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Managerial sentiment, consumer confidence and sector returns

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ABSTRACT

This paper investigates the relationship between managerial sentiment and sector returns. Using UK monthly data from January 1985 to December 2014 and a sample of consumer and business confidence indicators provided by the European Commission, we provide novel evidence on how managerial and consumer sentiment indicators affect stock returns. We find no support for consumer confidence as a predictor of stock returns. However, managerial sentiment shows a significant impact on aggregate market and sector return indices. Furthermore, we find that parameter estimates for sector groupings are not consistent, implying that the sentiment-return relationship differs across sectors. We also find parameters are sensitive to industry characteristics. Importantly, the overall sentiment-return relationship is dominated by sentiment associated with manufacturing firms.

1. Introduction

Studies in the relatively recent field of behavioural finance have identified pricing anomalies which contradict the expectations of the efficient markets hypothesis. In particular, considerable attention has focussed on how market prices are influenced by investor sentiment (Lee, Shleifer, & Thaler, 1991; Baker & Wurgler, 2006; Baker, Wurgler, & Yuan, 2012; Da, Engelberg, & Gao, 2015). Investor or market sentiment is defined in the financial literature as the prevailing attitude or feeling in the market as revealed by movements of stock prices. A large and growing literature examines the relationship between various proxies for investor sentiment and stock returns. We add to this literature in two ways. Using UK data from European Commission (EC) business and consumer surveys between January 1985 and December 2014, we analyse managerial sentiment as a proxy for investor sentiment. Further, we examine the impact of managerial sentiment and consumer confidence, a commonly used proxy for investor sentiment, on stock returns at the sectoral level.

Investment-related sentiment is not directly observable and so previous studies have used a number of proxies - including investor surveys, closed-end fund discounts, mutual fund flows and composite sentiment indices - which have been found to significantly influence stock prices (Lee et al., 1991; Frazzini & Lamont, 2008; Baker & Wurgler, 2006). In addition, various studies use information provided by consumer sentiment surveys as measure of investor sentiment (Otoo, 1999; Fisher & Statman, 2003; Jansen & Nahuis, 2003; Ferrer, Salaber, & Zalewska, 2016). However, their findings do not provide a consistent view of the association between consumer confidence and market values.

Contrary to consumer confidence studies, surveys of business confidence assess managerial sentiment regarding past and future performance. When compared to consumers, managerial access to business information allows for a more informed opinion of future market conditions. In this view, managerial sentiment informs investor sentiment and thereby stock-pricing. Baker & Wurgler (2013) include both sentiment from corporate insiders and surveys of consumer confidence in their list of potential proxies for investor sentiment. Thus, the first contribution of our study is to provide evidence on how managerial sentiment differs from consumer confidence in predicting stock returns.

Furthermore, sentiment studies predominantly examine the impact of investor sentiment proxies on aggregate market sentiment. Brown & Cliff (2004) suggest that aggregate sentiment measures are used primarily due to data limitations since sentiment measures such as surveys, advance-decline ratio and closed-end fund discounts are not commonly available at disaggregated levels. In addition, Brown and Cliff argue that aggregate sentiment effects become negligible when the number of stocks affected by high sentiment equals the number of stocks affected by low sentiment. This argument suggests that, when sentiment varies between sectors, aggregate measures of sentiment

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may not be sufficient to detect impacts on stock prices. Thus, our study also provides new evidence on the impact of investor sentiment on sector returns. Moreover, increasing attention to industry effects in the investment allocation literature provides further support for examination of sentiment at industry level. For example, Chen, Bennett, and Zheng (2006) suggest that industry-based investment strategies are more effective than country based strategies. Marcelo, Quirós, and Martins (2013) find that diversification based on industry leads to more efficient portfolios.

By examining the associations between managerial sentiment and sector returns, we provide significant evidence for investors and portfolio managers regarding which industries are most susceptible to sentiment. In addition, our findings are informative for policy-makers and regulators whose decisions affect stock prices. The rest of this paper is structured as follows. The next section reviews the existing literature. Section 3 describes the data and provides some descriptive statistics and preliminary tests. Section 4 describes the methodology used and discusses results. Section 5 concludes.

2. Literature review

There has been a long running debate in the academic literature regarding the success of the efficient market hypothesis in explaining the predictability in asset returns. The classical theory assumes financial markets are efficient; investors are rational and diversify to optimize the statistical properties of their investments. Even if some investors are irrational, prices are brought back into equilibrium by the actions of arbitrageurs (Baker & Wurgler, 2006), (Antoniou, Doukas, & Subrahmanyam, 2013). It follows then that there is no role for investor irrationality on asset pricing. However, research on behavioural finance confirms that investor sentiment affects stock prices and mispricing is persistent due to costly and non-profitable arbitrage (Lee et al., 1991).

2.1. Market-based measures of sentiment

Although the relation between investor sentiment and stock returns is well documented in numerous studies (Brown & Cliff, 2004; Baker & Wurgler, 2006; Baker & Wurgler, 2007; Schmeling, 2009; Da et al., 2015) researchers continue to debate sentiment measures and their impact on stock returns. Indeed, there is a large literature that documents the measurability of investor sentiment and its impact on stock prices. Despite using different proxies to measure sentiment, the overall conclusion is that sentiment is highly correlated with stock returns. For example, Baker and Wurgler (2006) use a group of sentiment proxies and principal component analysis to investigate the relationship between sentiment and stock returns. Their results suggest a significant correlation between sentiment and lead returns, in particular younger, smaller stocks. Such stocks are more likely to attract the attention of optimists and speculators who buy on the hype of stocks and sell after the hype is over. Similarly, using technical indicators, survey data from investor intelligence, and trading activity-related variables, Brown and Cliff (2004) find evidence supporting the co-movement of sentiment measures with market returns, particular in the long-run.

Another strand of research focuses on the predictability of sentiment to stock returns using individual sentiment proxies. For example, Fisher and Statman (2000) used Wall Street strategists' mean allocation to stocks as a proxy for sentiment of large investors and report a negative relationship with S&P 500 returns. In another key study, Lee et al. (1991) used closed-end fund discount as a proxy for investor sentiment, and argued that closed-end fund discounts and small stocks owned by individuals co-move with investor sentiment. In the same vein, Kaniel, Saar, and Titman (2004)) use the imbalances in the orders of individual stocks on the NYSE as a sentiment measure and find evidence supporting strong predicative power of future returns. Further, using net flows of mutual funds as a proxy of investor sentiment, Ben-Rephael, Kandel, and Wohl (2012) found a contemporaneous relationship between net exchanges to equity funds and changes in stock market prices. Similarly, issuing higher levels of equity shares compared to debt is believed to capture the market enthusiasm and predicts subsequent lower returns (Baker & Wurgler, 2000). (Lee et al., 1991) use the number of IPOs and average first day returns of IPOs as proxies for investor sentiment. They find that companies tend to time the market and issue IPOs during periods of positive sentiment. Consistent with Lee et al. (1991), Cornelli, Goldreich, and Ljungqvist (2006) indicate that investor sentiment can explain the underperformance of the IPOs returns.

2.2. Survey-based measures of sentiment

Due to the lack of directly-observable indicators measuring investor sentiment, a number of previous empirical studies employ consumer confidence indices to proxy for investor sentiment (Schmeling, 2009). Consumer confidence indicators (CCIs) are perceived to contain information that predicts future market conditions such as household spending, total personal consumption growth and expenditures on consumer durables (Carroll, Fuhrer, & Wilcox, 1994; Bram & Ludvigson, 1998; Throop, 1992). Furthermore, stock market studies report a contemporaneous correlation between CCIs and stock market returns. However, results vary on the direction of causality between them. For example, Fisher & Statman (2003) investigate the validity of consumer confidence as a proxy of the individual investor sentiment and its predictive power of stock returns. Overall, they find a positive contemporaneous relationship between changes in consumer confidence and S&P 500 returns. In another study, Otoo (1999) use US data and find that consumer confidence is affected by the increase in equity value. Elsewhere, using EU data, Jansen and Nahuis (2003) find evidence supporting the relationship between CCIs and stock returns, in particular in the short run. Additionally, they reported that stock returns predict consumer confidence but not vice versa. In contrast, Schmeling (2009) found that consumer confidence negatively predicts stock market return for 18 industrialized countries. Further, Charoenrook (2005)) investigate the University of Michigan Consumer Sentiment Index explanatory power for stock market return and find a positive relationship between the changes in consumer sentiment and the contemporaneous excess market returns in the long run, but negatively related to the future excess returns at one-month and one-year horizons.

Consistent with Brown and Cliff (2004), Wang, Keswani, and Taylor (2006) and Canba and Kandr (2009)) indicate that investor sentiment proxies are caused by stock returns and volatility rather than vice versa. According to Ferrer et al. (2016), the causality from stock returns to CCIs could be interpreted as an information effect (higher stock returns means good economic conditions and higher optimism) or as a wealth effect (higher value of equity leads to higher wealth). On the other hand, Lemmon & Portniaguina (2006) identified the forecasting power of investor sentiment, as measured by consumer confidence, in predicting stock market returns and find a relationship between consumer confidence and stock returns only for small stocks and stocks with low degrees of institutional ownership. Similarly, Schmeling (2009) suggests that there is two-way causality such that investor sentiment depends on previous returns and the returns depend on previous investor sentiment. For trading strategies, Antoniou et al. (2013) found that CCIs affects the profitability of momentum-based strategies but only in periods of high optimism. They argue that in periods of high sentiment, smaller investors are reluctant to sell losing stocks. Conversely, larger investors are usually ready to sell losing stocks promptly and profit from momentum strategies.

