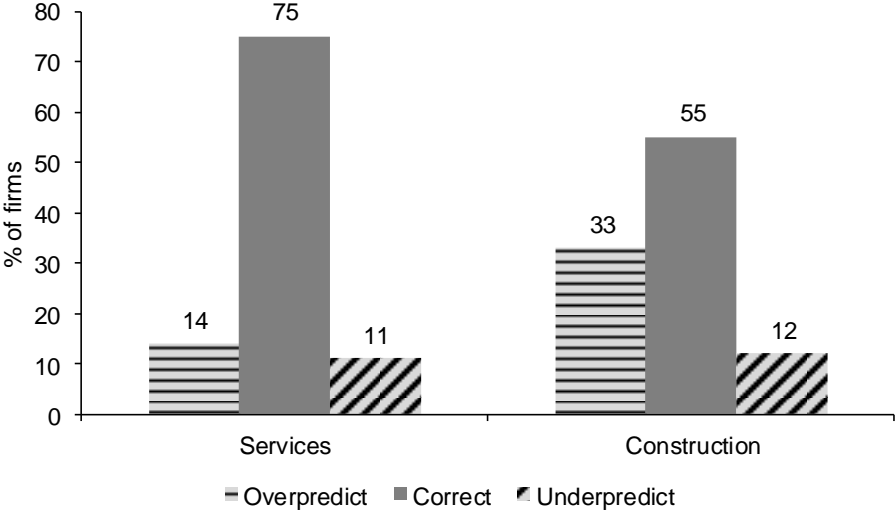


¹² The survey in the construction sector does not ask directly about expected economic activity. Thus, we compare the responses about current activity trends (realisations) with those about the order books since the latter incorporate expectations. The construction survey includes a question about expected employment but does not include a question on current employment, thus we use again the activity trends as realisations since construction is a labour intensive sector. Furthermore, the industry and retail trade surveys do not include questions on employment changes over the past three months.

Figure 4 presents the percentage of firms that predicted correctly, overestimated or underestimated their economic activity. By correct prediction we mean that the expectations expressed by a firm in a given month about its economic activity in the next three months, matched the realisation stated by the same firm three months later. For example, a firm in the services sector interviewed in May reported an expected increase in demand in the next three months and the same firm when surveyed again in August stated that its demand in the last three months increased. By overestimation (underestimation) we mean that the expected change in activity reported by the respondent was higher (lower) than the actual change in activity stated by the same respondent three months later.

In more than half of the cases firms' expectations matched their realisations. The highest percentage of correct predictions is observed in construction (62%). In services, retail trade and industry there appears to be a tendency for overprediction with about one third of the firms in each sector being more optimistic about their future activity compared to their subsequent realisations. A smaller percentage (12%-14%) expected lower demand, sales or production than their actual outcomes. In construction the opposite holds: 27% of the cases underpredicted their activity, while 11% had been expecting better outcomes than the realisations stated later. Furthermore, in services and industry, the vast majority of cases that predicted correctly the change in their demand and production were those that had not expected any changes in their economic activity, while in retail trade and construction the majority of the firms correctly predicted the decline in their activity (Table A2, Appendix).

Figure 5: Percentage of firms that provided correct (incorrect) predictions, employment



The percentage of firms in services and construction that conjectured accurately or overestimated/underestimated the change in their employment is shown in Figure 5. In services, there is a quite high proportion of correct predictions (75%). As far as the construction sector is concerned, even though for half of the cases expectations matched realisations, a significant proportion (33%) overestimated the change in the number of their employees, since in the realisations registered by the survey employment remained either unchanged (instead of higher as expressed in expectations) or decreased (instead of unchanged or higher as reported in expectations). The majority of the firms that provided correct predictions are those who stated that number of their employees would remain the same (Table A1, Appendix).

Furthermore, we estimated probit models to examine the effects of various firm-specific characteristics on the probability of correct prediction. More specifically, the dependent variables are binary i.e. they take the value 1 if the firm's expected change in activity/employment in the next three months, stated in month t (e.g. May), agrees with the firm's changes in activity/employment in the last three months reported in month $t+3$ (e.g. August), and 0 otherwise. Table 5 shows the estimated marginal effects for activity represented by demand, turnover, production and order books in services, retail trade, industry and construction respectively. The independent variables include firm's years of operation, firm size, legal entity, district, type of interview and subsector of activity. We also include dummy variables to control for the year of the interview.

