MACROECONOMIA E RETORNOS EMPRESARIAIS POR SETORES NO REINO UNIDO

MACROECONOMY AND COMPANY-SECTOR RETURNS IN UK

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Resumo

Neste trabalho analisamos a sensibilidade dos retornos de empresas por setores a choques macroeconómicos no Reino Unido considerando um período alargado de 1993 a 2013 com base em dados mensais. Providenciam-se novas conclusões com respeito à relação entre os retornos de empresas e as variáveis macroeconómicas, nomeadamente a de que retornos mais elevados são esperados face a taxas de inflação mais elevadas e que os retornos empresariais considerando sectores não podem ser usados para cobertura de risco relacionado com a produção industrial, juro e taxas de inflação, bem como preços do petróleo. Mas existe evidência de adequação de cobertura de risco relativamente a retornos de empresas individuais e por sectores sobre o índice de mercado, um resultado importante a ser tido em consideração por parte de investidores individuais. Verificou-se ainda que a relação existente entre as variáveis macroeconómicas e os retornos empresariais não é estável ao longo do tempo.

Palavras-chave: Regressão Linear múltipla, Impacto financeiro de informações económicas, variáveis macroeconómicas, retornos empresa-setor no UK.

Abstract

We analyze the sensitivity of company-sector-specific stock returns to macroeconomic news in the UK market considering the extended period between 1993 and 2013 using monthly data. We provide new evidence for past results respecting the relationship between stock returns and macroeconomic variables. Results reveal that higher expected returns are needed for higher inflation rate and that stock returns cannot be used as a hedge against industrial production, interest and inflation rates, and oil prices. But, there is adequacy for the hedging role of individual company and sector stocks against the respective sectors market index, interesting for portfolio investors. Relationships between macroeconomic variables and stock returns aren't stable through time.

Keywords: Multiple Regression Analysis, Financial Impact of National Levels of Disclosure, Macroeconomic Variables, UK Company-Sector Returns

JEL classification: C22; E0; G10

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1. Introduction

Globalization has challenged companies to survive in a competitive environment. Companies growth is challenged not only by individual risk (internal factors) as well as by market risk (macroeconomic driving forces). Previous research shows that stock returns, for a variety of countries, are determined by a number of fundamental macroeconomic variables like interest rates, inflation rates and industrial production (Kuwornu and Owusu-Nantwi, 2011; Kemboi and Tarus, 2012; Tangjitprom, 2012; Gupta and Reid, 2013). As such, macroeconomic variables effects over stock returns are interesting for scholars, investors, corporate managers and policy makers. This study aims to supply insights about the way the overall economy affects business, given the possible smoothness of trade disturbance, and to provide investors' the necessary understanding to evaluate stock returns taking into account the systematic influences of macroeconomic factors. A specificity of systematic risk is that unanticipated fluctuations in macroeconomic factors can't be diversified, and we expect stock markets to react to these changes.

For this we try to identify the effects of six selected macroeconomic variables including oil price changes, inflation rate, industrial production index, market interest rate, market stock index and consumer confidence index on stock returns of 55 companies from 11 different sectors in the United Kingdom (UK) between March 1993 and February 2013. We choose to work with the UK market given its financial market development, being a world major economy and a member of G7, and given its dimension compared to other financial markets (Chen et al., 1986; Poon and Taylor, 1991; Liow et al., 2006; Masuduzzaman, 2012). The findings of this study are expected to support both the theoretical and empirical framework of the determinants of stock market movements, from the developed markets perspective, given the policy implications which may be undertaken from the analysis.

Results to be presented here show that portfolio investors should be aware that a movement in the market index is the best predictor to forecast stock returns of individual companies and sectors. The sector market index revealed to be the variable which most influences companies and sector stock index returns, with a positive and significant influence over the entire period. Empirical findings also reveal a nonlinear relationship between macroeconomic variables under study and stock returns, generalized to all sectors. Despite this fact, individual company results suggest the relevance of including the consumer confidence index as a macroeconomic variable affecting company's stock returns. In the UK, sentiment influences individual company's returns from sectors of limited growth and stable earnings (oil & gas, telecommunications and utilities). In the sample considered, investors, managers and policy makers should be aware that sector stock returns cannot be used as a hedge against industrial production, inflation, oil prices and the riskless interest rate, which should thus not affect their decisions. Using moving average regressions, it is finally shown that insignificant beta coefficients estimates obtained are not due to a bad choice of regressor, but yes to the instability of beta coefficients estimates throughout time, revealing that variables relationship is not stable through time.