Most recently, Ferrer et al. (2016) argue for the inappropriateness of consumer confidence indicator as a proxy for investor sentiment. Using data for the EU and the US, they investigated the relationship between stock returns and CCIs around the dotcom bubble period. Their finding suggests that CCIs failed to forecast stock returns, particularly for the EU countries after the dotcom bubble. Importantly, the majority of studies

finding support for CCIs as a measure of sentiment have used US data. This may reflect the sentiment of individual investors who represent a larger proportion of US market participants compared to the EU market.

2.3. Sector effects

The majority of literature on the relationship between investor sentiment and stock returns concerns the aggregate market. Notably, studies on how equity managers allocate their investment pay considerably more attention to sectoral effects on returns and diversification strategies (Baca, Garbe, & Weiss, 2000; Cavaglia, Brightman, & Aked, 2000; Griffin & Karolyi, 1998). For example, Chen et al. (2006) investigated the importance of sector effects in diversification strategies for developed and emerging markets. Their findings suggest that, for developing markets, sector-based strategies become more important than country-based strategies. For emerging markets, they advocate sector-based strategies despite finding that country-based strategies still dominate the allocation of investments in these markets.

Another stream of research provides evidence on the significance of industry factors on periods with high volatility (see for example, Marcelo et al., 2013; Soriano & Climent, 2006). In a key study, Marcelo et al. (2013) found that industry-based diversification leads to more efficient portfolios. Additionally, they provide an evidence supporting diversification across industries provides better protection in periods of high volatility compared to diversification associated with countries. In addition to the impact of industries on investment diversification, recent studies have investigated industry-level returns as predictors of economic activity. Laopodis (2016) examines the relationship between industries returns, macroeconomic variables and aggregate market returns. The findings show that industry portfolios explain macroeconomic indicators such as inflation, unemployment rate and dividend yield. Further, Laopodis demonstrates that returns in some industries such as Food, Mining, Consumer, Construction and Machinery contain valuable information supporting decisions related to investments on the stock market. Overall, findings with respect to the importance of industry effect provide support for our investigation of the relationship between sentiment and return at a sectoral level.

As evidence against the reliability of consumer confidence indicator has accumulated and the importance of investigating the sentiment-sector return relationship have been documented, in our study, we argue that managerial sentiment is an appropriate predictor of stock market return since managers possess direct information of the past, current and the future of their businesses compared to consumer. In addition, the availability of data on sector-specific sentiment provides the ability to asses how the sentiment-return relationship is shaped by the characteristics of each industry.

3. Data and descriptive statistics

3.1. Data on investor sentiment

This study uses confidence indicators published by the European Commission (EC) as proxies for investor sentiment. The indicators are calculated using business and consumer surveys which are conducted on a monthly basis by national institutions (such as ministries, statistical offices, central banks, research institutes, business associations or private companies) in 27 European countries. For every country, businesses and consumers are surveyed seeking their opinions regarding the economic conditions and short term forecasting. The surveys are then harmonized to generate comparable data for the countries that have been surveyed.

For business indicators, five surveys are conducted on a monthly basis with more questions added to every survey on a quarterly basis. The surveys cover Manufacturing, Construction, Retail Trade, Services, and Financial Services sector groupings. A biannually investment survey of the Manufacturing sector is conducted to gather information on companies' investment plans. Classification of business surveys into sectors follows the classification of economic activities in the European Community (NACE Rev. 2). The EC includes multiple industries in each of the five sector groupings. Therefore, each survey under the NACE Rev. 2 classification reflects one or more industries of the Industry Classification Benchmark (ICB). For example, the EC Manufacturing sector cover Industrials and Basic Materials industries from the ICB.[1]

Table 1
Sample size for business surveys in the UK and the EU. This table presents the sample size for business surveys in the UK and the EU. In the UK, business surveys are collected by National Institutions (NI) such as the Confederation of British Industry (CBI) and Experian (EXP).

Sectors	Manufacturing	Services	Retail Trade	Construction
UK	1500	1000	500	750
EU	38,270	43,720	30,730	22,140
NI	CBI	CBI	CBI	EXP.

Survey data is collected for the period from January 1985 to December 2014 for all sectors except the services sector. For the Services sector, data is not available until January 1997. Prior to May 2006, the Services sector surveys included Financial Services firms. From May 2006 onwards, Financial Services sentiment was surveyed separately. This indicates a statistical break in the Services sector sample. Therefore, we take the Services sector sentiment as our indicator for the sample period from May 2006 to December 2014. For Financial Services, confidence indicators is not available for individual countries but rather for the whole EU. Hence, they are excluded from our analysis as a sentiment index. The number of companies covered by EC surveys by sector is displayed in Table 1.

Monthly surveys are performed in the first ten days of each month for all business and consumer indicators. Survey questions use a Likert-type scale with responses divided into three, five or six options in an ordinal scale. Example of replies are ("increase", "remain unchanged", "decrease"), ("more than sufficient", "sufficient", "not sufficient"), or ("too large", "adequate", "too small"). Sample questions for each sector and the method of constructing confidence indicators are included in Appendices A and B.[2]

The aggregate sentiment indicator for the market, Economic Sentiment Indicator (ESI), is the weighted average of all confidence indicators with 40% to Manufacturing, 30% to Services, 20% Consumers, 5% for each of Construction and Retail Trade sectors.[3] The descriptive statistics for ESI and sector confidence indicators are shown in Table 2.

Values for ESI are transformed to have a mean of 100 and standard deviation of 10. The whole market is identified as optimistic about the economy if the value of the ESI is above 100 and pessimistic if it is below 100. Each of the business and Consumer confidence indicators has a mean equals zero. Values of confidence indicators along with Economic Sentiment Indicator are presented in Fig. 1.

All confidence indicators reflect major events in the economy. Fig. 2 shows the growth rate of UK GDP and indicates the major events affecting confidence indicators during the period. Confidence indicators are associated with the major events that have affected the UK economy including the recession of the late-1980s, recovery in the mid-1990s and the Global Financial Crisis (GFC) can clearly be seen from the graph in Fig. 1. On average, Retail Trade and Services sectors encounter high average levels of confidence indicators. Notably, the Construction industry is associated with a lower level of sentiment. Importantly, sentiment in the Construction industry is highly sensitive to shocks in the market. Furthermore, the effect of these shocks on the Construction sector sentiment takes more time to return to mean levels compared to other sectors. Confidence indicators are more volatile for Construction,

[1] More information is available in the Joint Harmonized EU Programme of Business and Consumer Surveys guide available at http://ec.europa.eu, accessed on 26 May 2016.
[2] More information on the method is available on the EC web site at: http://ec.europa.eu, accessed on 26 May 2016.
[3] Economic Sentiment Indicator is the term issued by the EC to describe their indicator.

Table 2
Descriptive statistics and correlation for economic, consumer and managerial sentiment indicators. Data covers the period from January 1985 to December 2014 for the economic sentiment, consumer confidence and sector sentiment indicators except Services sector. Services sector sample starts from May 2006 to December 2014. The fourth column represents the "trimmed" values at 1%.

Panel A: descriptive statistics

	Mean	SD	Trimmed	Min	Max
Economic and Consumer confidence indicators					
Economic	101.77	10.71	101.86	64.60	127.20
Consumer	−9.29	8.64	−9.23	−35.20	7.60
Managerial sentiment					
Manufacturing	−7.33	12.59	−7.23	−49.00	21.60
Construction	−17.19	23.40	−17.17	−79.30	43.10
Retail Trade	3.38	13.78	3.58	−47.10	29.00
Services	−4.96	20.80	−4.79	−57.40	30.40

Panel B: correlations

	Manufacturing	Construction	Retail Trade	Services
Construction	0.60***			
Retail Trade	0.66***	0.55***		
Services	0.81***	0.86***	0.75***	
Consumer	0.43***	0.63***	0.52***	0.84***

*** Level of significance for correlation coefficients is 0.01.

Retail Trade and Services compared to Manufacturing and Consumer confidence indicators.

Correlations between confidence indicators are relatively high and significant between sectors. However, plotting correlations with 12 month windows over the sample period shows a wave-like pattern indicating unstable correlation (see Fig. 3). Confidence indicators have strong positive correlation following major events. When the market experiences stability, correlation reverts to mean levels.

3.2. Data on stock returns

Our analysis covers the relationship between consumer and managerial sentiment and stock returns for the aggregate market and individual sectors. We used FTSE All Share Index monthly returns for the aggregate level of stock returns. Following Jansen and Nahuis (2003), we calculated monthly returns as the simple average of the first ten days returns to avoid any spurious causality due to non-synchronous observations.

Sector returns have been obtained by classifying FTSE All-Share Index constituents into sectors. For each firm, we used the Industry Classification Benchmark (ICB) obtained from Datastream. Sector returns are matched to the 'Classification' of economic activities in the European Community (NACE Rev. 2). For example, using the ICB system, Associated British Foods plc is classified under the Food Producer sector name. Consequently, the company has been placed under the Manufacture of food products category in the NACE. This ended up with four sector return indices that match the corresponding sector sentiment indicators and another index for Financial Services sector.[4] The number of firms in each sector is as follows: Manufacturing(212); Construction(13); Retail Trade (34); Services (78); and Financial Services (278).