The probability that a firm correctly predicts its activity in the short run is higher for larger firms in services and industry; the opposite is found for firms in retail trade, i.e. medium-sized firms (10-49 employees) are associated with higher probability of correct predictions. In construction the size of the firm is not found to affect the probability of correct predictions.

The type of interview seems to influence strongly firm's ability to give correct predictions in all sectors except construction. In services and industry, firms answering by fax are the most likely to give precise predictions; firms that respond via email are more likely than those interviewed over the phone to predict correctly. In retail trade firms that answer by fax are associated with the highest probability that their expectations match their realisations. However the use of e-mail does not affect the probability of correct predictions in retail trade.

The legal form of the firm affects the probability of correct predictions only in services and to a smaller extent in retail trade. Private firms in services are less likely than firms of other legal forms to state demand expectations that will later match their actual demand. Furthermore, partnerships in retail trade appear to be the least successful in the sector in predicting their future turnover.

Table 5: Estimated marginal effects, economic activity ¹

	Services	Retail Trade	Industry	Construction
<i>Firm size (1-9) ²</i>				
10 - 49	-0.011 (0.014)	-0.029 (0.013)**	-0.013 (0.020)	0.004 (0.018)
50 - 249	0.045 (0.017)***	-0.006 (0.025)	-0.010 (0.027)	-0.000 (0.030)
250+	0.094 (0.024)***	-0.067 (0.082)	0.127 (0.064)*	-0.204 (0.071)
<i>Interview type (Phone) ²</i>				
Fax	0.101 (0.023)***	0.065 (0.022)***	0.082 (0.025)***	-0.035 (0.025)
E-mail	0.070(0.016)***	-0.017 (0.024)	0.060 (0.027)**	0.029 (0.028)
<i>Legal Form (Ltd) ²</i>				
Private Firm	-0.059(0.019)***	0.001 (0.017)	0.015 (0.030)	-0.007 (0.032)
Partnership	0.003(0.02)	-0.075 (0.041)*	0.092 (0.056)	-0.002 (0.045)
<i>District (Nicosia) ²</i>				
Limassol	0.027(0.016)*	0.006 (0.013)	0.066 (0.020)***	-0.018 (0.021)
Larnaca	0.025(0.021)	0.013 (0.016)	-0.016 (0.020)	0.037 (0.021)*
Famagusta	0.012 (0.024)	0.044 (0.033)	0.089 (0.043)**	-0.017 (0.039)
Pafos	0.035 (0.018)**	0.042 (0.025)*	0.067 (0.035)*	0.069 (0.021)***
Years of operation	0.000 (0.000)	0.000 (0.000)	-0.000 (0.001)	0.003 (0.001)***
<i>Subsectors</i>				
<i>(Hotels & Restaurants) ²</i>				
Transportation	-0.066 (0.021)***			
Financial	0.042 (0.022)*			
Other Services	-0.024 (0.014)*			
<i>(Retail sale of other goods) ²</i>				
Sale of motor vehicles		0.030 (0.030)		
Sale of accessories		-0.001 (0.018)		
Sale of food, beverages, tobacco		0.026 (0.019)		
Sale of automotive fuel		-0.006 (0.035)		
<i>(Non-durable consumer goods) ²</i>				
Durable consumer goods			0.021 (0.032)	
Investment goods			-0.037 (0.027)	
Intermediate goods			-0.001 (0.018)	
<i>(Buildings) ²</i>				
Civil engineering				0.078 (0.029)**
Specialised construction activities				0.076 (0.017)***
<i>Years (2010) ^{2,3}</i>				
2008	0.009 (0.020)	-0.023 (0.019)	-0.009 (0.026)	-0.015 (0.026)
2009	-0.014 (0.017)	0.008 (0.017)	-0.013 (0.023)	0.040 (0.022)*
2011	0.017 (0.017)	0.008 (0.016)	0.001 (0.023)	0.049 (0.021)**
2012	0.005 (0.018)	0.037 (0.018)**	0.018 (0.025)	0.014 (0.024)
Number of observations	7771	8489	4255	4314

Notes:

¹ Robust standard errors are provided in parentheses. The symbols ***, ** and * denote statistical significance at 1%, 5% and 10% respectively.