Sector returns, as displayed in Fig. 4, are the summation of daily returns weighted by the market value of its constituents. Returns are winsorized at 1% level to eliminate the effect of outliers. Both FTSE All-Share Index and sectors prices data are obtained from Datastream for the period from January 1985 to December 2014. Table 3 shows descriptive statistics and correlation coefficients for market and sector returns.

3.3. Preliminary tests

Plotting the autocorrelation function for all time series shows large autocorrelations in confidence indicators.[5] That in turn leads us to examine whether our time series are unit-root non-stationary using Augmented Dickey-Fuller (ADF), Philips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests. Table 4 summarizes all tests for both level and differenced data. Based on the three tests, all time series except Services sectors are stationary on their level values (i.e. they have $I(0)$).

Notably, both ADF and PP tests confirms that Services series is non-stationary and has a unit root. On the other hand, KPSS test for stationarity shows that the series is stationary. Differencing the series removes the nonstationarity behaviour and all tests produce the same results. Consequently, service sector has either $I(1)$ based on ADF and PP tests or $I(0)$ based on KPSS test. The different behaviour of the Services sector CI will lead us to change the model used to test its relationship with different returns series. This will be discussed in details in the next section.

4. Methodology and findings

We use Granger-Causality test to examine the causality between managerial sentiment and stock returns (Granger, 1988). For the causality from sentiment to return, the test determines whether lagged values of sentiment contain information that is not already included in past values of stock returns, and vice versa. Our choice of the methodology is consistent with previous studies on consumer confidence as a proxy for investor sentiment (Fisher & Statman, 2003; Jansen & Nahuis, 2003; Otoo, 1999; Schmeling, 2009; Ferrer et al., 2016). Some studies which use similar methods but different measures of sentiment to examine the sentiment-returns relationship include (Brown & Cliff, 2004; Chung,

[4] The reason for the inclusion of Financial Services return index despite the unavailability of a corresponding sentiment index is its importance in the stock market. The sector accounts for 24.07% and 20.34% of the FTSE All-Share and FTSE 100 indices constituents, respectively.

[5] Appendix C reports the graphs for autocorrelation functions for level and differenced series.

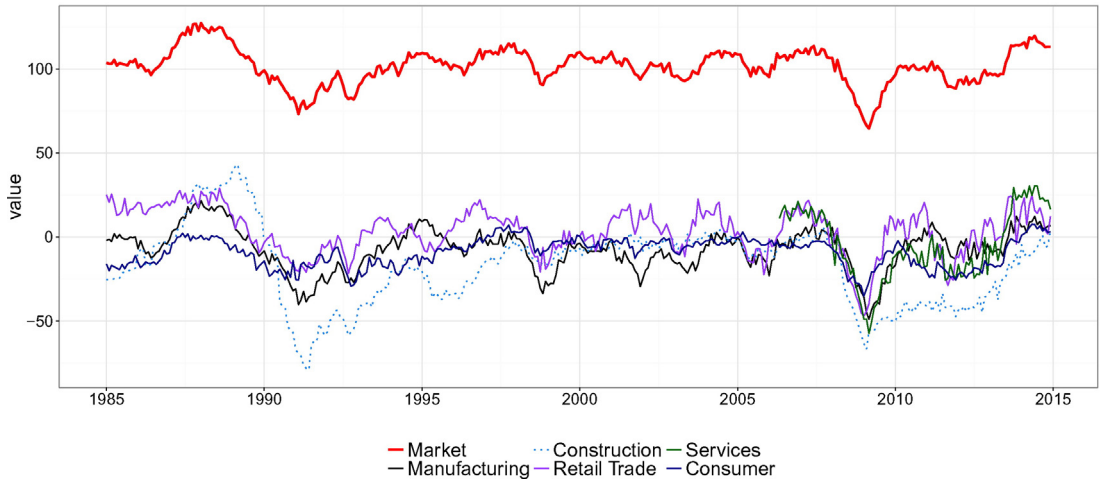


Fig. 1. Sentiment indicators. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

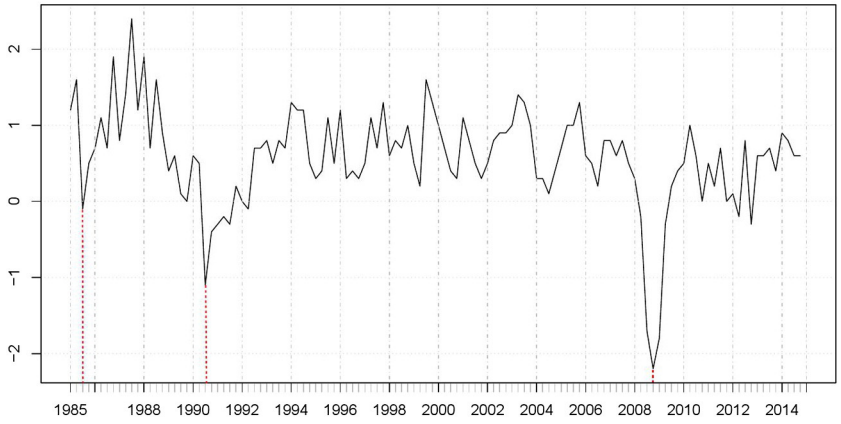


Fig. 2. UK GDP Growth Rate. The red line corresponds to major events which affected the UK economy (recessions of the late-1980s, early-1990s and the Global Financial Crisis (GFC), respectively)

Hung, & Yeh, 2012; Kumar & Lee, 2006; Wang et al., 2006). We conduct Granger-Causality tests on the base of the following equations[6]:

$$R_t = \alpha_r + \sum_{i=1}^{k} \beta_{ri} R_{t-i} + \sum_{i=1}^{k} \gamma_{ri} S_{t-i} + \upsilon_{rt} \quad (1)$$

$$S_t = \alpha_s + \sum_{i=1}^{k} \beta_{si} S_{t-i} + \sum_{i=1}^{k} \gamma_{si} R_{t-i} + \upsilon_{st} \quad (2)$$

where S_t denotes sentiment indicator at time t; R_t is the monthly return of sector groupings and the economy at time t; υ is a disturbance term; and k is the maximal lag.

For Services sector sentiment, we employ Eqs. (1) and (2) using level values with maximal lag to k. In addition, when ADF and PP tests are correct that the Services sentiment series is $I(1)$, we use Eqs (3) and (4) and follow the procedures suggested by Toda and Yamamoto (1995) to fix the asymptotics of the test.

$$R_t = \alpha_r + \sum_{i=1}^{k+I} \beta_{ri} R_{t-i} + \sum_{i=1}^{k+I} \gamma_{ri} S_{t-i} + \upsilon_{rt} \quad (3)$$

$$S_t = \alpha_s + \sum_{i=1}^{k+I} \beta_{si} S_{t-i} + \sum_{i=1}^{k+I} \gamma_{si} R_{t-i} + \upsilon_{st} \quad (4)$$

where I is the maximal order of integration in the model which in our study equals 1. The lag is only used to estimate the coefficients but not in use when estimating Wald test to test whether β_i and γ_i are jointly zero.

Eqs. (1) and (3) indicate that sentiment is believed to Granger-cause stock prices when lagged sentiment contain information that is not already included in past values of stock returns. The null hypothesis for estimated models is H_0: Sentiment does not Granger-cause returns. Eqs. (2) and (4) are used to test the relationship from returns to sentiment. Table 5 reports Granger-causality test results in both directions. The cross-correlation functions between indices and returns are displayed in Appendix D.

Where the right hand side of each cross correlation plot represents the correlations between returns at time t and sentiment at time $t + k$ (i.e. returns leads sentiment), the other side reveals the correlations between returns at time t and lags of sentiment. The pattern of the plots illustrates that sentiment is positively correlated to lags of returns. Furthermore, this correlation disappears with the long lags. In contrast, returns are negatively correlated to lags of sentiment suggesting that high returns are associated with low sentiment in previous periods and vice versa, which is consistent with (Brown & Cliff, 2005; Baker & Wurgler, 2006; Lemmon & Portniaguina, 2006; Schmeling, 2009). However, the relationship between sentiment and returns in each pair is not necessary due to a causal relationship. Rather, a relationship might exist

[6] Since unit root and stationarity tests result in a stationary $I(0)$ series for most of the sectors, VAR models specification uses both sentiment and returns series at their level.