² The characteristic in brackets denotes the group with which comparisons are made.

³ The year in which expectations were stated.

The district where a firm is located is found to affect the probability of correct prediction in all sectors. In services the probability is higher for companies in Pafos followed by firms in

Limassol, while in retail trade only those located in Pafos are found to have a higher chance of predicting correctly their turnover in the short run. In industry, the highest likelihood of correct predictions about production relates to business in Famagusta followed by those in Limassol and Pafos. In construction the probability of correct predictions is significantly higher for building companies in Pafos and to a smaller degree for those in Larnaca.

The number of years that a company operates has a positive effect on the probability of correct prediction for firms in construction, whereas it does not impact the ability of companies to provide correct predictions about their activity in other sectors. Moreover, the probability of correct predictions is found to vary between subsectors in services and construction. In particular, firms engaged in the transportation and other services are associated with significantly lower probability of correct prediction, while firms in the financial sector are the most likely to predict correctly developments in their future demand. In construction, firms engaged in civil engineering projects and specialised construction activities have a better chance of having their reported expectations realised than firms dealing with building activities. In retail trade and industry the subsector where firms operate does not affect their chance of making accurate predictions about their activity.

The year when expectations were stated influences the probability of correct predictions in the case of retail trade and construction.¹³ Firms in retail trade interviewed about their turnover expectations in 2012 were the most likely to provide outcomes that matched their expectations in subsequent surveys. In construction the highest probability of correct predictions is found in 2009 and 2011.

The effects of various firm characteristics on the probability of correct predictions about employment in the short run are given in Table 6. Larger firms are the least likely to give precise predictions about employment in services. In particular, the larger the firm the smaller the probability that employment expectations are realised. In construction larger firms (50-249 employees) are the most likely to predict developments in their employment accurately. Although the method of interview influences significantly activity predictions in services but not in construction, we obtain the opposite result in the case of employment predictions. Firms in construction answering by e-mail or fax are more likely to give accurate predictions than the firms interviewed over the phone.

¹³ In the majority of cases the years when expectations (concerning the next three months) were stated coincide with the years when realisations (during the past three months) were reported. The dummy variables for the years when realisations were reported were not found to be significant either with or without the inclusion of the years when expectations were reported.

Table 6: Estimated marginal effects, employment ¹

	Services	Construction
<i>Firm size (1-9) ²</i>		
10 - 49	-0.137 (0.013)***	0.008 (0.019)
50 - 249	-0.191 (0.018)***	0.054 (0.029)*
250+	-0.221 (0.025)***	-0.022 (0.069)
<i>Interview type (Phone) ²</i>		
Fax	0.022 (0.197)	0.072 (0.025)***
E-mail	0.015 (0.014)	0.060 (0.028)**
<i>Legal Form (Ltd) ²</i>		
Private Firm	0.042 (0.016)***	-0.137 (0.033)***
Partnership	0.013 (0.019)	-0.065 (0.046)
<i>District (Nicosia) ²</i>		
Limassol	-0.013 (0.014)	-0.006 (0.022)
Larnaca	0.006 (0.019)	-0.081 (0.022)***
Famagusta	-0.039 (0.022)*	0.092 (0.039)**
Pafos	-0.023 (0.016)	-0.008 (0.022)
Years of operation	0.000 (0.000)	0.001 (0.001)
<i>Subsectors</i>		
<i>(Hotels & Restaurants) ²</i>		
Transportation	0.073 (0.016)***	
Financial	0.097 (0.015)***	
Other Services	0.052 (0.012)***	
<i>(Buildings) ²</i>		
Civil engineering		-0.019 (0.032)
Specialised construction activities		-0.019 (0.017)
<i>Years (2010) ^{2,3}</i>		
2008	-0.040 (0.018)**	-0.035 (0.027)
2009	-0.012 (0.015)	0.031 (0.023)
2011	0.025 (0.014)*	-0.027 (0.022)
2012	0.020 (0.016)	0.049 (0.025)**
Number of observations	7771	4314

Notes:

¹ Robust standard errors are provided in parentheses. The symbols ***, ** and * denote statistical significance at 1%, 5% and 10% respectively.