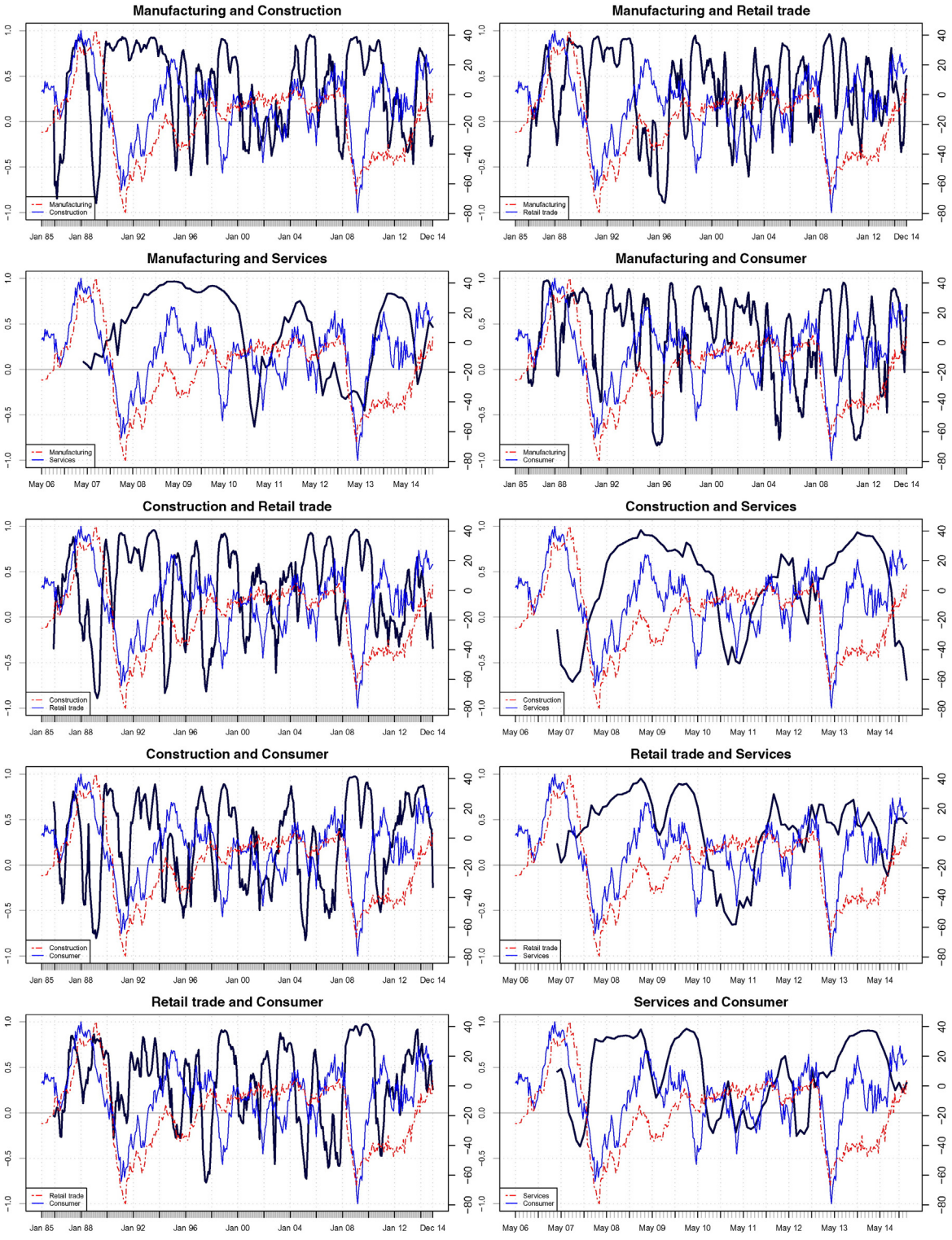


Fig. 3. Rolling correlation between sentiment indicators. Each graph plots the rolling correlation between two sentiment indicators using 12 month window.

as a result of common macro factors that drive both sentiment and returns (Jansen & Nahuis, 2003). The nature of the relationship between each pair is captured by Granger causality tests reported in Table 5.

Table 5 shows that market sentiment (Economy) Granger-causes both aggregate market and Financial sector returns. The significance of this relationship relies mainly on the Manufacturing sector sentiment that constitutes 40% of aggregate market sentiment. This finding is supported by the lack of significance of the rest of sentiment indices in causing aggregate market returns to change. In contrast, returns of the majority of sectors Granger-cause market sentiment. At sector level, causality runs in both directions with the exception of Retail Trade and Services industries for which causality only runs from returns to sentiment. These results can be interpreted in two ways. Firstly, Manufacturing and Construction sectors are more prone to sentiment than Retail Trade and Services sectors. Therefore, risks associated with their sentiment are translated into returns. However, this interpretation

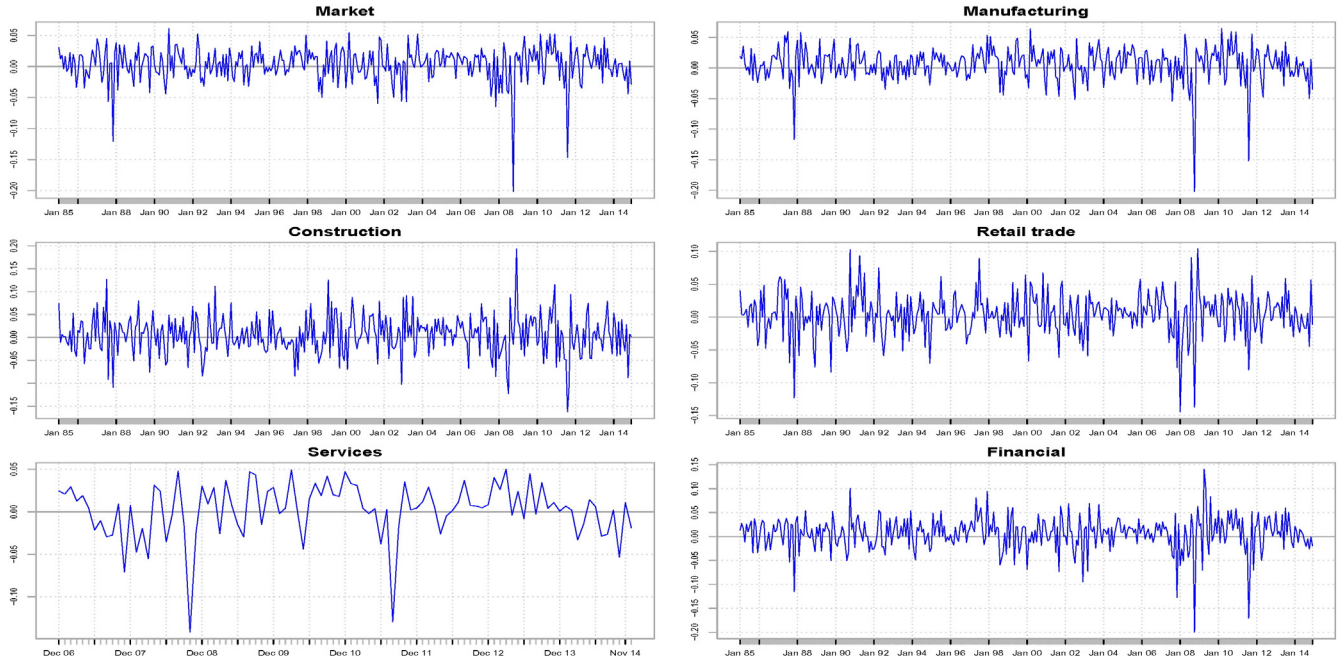


Fig. 4. Market and sectors returns.

is inconsistent with the hard to value argument of Baker & Wurgler (2007). The output of both Retail Trade and Services sectors are hard to measure (Mclaughlin & Coffey, 1990; Doms, Jarmin, & Klimek, 2004). Therefore, these sectors are more likely to be prone to fluctuations in sentiment than the Manufacturing and Construction sectors. Another way to interpret this result is that managerial sentiment indices are constructed by surveying firms rather than investors. Individual investors are subject to asymmetric information problems when valuing the companies in which they invest. Firms have more internal information. Hence, firm survey data on managerial sentiment would be expected to inform stock returns. Consequently, our results point to lower levels of information asymmetry and less uncertainty in valuation of stocks in Manufacturing and Construction sectors. Our data provides evidence of resolution of information asymmetry in those sectors. Expectations are less accurately reflected in stock returns in Services and Retail Trade sectors.

For Financial Services sector, results shown in Table 5 are consistent with the literature (such as Nejad & Huerta (2014)) in terms of the direction of causality. Nonetheless, the relationship is greatly affected by Manufacturing sector sentiment. These results reveal that the

Table 3
Descriptive statistics and correlation for market and sector returns. Data covers the period from January 1985 to December 2014 for the whole UK market and sectors returns except Services sector. Services sector sample starts from May 2006 to December 2014. To remove the impact of any outliers, we "trimmed" our data at 1% level.

Panel A: descriptive statistics

	Mean	SD	Trimmed	Min	Max
Market	0.34%	2.76%	0.43%	−20.17%	6.13%
Manufacturing	0.58%	2.77%	0.67%	−20.22%	6.44%
Construction	0.56%	4.27%	0.55%	−16.25%	19.32%
Retail Trade	0.36%	3.29%	0.40%	−14.46%	10.39%
Services	0.23%	3.19%	0.32%	−14.02%	5.12%
Financials	0.65%	3.54%	0.70%	−19.99%	14.06%

Panel B: correlations

	Market	Manufacturing	Construction	Retail	Services
Manufacturing	0.89***				
Construction	0.54***	0.51***			
Retail Trade	0.73***	0.62***	0.50***		
Services	0.89***	0.80***	0.58***	0.77***	
Financials	0.88***	0.71***	0.50***	0.67***	0.83***

*** Level of significance for correlation coefficients is 0.01.

Table 4
Unit root tests. Tests are based on 360 observations for all variables except Services sector which has 104 observations. Models used for unit root test specified to include the intercept with lags of the variable. Lag length for Augmanted Dicky-Fuller (ADF) tests are determined by Akaike Information Criterion with maximum of twelve lags differences. Newey-West procedure is used to calculate bandwidths for both Philips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests. For spectral estimation, Bartlett's kernel is used.

	Level			Differenced		
	ADF	PP	KPSS	ADF	PP	KPSS
Confidence indicators						
Market	−4.13	−2.95	0.10	−8.37	−20.15	0.05
(*p*-value)	(0.000)	(0.018)		(0.000)	(0.000)	
Manufacturing	−4.22	−3.26	0.10	−6.04	−22.75	0.04
(*p*-value)	(0.000)	(0.006		(0.000)	(0.000)	
Construction	−3.44	−1.96	0.17	−5.04	−20.30	0.10
(*p*-value)	(0.009)	(0.176)		(0.000)	(0.000)	
Retail Trade	−4.61	−4.24	0.24	−9.08	−21.80	0.03
(*p*-value)	(0.000)	(0.000)		(0.000)	(0.000)	
Services	−1.28	−1.59	0.20	−3.78	−13.62	0.14
(*p*-value)	(0.228)	(0.114)		(0.000)	(0.000)	
Consumer	−2.78	−3.09	0.17	−13.43	−21.28	0.03
(*p*-value)	(0.050)	(0.024)		(0.000)	(0.000)	
Stock returns						
Market	−10.00	−18.52	0.06	−10.22	−48.14	0.00
(*p*-value)	(0.000)	(0.000)		(0.000)	(0.001)	
Manufacturing	−12.63	−17.66	0.13	−9.25	−46.40	0.00
(*p*-value)	(0.000)	(0.000)		(0.000)	(0.001)	
Construction	−12.73	−20.06	0.06	−9.32	−54.19	0.00
(*p*-value)	(0.000)	(0.000)		(0.000	(0.001)	
Retail trade	−7.17	−19.65	0.02	−9.80	−51.53	0.00
(*p*-value)	(0.000)	(0.000)		(0.000)	(0.001)	
Services	−3.35	−8.73	0.10	−10.52	−21.06	0.01
(*p*-value)	(0.000)	(0.000)		(0.000)	(0.000)	
Financials	−6.74	−19.60	0.03	−10.17	−50.91	0.00
(*p*-value)	(0.000)	(0.000)		(0.000)	(0.000)	

Table 5
p-Values for Granger causality tests for sentiment and aggregate market and sector returns. This table presents the *p*-value for Granger causality tests for sentiment indicators and stock return indices. The results cover the period from January 1985 to December 2014. *r*, *g-cause*, and *sent* denote return, Granger-cause, and sentiment, respectively.

	Returns					
	Market	Manufacturing	Construction	Retail Trade	Services	Financials
Economic and consumer confidence indicators						
Economy	0.0173					0.0830
(*r g-cause sent*)	0.1342					0.1030
Consumer	0.6673	0.5800	0.7611	0.1662	0.2176	0.2078
(*r g-cause sent*)	0.0319	0.0225	0.2850	0.1544	0.3260	0.0117
Managerial sentiment						
Manufacturing	0.0003	0.0063				0.0479
(*r g-cause sent*)	0.0062	0.0399				0.0384
Construction	0.5479		0.0705			0.2762
(*r g-cause sent*)	0.3240		0.1018			0.5983
Retail Trade	0.8793			0.1622		0.7013
(*r g-cause sent*)	0.0069			0.0146		0.0057
Services	0.0992				0.0892	0.1795
(*r g-cause sent*)	0.0003				0.0135	0.0107
Services [Wald test]	0.5055				0.1320	0.8143
(*r g-cause sent* [Wald test])	0.0004				0.0346	0.0199

relationship between sentiment and stock market returns is not consistent across sectors. Where the aggregate sentiment of the market causes adjustment to stock returns, it is the different characteristics of the sector groupings that shapes the relationship.[7]

In Table 5, we also examine the association of consumer confidence with stock returns at aggregate and sector levels. Notably, consumer confidence is not found to Granger-cause stock returns in any of our tests while stock returns only Granger-cause consumer confidence in Manufacturing and Financials.

To further understand the nature of the return-sentiment relationship, we next turn our attention to the components of the sentiment surveys. We breakdown our causality tests by individual questions included in each sector survey. As shown in Table 6, questions explained how company respondents in each sector feel about past, present and future activities. Levels of confidence regarding prices and employment expectations are also considered.

Given the fact that stock returns reflect fundamentals of companies in each sector, we assume that stock returns explain company responses about their past activities. Respondents are aware of the performance of their firms in the past, which is reflected in stock returns. However, Construction sector projects have a longer time horizon than other sector groupings. For example, long time horizons to completion make judgment on performance more uncertain for companies and investors. The sentiment question in the survey focuses on judging the performance over a relatively short three-month horizon which may in part explain the inability of past returns to predict Construction sector sentiment.

Results shown in Table 6 indicate that stock returns have a significant impact on the expectations in the sector. Changes in stock returns cause adjustment to the expectation about the level of the employment in all sectors. However, returns have no effect on the expectations regarding selling prices in both Construction and Retail Trade sectors. Since stock returns mainly reflect company fundamentals, the development of expectations might be affected by availability bias. This implies that individuals assign greater weights to recent experience. Therefore, company expectations for the future of their activities explain how their stocks perform in the recent past.

In contrast, we find that sentiment Granger-causes returns for most of the sector groupings. Sentiment about production (order) expectations plays a significant role in causing the returns of the Manufacturing (Retail Trade) sectors. For the Construction sector, expectations about the employment level are associated with highly significant changes in stock returns. However, for Services sector, expectations about the future appear to have no role in causing changes in stock returns. One explanation might be the uncertainty regarding future activities in the Services sector. Interestingly, company assessments of business activity development over the past three months, which reflects structural changes in the Service sector, shows a strongly significant impact on subsequent returns.

4.1. Robustness tests

4.1.1. Causality using FTSE100 Index, sectors return index and Managerial Sentiment Indicator (MSI)

The first set of robustness tests we conducted was to change the definition and construction of aggregate market returns and the aggregate sentiment index. Although, the five sector return indices constituents included 87.27% of the market capitalization of companies included in the FTSE All-Share, as a robustness check we substituted alternative indices of aggregate market returns.[8]

In addition to changing the definition of aggregate market returns, we reconstructed the Economical Sentiment Indicator (ESI) using only four sectoral sentiment indicators after the exclusion of consumer confidence indicator (CCI). As discussed earlier, CCI represents 20% of the ESI, therefore elimination will result in a pure Managerial Sentiment Indicator (MSI). The weights of the four sectors in the MSI are adjusted pro rata to their original values in the ESI. Consequently, the MSI is used as an aggregate sentiment index.[9]

We then repeated the analysis using FTSE 100 Index and an equally weighted return index (RI 5-sectors) that contains the five previously constructed sector return indices. In order to match the same sectors included in the ESI and the MSI, we created another index (RI 4-sectors) that encompasses all sector return indices except Financial Services sector. As reported in Table 7, results show no significant sensitivity to the change of returns definition. The results using different indices indicate some very small differences to the FTSE All Share results. Significance levels are largely unchanged for sentiment granger-

[7] Responses on sentiment survey contains information from companies based on their previous month performance. This may impact the relationship from returns to sentiment if returns are calculated using only the first 10 days. Therefore we repeated the analysis using the first 21 days and full month returns. The modifications had no impact on the results except for the Construction sector for which the relationship becomes insignificant when using full month returns.

[8] The other 12.63% represents the Utilities and Health Care sectors which we excluded when constructing sectors return indices. Although the NACE Rev. 2 classification includes utility and health care activities, sentiment surveys do not. Hence, we exclude Utilities and Health Care from sector return indices.

[9] The calculation of indicators' weights to construct the MSI are described in details in Appendix E.

Table 6
p-Values for Granger causality tests for survey questions and returns. This table presents the *p*-value for Granger causality tests for sentiment indicators and sector return indices using individual survey questions. The results cover the period from January 1985 to December 2014. *r*, *g-cause*, and *sent* denote return, Granger-cause, and sentiment, respectively.