² The characteristic in brackets denotes the group with which comparisons are made.

³ The year in which expectations were stated.

Private firms in services are associated with a higher probability of correct predictions about their employment while the opposite is found for demand predictions. Additionally, in construction private firms are the least likely to predict their employment correctly. In services firms located in Famagusta have smaller chances of having their expectations realised, while in construction the opposite is found. Also, construction firms located in Larnaca are the least likely to state expectations that match the realisations reported later.

Looking at the subsectors we find that in services companies providing accommodation and food services are associated with the lowest probability of correct predictions about their

employment in the short run, possibly because the number of employees in hotels and restaurants changes more frequently compared to other type of services.

Expectations stated by firms in services in 2011 and by firms in construction in 2012 stood a better chance of being realised compared to expectations stated in a different year.¹⁴ Consequently, the downturn in the economy in 2009 and 2012 did not affect firms' ability to form realistic expectations about their activity and employment.

5. CONCLUDING REMARKS

This study provided an investigation of the properties of the business survey data for Cyprus at the aggregate level and at the individual firm level. This study was conducted as part of the systematic assessment of the information content of the Cyprus Business Survey data. At the aggregate level, we evaluated the ability of confidence indicators to track developments in the economy and to forecast relevant reference (quantitative) economic series. At a micro level we investigated the consistency of the firms' responses by comparing their expectations stated in a given month with the realisations reported by the same participants in subsequent surveys. In addition, we examined whether the probability of correct predictions (i.e. expectations that are in agreement with realisations) varies with firm-specific characteristics.

Preliminary analysis showed that confidence indicators capture well the evolution of output and employment growth in the economy as a whole and in specific sectors. Although the relation between survey and output data for financial services is very weak, the unusually steep decline of confidence over the period 2011-2012 has been signalling the distressing circumstances in the financial sector. Moreover, the usefulness of business survey data is investigated in a pseudo out-of-sample forecasting exercise. The results show that the inclusion of confidence indicators or employment expectations series in the forecasting models does not lead to more accurate forecasts for aggregate output (GDP) or employment growth than those obtained from simple univariate models. Nevertheless, substantial gains are achieved in forecasting output growth in construction, manufacturing and services one quarter ahead. The use of employment expectations in construction and manufacturing also generate considerable forecasting gains over the univariate models for employment growth one quarter ahead. The results also show that for sub-categories of the services sector, the models with survey series outperform univariate models for one-quarter ahead forecasts. More specifically this is found for the GVA growth in non-financial and financial services and for the percentage change of retail sales and tourist arrivals. Moreover, ESI(CypERC) is found to be a useful predictor of the growth rate of tourist arrivals for two- and three-quarter ahead forecasts.

¹⁴ See footnote 13.

The result that the use of survey information does not lead to improved forecasting performance in the case of GDP and total employment growth, is found in other studies for different countries (e.g. Claveria et al. 2007, Horvath 2012). In the case of Cyprus, however, the available time series of survey variables are rather short, with the last three years of the series (2009-2012) covering the first serious downturn since 1974. Thus the forecasting exercise needs to be repeated in the near future with a larger sample size. The analysis can also be extended to include a larger set of survey questions as candidate predictors or common factors extracted from a large dataset of survey information. Augmenting the ADL models with monthly leads of the survey variables (so that the most recent monthly information is included) also seems a promising strategy.

No strong or specific patterns emerged from the analysis at the individual firm level with respect to the firm size, except in the case of services. The larger the size of a firm in the services sector the higher the probability that the firm gives correct prediction about its activity. This finding however is reversed in the case of employment predictions with the probability being negatively affected by the firm size. Responses obtained by fax or email, as opposed to those collected over the phone, are found to be associated with higher probability of correct predictions about activity and employment. Hence the use of fax and email should be encouraged since such methods give more time to interviewees to reflect on their responses.