	Questions							
Manufacturing								
	Production trend observed in recent months	Assessment of order-book levels	Assessment of export order-book levels	Assessment of stocks of finished products	Production expectations for the months ahead	Selling price expectations for the months ahead	Employment expectations for the months ahead	Confidence Indicator (Q2 − Q4 + Q5)/3
sent g-cause return	0.3300	0.0634	0.2654	0.7526	0.0584	0.4930	0.9956	0.0063
return g-cause sent	0.0188	0.0385	0.1231	0.0114	0.0398	0.0026	0.0022	0.0399
Construction								
	Building activity development over the past 3 months	Evolution of your current overall order books	Employment expectations over the next 3 months	Prices expectations over the next 3 months	Confidence Indicator (Q3 + Q4)/2			
sent g-cause return	0.7873	0.0823	0.0014	0.1019	0.0705			
return g-cause sent	0.2057	0.2423	0.1010	0.9985	0.1018			
Retail Trade								
	Business activity (sales) development over the past 3 months	Volume of stock currently hold	Orders expectations over the next 3 months	Business activity expectations over the next 3 months	Employment expectations over the next 3 months	Prices expectations over the next 3 months	Confidence Indicator (Q1 − Q2 + Q4)/3	
sent g-cause return	0.5907	0.2856	0.0522	0.3200	0.2664	0.6740	0.1622	
return g-cause sent	0.0210	0.5369	0.0626	0.0183	0.0396	0.1167	0.0146	
Services								
	Business situation development over the past 3 months	Evolution of the demand over the past 3 months	Expectation of the demand over the next 3 months	Evolution of the employment over the past 3 months	Expectations of the employment over the next 3 months	Expectations of the prices over the next 3 months	Confidence Indicator (Q1 + Q2 + Q3)/3	
sent g-cause return	0.0831	0.0157	0.4882	0.1928	0.0857	0.1563	0.0892	
return g-cause sent	0.1218	0.1385	0.0356	0.0009	0.0002	0.0067	0.0135	
sent g-cause return [Wald test]	0.2336	0.0009	0.3356	0.3924	0.1648	0.1325	0.1137	
return g-cause sent [Wald test]	0.1733	0.0744	0.0299	0.0006	0.0003	0.0036	0.0346	

Table 7
Granger causality tests using different sentiment and return indices. This table presents the *p*-values for testing the sentiment-return relationship using alternative definitions for aggregate market return index and the managerial sentiment indicator. RI 5 Sector is an equally weighted return index of Manufacturing, Construction, Retail Trade, Services and Financial Services sectors. RI 4 Sector represents the same sectors as in RI 5 Sector except the Financial Services sector. The results cover the period from January 1985 to December 2014. *r*, *g-cause*, and *sent* denote return, Granger-cause, and sentiment, respectively.

	Returns indices			
	FTSE-ALL	FTSE 100	RI 5 sector	RI 4 sector
Economic and Consumer confidence indicators				
Economy (ESI)	0.0173	0.0724	0.0059	0.0059
(*r g-cause sent*)	0.1342	0.1324	0.0441	0.0523
Consumer	0.6673	0.9339	0.2790	0.5731
(*r g-cause sent*)	0.0319	0.0256	0.0200	0.0900
Managerial sentiment				
Managerial Sentiment Index	0.8236	0.0650	0.0288	0.0412
(*r g-cause sent*)	0.0233	0.0907	0.0291	0.0458
Manufacturing	0.0003	0.0024	0.0031	0.0019
(*r g-cause sent*)	0.0062	0.0099	0.0136	0.0418
Construction	0.5479	0.5598	0.3700	0.2274
(*r g-cause sent*)	0.3240	0.3262	0.0462	0.0186
Retail Trade	0.8793	0.8588	0.8877	0.7743
(*r g-cause sent*)	0.0069	0.0102	0.0015	0.0021
Services	0.0992	0.1214	0.1696	0.5326
(*r g-cause sent*)	0.0003	0.0002	0.0045	0.0009
Services [Wald test]	0.5055	0.5100	0.6900	0.7000
(*r g-cause sent* [Wald test])	0.0004	0.0004	0.0085	0.0110

causes returns. The one notable difference being that Contruction returns grange-cause sentiment in the RI 5-sectors and RI 4-sectors indices.

4.1.2. Causality during different periods

We further examine the predictability of managerial sentiment before and after two major stock market crises; the dotcom bubble and the GFC.[10] As can be seen by comparison of Tables 8 to 11, our main findings remain unchanged for the dotcom bubble and the GFC periods. As before, this implies that the sentiment associated with Manufacturing industry significantly affects both sector and aggregate market returns. However, the reverse does not hold in either period. This could be explained by increased attention to stock prices as a result of the dotcom period. It is also worth noting that the EC Manufacturing questionnaire includes producers of technological products which explains the increased significance of Manufacturing sentiment in predicting stock market returns for the post-dot com period. Additionally, the insignificance of Construction and Consumer confidence in predicting aggregate market returns is also confirmed for the dotcom bubble.

Similarly, results before and after the GFC, as shown in Tables 10 and 11, provide some interesting differences in results. The sentiment associated with both the Manufacturing sector and the Construction sector become more significant in predicting aggregate market returns after the crisis. This result could reasonably be assumed to reflect the impact of the sub-prime crisis on the sensitivity of the market to changes in these sectors. Sentiment in the Retail Trade sector appears to be marginally significant in the pre-crisis period but insignificant in the post-crisis period.

Ferrer et al. (2016) examined CCI as a measure of investor sentiment before and after the dotcom and the GFC meltdowns. Notably, their findings show that, unlike the US, CCIs have an insignificant relationship with the stock market in the EU. Hence, our results are consistent with their conclusion that CCIs are an inappropriate measure of investor sentiment, at least in the UK market, where individual investors participate less actively and less directly in stock market trading compared to the US.[11]

Table 8
p-Values for Granger causality tests for aggregate market and sectoral levels (*pre*-dotcom collapse). This table presents the *p*-value for Granger causality tests for sentiment indicators and stock return indices for the *pre*-dotcom crisis. The results cover the period from January 1985 to December 1999. *r*, *g-cause*, and *sent* denote return, Granger-cause, and sentiment, respectively.

	Returns				
	Market	Manufacturing	Construction	Retail Trade	Financials
Economic and Consumer confidence indicators					
Economy	0.8236				0.7705
(*r g-cause sent*)	0.0233				0.0111
Consumer	0.5266	0.1052	0.5090	0.7169	0.6338
(*r g-cause sent*)	0.2956	0.0021	0.5057	0.7647	0.1830
Managerial sentiment					
Manufacturing	0.0333	0.0084			0.1400
(*r g-cause sent*)	0.2042	0.5103			0.0346
Construction	0.9772		0.2845		0.9872
(*r g-cause sent*)	0.2894		0.0861		0.7617
Retail Trade	0.0486			0.3532	0.2119
(*r g-cause sent*)	0.1587			0.0101	0.1126

5. Conclusion

In this study, we examine the association between managerial sentiment with aggregate UK market returns and returns for five sector groupings. Using time series of UK sector and market return indices and managerial and business confidence indicators obtained from European Commission (EC), we provide evidence that managerial sentiment is an effective predictor of aggregate and sector stock returns. Our measure of consumer confidence is not a predictor of sector or aggregate returns. However, aggregate stock returns and Manufacturing returns predict consumer confidence in our tests.

We find evidence, both for FTSE-ALL share index and FTSE 100 index, that the predictive power of sentiment is sector dependent. For all aggregate sentiment measures, we find strong evidence of co-movement with the market but little evidence of short-run predictability in returns. Additionally, our results confirm that sentiment has a significant effect on aggregate UK stock returns over the period and that sentiment is a significant predictor of expected returns on average. For sector groupings, we find that stock market returns are mainly affected by the sentiment associated with the Manufacturing and Construction sector groupings. Further, we demonstrate that sentiment associated with the Retail Trade and Services sector groupings have no predictive power for stock returns.

In order to examine how the characteristics of each sector affect the sentiment-returns relationship, we also collected data from the questions included in sectoral surveys. Notably, our analysis of answers to survey questions suggests that the specific issues that drive the sentiment-return relationship differ between sectors. While expectations about productions and order levels predict returns in both Manufacturing and Retail Trade sectors, employment expectations constitute an important factor in predicting Construction sector returns. In contrast, sentiment for lagged business development sentiment is more significant in the Services sector. These results support our general

[10] Since the Services sector indicator is only available starting from April 2006, we are unable to examine the relationship for earlier periods.

[11] Individual investors in the UK own 12% of the value of equity shares traded in the stock market compared to 37.3% in the US. For the UK, the figure is obtained from the Office of National Statistics(ONS) available at http://www.ons.gov.uk, accessed on 20 May 2016. For the USA, the figure is obtained from the Federal Reserve available at http://www.federalreserve.gov, accessed on 20 May 2016.

Table 9
p-Values for Granger causality tests for aggregate market and sectoral levels (*post*-dotcom collapse). This table presents the *p*-value for Granger causality tests for sentiment indicators and stock return indices for *post*-dotcom crisis. The results cover the period from January 2003 to December 2014. *r*, *g-cause*, and *sent* denote return, Granger-cause, and sentiment, respectively.

	Returns				
	Market	Manufacturing	Construction	Retail	Financials
Economic and Consumer confidence indicators					
Economy	0.0464				0.0725
(*r g-cause sent*)	0.0794				0.2461
Consumer	0.1457	0.2704	0.9617	0.2608	0.4312
(*r g-cause sent*)	0.0487	0.3504	0.9530	0.7625	0.2324
Managerial sentiment					
Manufacturing	0.0026	0.0084			0.0222
(*r g-cause sent*)	0.0299	0.1859			0.0092
Construction	0.4369		0.7641		0.5079
(*r g-cause sent*)	0.1160		0.1889		0.0620
Retail Trade	0.0560			0.7627	0.6438
(*r g-cause sent*)	0.0679			0.2009	0.1594

Table 10
p-Values for Granger causality tests for aggregate market and sectoral levels (*pre*-GFC). This table presents the *p*-value for Granger causality tests for sentiment indicators and stock return indices for *pre*-GFC. The results cover the period from January 1985 to December 2006. *r*, *g-cause*, and *sent* denote return, Granger-cause, and sentiment, respectively.

	Returns				
	Market	Manufacturing	Construction	Retail Trade	Financials
Economic and Consumer confidence indicators					
Economy	0.8539				0.9470
(*r g-cause sent*)	0.0175				0.0070
Consumer	0.7442	0.1832	0.7409	0.3268	0.4616
(*r g-cause sent*)	0.0351	0.0017	0.0454	0.1059	0.0140
Managerial sentiment					
Manufacturing	0.1139	0.0698			0.2912
(*r g-cause sent*)	0.1809	0.2598			0.0251
Construction	0.8192		0.1382		0.9222
(*r g-cause sent*)	0.6183		0.2608		0.8392
Retail Trade	0.0828			0.1588	0.4355
(*r g-cause sent*)	0.0081			0.0000	0.0467

conclusion that the strength and significance of the relationship between sentiment and stock returns varies between sectors.

Taken together, the findings of this study have implications for practitioners, policy-makers, regulators and portfolio managers whose decisions depend on and/or are affected by movements of stock prices. Our evidence indicates that sector-specific sentiment influences stock returns and stock returns in turn affect investor sentiment, in the form of consumer confidence and managerial sentiment. However, the relationship varies across sectors. For practitioners, our results suggest that asset allocation and fund management strategies might take account of both managerial sentiment and their impact on sector returns. Such information might be obtained by scrutinizing channels of information from management to markets such as trading statements, corporate reports, news announcements and interviews with managers. Regulators might consider how their policies with respect to capital and credit allocation might be received by managers in particular sectors. Such sentiment, in our study at least, affects stock pricing and thus contributes to pricing anomalies which can have serious consequences for investors and markets. Further research might consider how sector-specific sentiment contributes to pricing bubble formation or, from a more pecuniary perspective, how to exploit the effects identified in this paper in a trading strategy.

Table 11
p-Values for Granger causality tests for aggregate market and sectoral levels (*post*-GFC). The table presents the *p*-value for Granger causality tests for sentiment indicators and stock return indices for *post*-GFC. The results cover the period from January 2010 to December 2014. *r*, *g-cause*, and *sent* denote return, Granger-cause, and sentiment, respectively.

	Returns				
	Market	Manufacturing	Construction	Retail Trade	Financials
Economic and Consumer confidence indicators					
Economy	0.3257				0.0272
(*r g-cause sent*)	0.0255				0.0470
Consumer	0.9999	0.9960	0.4643	0.3301	0.9981
(*r g-cause sent*)	0.9987	0.0598	0.7722	0.7172	0.9981
Managerial sentiment					
Manufacturing	0.0137	0.0466			0.8876
(*r g-cause sent*)	0.8204	0.5268			0.4288
Construction	0.0278		0.2262		0.8924
(*r g-cause sent*)	0.3348		0.8473		0.6189
Retail Trade	0.8964			0.9885	0.7597
(*r g-cause sent*)	0.9998			0.6766	0.9937

Appendix A. Sample questions of sectors surveys

1- *Manufacturing confidence indicator*

Q. Do you consider your current overall order books to be…?

[more than sufficient, sufficient, not sufficient].

Q. How do you expect your production to develop over the next 3 months? It will…

[increase, remain unchanged, decrease].

2- *Construction confidence indicator*

Q. Do you consider your current overall order books to be…?

[more than sufficient (above normal), sufficient (normal for the season), not sufficient (below normal)].

Q. How do you expect your firm's total employment to change over the next 3 months? It will…

[increase, remain unchanged, decrease].

3- *Services confidence indicator and financial services confidence indicator*

Q. How has your business situation developed over the past 3 months? It has

[improved, remained unchanged, deteriorated].

Q. How do you expect the demand (turnover) for your company's services to change over the next 3 months? It will…

[increase, remain unchanged, decrease].

4- *Consumer confidence indicator*

Q. How do you expect the financial position of your household to change over the next 12 months? It will….

[get a lot better, get a little better, stay the same, get a little worse, get a lot worse, don't know].

Q. How do you expect the general economic situation in this country to develop over the next 12 months? It will…

[get a lot better, get a little better, stay the same, get a little worse, get a lot worse, don't know].

Q. How do you expect the number of people unemployed in this country to change over the next 12 months? The number will…

[increase sharply, increase slightly, remain the same, fall slightly, fall sharply, don't know].

Q. Over the next 12 months, how likely is it that you save any money?

[very likely, fairly likely, not likely, not at all likely, don't know] Retail trade confidence indicator.

Q. How has (have) your business activity (sales) developed over the past 3 months? It has (They have)

[improved (increased), remained unchanged, deteriorated (decreased)].

Q. How do you expect your business activity (sales) to change over the next 3 months? It (They) will…

[improve (increase, remain unchanged, deteriorate (decrease)]

Appendix B. Construction of confidence indicators

Confidence indicators are calculated using *Scores* that summarize replies to surveys questions. Percentage of responses to any single question should follow:

$$PP + P + E + N + NN + M = 100 \tag{5}$$

where:

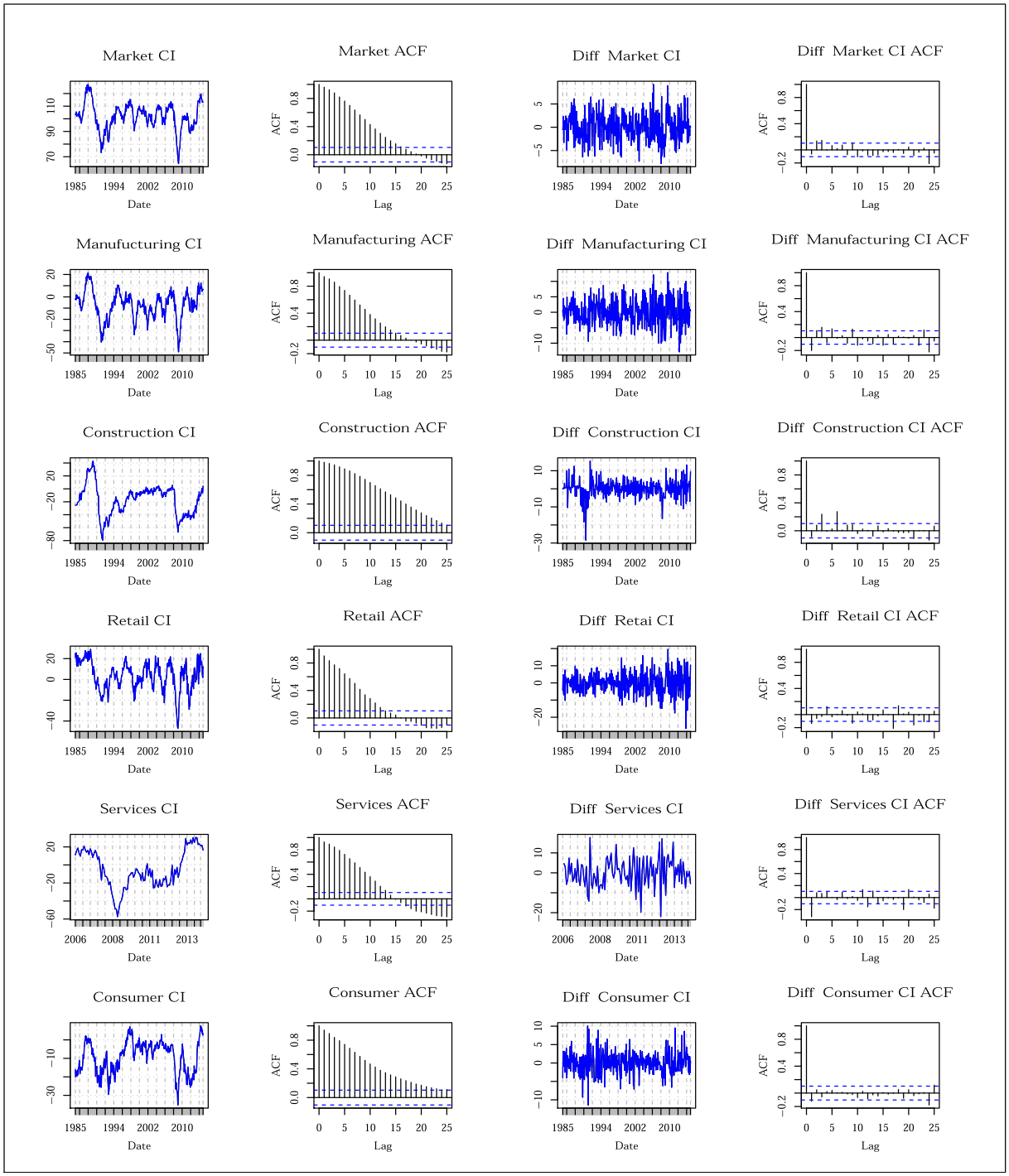
PP is very positive, *P* is positive, *E* is neutral, *N* is negative, *NN* is very negative and *M* is without any opinion.