Overall the results of the analysis suggest that business survey data contain valuable information about movements in output and employment in the sectors of construction, manufacturing and services as well as in sub-categories of services. The inclusion of business survey information for purposes of short-run forecasting can improve substantially the accuracy of the forecasts at the sector-specific level. These forecasts can therefore provide early signs about the evolution of each sector and the drivers of future economic growth. As such the sector-specific forecasts can be useful to policy makers for the introduction of new policies and regulations as well as to private agents for facilitating investment decisions.

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APPENDIX

Table A1: Correlations between monthly indicators and business survey indicators

Monthly indicator growth	Survey variable (lags/leads)								
	-4	-3	-2	-1	0	1	2	3	4
	Construction Confidence Indicator								
Local Sales of Cement	0.75***	0.78***	0.74***	0.77***	0.78***	0.77***	0.75***	0.77***	0.73***
	Turnover Expectations								
Value Index of Retail Trade	0.56***	0.63***	0.62***	0.64***	0.67***	0.62***	0.65***	0.61***	0.54***
	Turnover Perceptions								
Value Index of Retail Trade	0.47***	0.52***	0.57***	0.58***	0.60***	0.67***	0.62***	0.63***	0.58***
	Retail Trade Confidence Indicator								
Value Index of Retail Trade	0.60***	0.65***	0.66***	0.67***	0.68***	0.67***	0.67***	0.63***	0.57***
	Production Expectations								
Volume Index of Manufacturing	0.64***	0.66***	0.68***	0.66***	0.72***	0.65***	0.68***	0.64***	0.64***
	Production Perceptions								
Volume Index of Manufacturing	0.53***	0.56***	0.60***	0.65***	0.67***	0.64***	0.65***	0.61***	0.61***
	Industry Confidence Indicator								
Volume Index of Manufacturing	0.69***	0.71***	0.76***	0.75***	0.78***	0.72***	0.73***	0.70***	0.67***
	Hotels & Restaurants Confidence Indicator								
Tourist Arrivals	0.10	0.18	0.26*	0.34**	0.34**	0.34**	0.33**	0.29**	0.20

Table A2: Percentage of firms that provided correct (incorrect) predictions

	Correct				Overpredict				Underpredict				Total obs.
	++	==	--	Total	+=	+-	=-	Total	=-	-+	=+	Total	
Services													
Demand	12	24	17	54	12	7	13	32	7	2	5	14	8388
Employment	5	64	5	75	6	1	7	14	6	0	5	11	8638
Retail Trade													
Sales	9	15	27	51	9	9	18	36	7	2	4	13	8866
Industry													
Production	7	29	19	55	10	6	16	33	7	1	4	12	4267
Construction													
Order Books	1	20	42	62	2	1	8	11	21	3	3	27	4451
Employment	1	32	21	55	4	1	28	33	7	1	4	12	4391

Table A3: Forecasting performance (RMSFE) of univariate and ADL models relative to random walk, activity growth in services sub-categories