Scores then are calculated as:

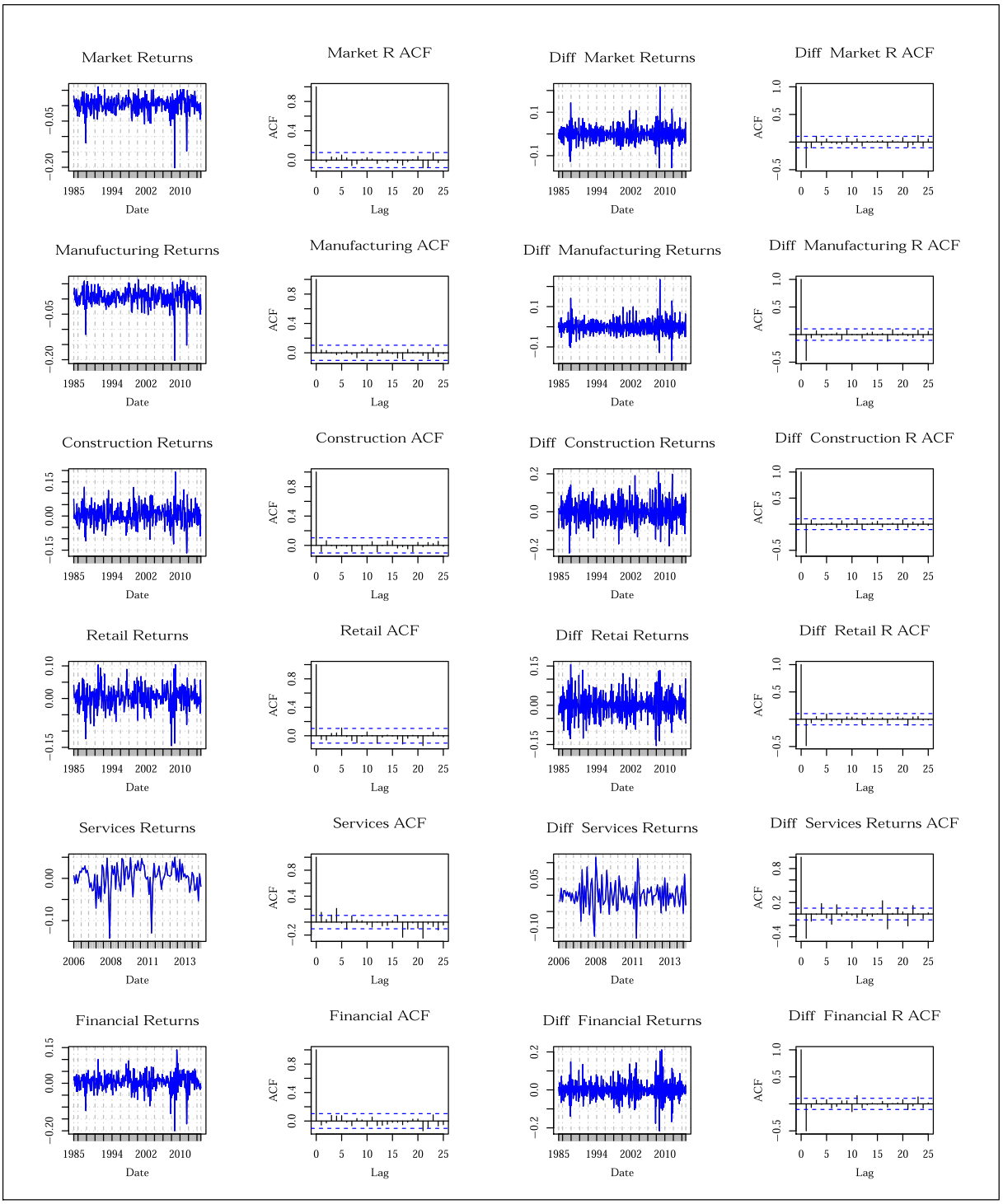
$$Score = \left(PP + \frac{1}{2}P\right) - \left(\frac{1}{2}N + NN\right) \tag{6}$$

The score of a question is ranged from −100 if all respondents choose the negative option to +100 if all respondents choose the positive option. Scores are seasonally adjusted using "Dainties" as the seasonal-adjustment algorithm. For each sector, the confidence indicator is the simple arithmetic average of all seasonally adjusted scores of questions.

Appendix C. Autocorrelation function for level and differenced series

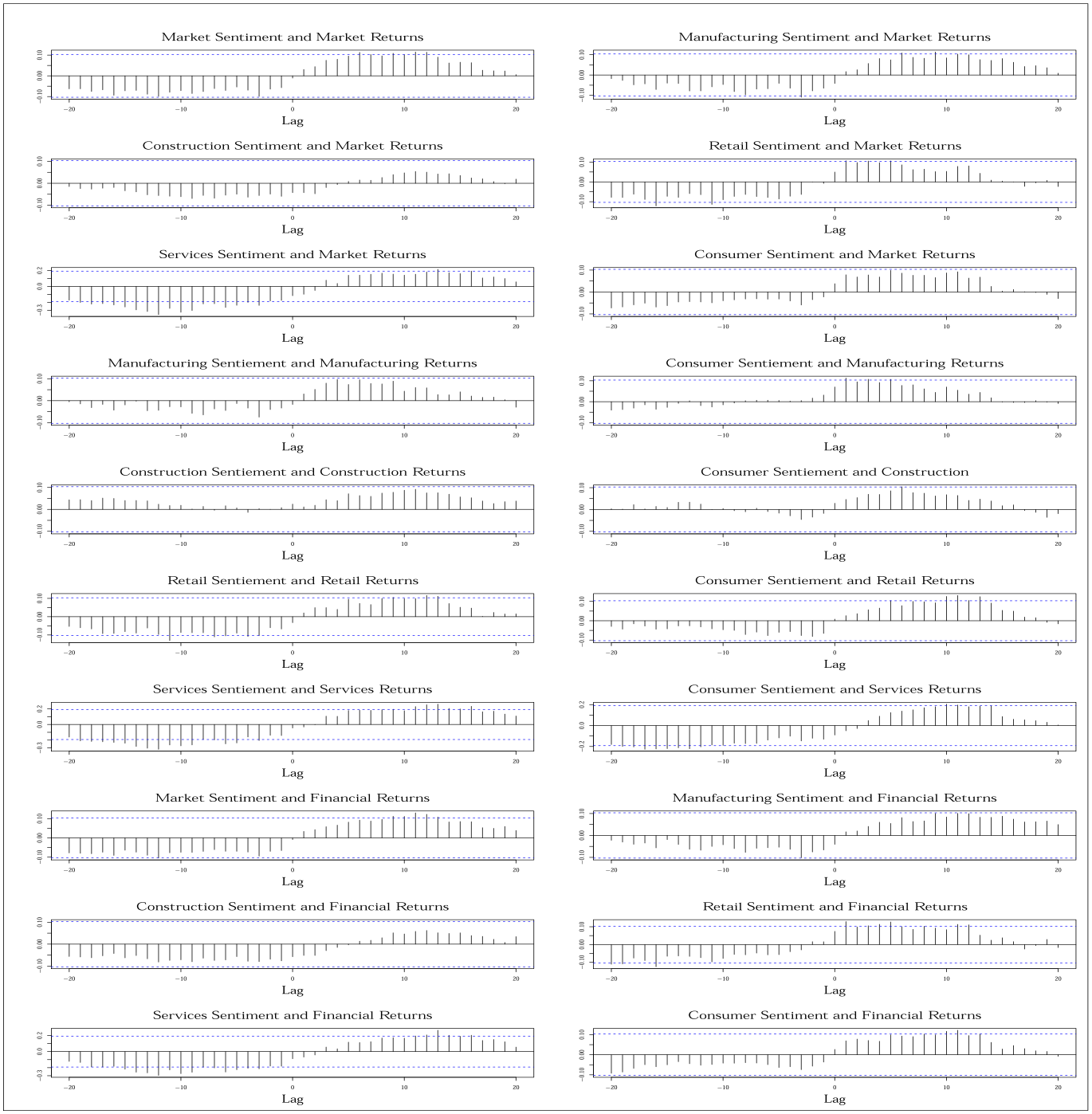


Correlogram of confidence indicators at both level and differenced values.



Correlogram of returns at both level and differenced values.

Appendix D. Cross-correlation function between sentiment indices and returns



Cross correlation function between sentiment and returns: the x and y axes represents the number of lags used and the correlation coefficient respectively. The graph shows the correlation between investor sentiment $Sent_{t+k}$ and stock returns R_t. Positive lags on the x axis means R leads $Sent$ and the negative lags means $Sent$ leads R. The dashed line shows the 5% significance level.

Appendix E. Construction of the Managerial Sentiment Indicator (MSI)

The Managerial Sentiment Indicator (MSI) covers four business surveys of the Economic Sentiment Indicator (ESI). The original weights of indicators in the ESI are 40% to Manufacturing, 30% to Services, 20% Consumer and 5% for each of the Retail Trade and Construction indicators. After the exclusion of the consumer confidence indicator, we redistribute the 20% pro rata based on the original distribution. This results in 50% to Manufacturing, 37.5% to Services, and 6.25% for each of the Retail Trade and Construction indicators.

For the Services sector, the indicator has no values until April 2006. Therefore the MSI is constructed using only three sectors for the period from January 1985 to March 2006. The percentage redistributed to the weights of the three sectors is 50% (%20 from the consumer confidence indicator and 30% from the Services indicator). The weights for this period are 80% to Manufacturing, 10% to each of the Construction and Retail Trade indicators. These adjustments maintain the ratio of Services

weight to Manufacturing weight at 0.75 and Construction and Retail Trade weights to Manufacturing weight at 0.125 for ESI and MSI. Following the same methodology used by the EC in constructing the ESI, the MSI is scaled to have a mean of 100 and a standard deviation of 10.

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