Horizon	GVA growth								Value index percentage change				Percentage change			
	Services, excluding financial				Financial services				Retail trade				Tourist arrivals			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RMSFE: Random Walk	0.67	1.45	2.43	2.79	11.28	11.31	12.89	13.15	1.38	1.33	2.02	2.33	3.09	3.29	3.58	3.59
Models																
<i>Univariate</i>																
Random walk: Benchmark	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AR(1)	1.08	1.31	1.05	0.94	1.17	1.44	1.50	1.03	1.10	1.65	1.30	1.06	0.91	1.23	1.07	0.86
AR(4)	1.03	1.40	1.10	0.88	1.31	1.63	0.96	1.01	0.94	1.77	1.37	1.28	0.87	1.33	1.04	0.83
AR(AIC)	1.09	1.51	1.19	0.95	1.31	1.63	1.06	1.04	0.99	1.40	1.27	1.03	0.85	1.33	1.02	0.86
AR(BIC)	1.10	1.50	1.34	1.00	1.31	1.74	1.50	1.03	0.99	1.40	1.27	1.03	0.85	1.31	1.09	0.90
<i>ADL (AIC)</i>																
<i>Predictors, levels</i>																
Confidence Indicator ¹	0.71	1.18	1.07	1.69	0.40	1.38	1.10	1.00	0.91	1.48	1.02	1.39	0.71	1.13	0.76	0.82
Activity perceptions ²	0.75	1.40	1.14	1.69	0.41	1.57	1.43	1.22	0.90	1.58	1.35	1.65	-	-	-	-
Activity expectations ³	0.72	1.23	1.44	1.87	0.42	1.56	1.47	1.32	0.98	1.81	1.38	1.31	-	-	-	-
Employment expectations ⁴	0.82	1.52	1.83	2.18	0.42	1.77	1.36	0.98	-	-	-	-	-	-	-	-
ESI(CypERC)	-	-	-	-	-	-	-	-	-	-	-	-	0.70	0.82	0.70	0.92
<i>ADL (BIC)</i>																
<i>Predictors, levels</i>																
Confidence Indicator ¹	0.70	1.19	1.12	1.27	0.43	1.44	1.27	1.16	0.88	1.47	1.20	1.40	0.71	1.11	0.73	0.83
Activity perceptions ²	0.75	1.37	1.16	1.12	0.44	1.51	1.32	1.26	0.77	1.55	1.43	1.67	-	-	-	-
Activity expectations ³	0.72	1.23	1.45	1.84	0.45	1.51	1.45	1.18	0.92	1.78	1.41	1.17	-	-	-	-
Employment expectations ⁴	0.82	1.60	1.99	2.07	0.44	1.54	1.26	1.14	-	-	-	-	-	-	-	-
ESI(CypERC)	-	-	-	-	-	-	-	-	-	-	-	-	0.76	0.82	0.64	0.90
<i>ADL (AIC)</i>																
<i>Predictors, first differences</i>																
Confidence Indicator ¹	0.76	1.27	1.09	1.26	0.40	1.14	1.01	1.00	0.83	1.23	1.02	1.06	0.75	1.12	0.84	0.96
Activity perceptions ²	0.79	1.41	1.17	1.10	0.42	1.48	1.41	1.42	0.82	1.20	0.93	0.91	-	-	-	-
Activity expectations ³	0.75	1.22	0.94	0.89	0.44	1.47	1.33	1.05	0.83	1.51	1.20	0.91	-	-	-	-
Employment expectations ⁴	0.73	1.15	1.26	0.98	0.43	1.49	1.50	1.18	-	-	-	-	-	-	-	-
ESI(CypERC)	-	-	-	-	-	-	-	-	-	-	-	-	0.63	0.93	0.74	0.93
<i>ADL (BIC)</i>																
<i>Predictors, first differences</i>																
Confidence Indicator ¹	0.76	1.27	1.14	1.24	0.43	1.14	1.19	1.02	0.89	1.12	1.03	1.05	0.72	1.11	0.88	0.99
Activity perceptions ²	0.80	1.38	1.13	1.04	0.40	1.50	1.42	1.32	0.82	1.22	0.92	0.95	-	-	-	-
Activity expectations ³	0.75	1.30	1.17	1.00	0.45	1.36	1.33	1.05	0.84	1.41	1.20	0.94	-	-	-	-
Employment expectations ⁴	0.74	1.18	1.24	1.01	0.46	1.60	1.50	1.18	-	-	-	-	-	-	-	-
ESI(CypERC)	-	-	-	-	-	-	-	-	-	-	-	-	0.64	0.93	0.74	0.93

Notes:¹ In the models for sector-specific GVA growth the Confidence Indicator refers to the corresponding sub-sector of services, while in the models for the value index of retail trade the Confidence Indicator covers the retail trade sector only. In the models for tourist arrivals the Services Confidence Indicator that covers the broad services sector (including retail trade) is used.

² Activity perceptions refer to firms' assessment about turnover/demand in the last three months in the sub-sectors of non-financial, financial services.

³ Activity expectations refer to firms' expectations about the developments in their turnover/demand in the next three months in the sub-sectors of non-financial, financial services and retail trade.

⁴ Employment expectations refer to firms' expectations about their number of their employees in the next three months in the sub-sectors of non-financial and financial services.

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