This paper improves earlier findings by using different measures of macroeconomic news, a higher sample period and by emphasizing results considering individual company and sector stocks in the UK. Results may help investors and portfolio managers to deepen their understanding of the systematic risk-return relationship and pricing of macroeconomic risk. Policy makers can play a vital role in influencing the expected risk premium on company and sector stock returns through the use of the appropriate macroeconomic policies.

In the following, section 2 provides a brief literature review. Section 3 presents the methodology, the hypothesis to be tested and data used for the empirical results, which are to be presented in section 4. Also in section 4 policy and results implications are discussed and future research directions are emphasized. Finally, section 5 concludes.

2. Literature Review

The stock market may be seen as the mirror of an economy exerting influence over its development (Sharpe, 2002; Jones and Wilson, 2006). Sharpe (2002) concludes for a negative relation between expected long-term earnings growth and expected inflation, while Jones and Wilson (2006) observed that inflation adjustments can weakly estimate stock returns. Marone (2003) argues that capital markets provide an avenue for growth oriented companies to raise capital at low cost, whereas Yartey (2008) points that capital markets reduce reliance on bank finance which is susceptible to interest rate fluctuations, and provides a channel for foreign capital inflows.

There have been different versions in the literature favoring the force of general macroeconomic conditions over stock returns and those arguing for no specific impact. For example, Kandir (2008) uses monthly data from July 1997 to June 2005 and multiple regression models for Turkey, to suggest a negative impact of interest rates over stock returns. Industrial production, money supply and oil prices don't show any significant influence on stock returns. Using maximum likelihood estimation, Kuwornu and Owusu-Nantwi (2011) found no significant influence of oil prices over stock returns, a positive impact of the inflation rate (CPI – consumer price index), and a negative one of the exchange rate and treasury bill over stock returns for Ghana.

Rjoub et al. (2009) use the arbitrage pricing theory (APT) model to evidence a relationship between macroeconomic variables (interest rate, unanticipated inflation, risk premium, exchange rate, money supply and unemployment rate) and the Istanbul Stock Market from January 2001 to September 2005. Using a vector error correction model, Mukherjee and Naka (1995) tried to model the relationship between Japanese stock returns and macroeconomic variables finding cointegration effects among stock prices and exchange rate, inflation rate, money supply, real economic activity, long term government bond rate and call money rate. Quadir (2012) investigates the effects of macroeconomic variables on stock returns of Dhaka Stock Exchange, using 8 years of monthly data and the Autoregressive Integrated Moving Average model. He finds a positive relationship between Treasury bill interest rate and industrial production with the market index stock return, although coefficients revealed to be statistically insignificant.

Tangjitprom (2012) reviews a number of studies on macroeconomic factors and stock returns. Here macroeconomic variables are classified into four groups: those reflecting general economic conditions, related to interest rate and monetary policy, concerning price level, and pertaining to international activities. He concludes that most studies show evidence for a significant relationship between macroeconomic variables and stock returns.

Taking a company perspective, Özlen and Ergun (2012) study macroeconomic variables and their effects on stock returns of 45 companies from 11 different sectors in Turkey, on the basis of the autoregressive distributed lag method using monthly data from February, 2005 to May, 2012. The authors found that exchange rate and interest rate are more significant factors in stock price fluctuations of companies, then inflation rate, current account deficit and unemployment rate. Benaković and Posedel (2010) analyze returns on fourteen stocks of the Croatian capital market from January 2004 to October 2009, to show that the market index has the largest positive statistical significance for all stocks and returns. Interest rates, oil prices and industrial production also showed a positive relation to returns, while inflation had a negative influence. Looking for industry-specific stock returns, Gupta and Reid (2013) use a Bayesian vector autoregressive analysis to explore their sensitivity to monetary policy and macroeconomic news in South Africa. They find that in addition to monetary policy surprises, the CPI and producer price index (PPI) affect stock returns significantly.

Chen et al. (1986) tested the multifactor model in the UK and USA markets, finding that consumption, oil prices and the market index are not priced by the financial market while in-

dustrial production, changes in risk premium and twists in the yield curve are significant. For the UK market, also Poon and Taylor (1991) reached similar results (macroeconomic variables don't affect share returns in UK but yes in the US). They suggest that either different variable should impact UK returns or that the model applied by Chen et al. (1986) is inappropriate. Also for the UK, Clare and Thomas (1994) try to analyze the effect of eighteen macroeconomic variables over stock returns. Oil prices, retail price index, bank lending and corporate default risk are found to be important systematic risk factors to be included. Priestley (1996) uses macroeconomic variables and financial factors (default risk, industrial production, exchange rate, retail sales, money supply unexpected inflation, change in expected inflation, interest rates term structure, commodity prices and market portfolio) to pre-specify that these factors may carry a risk premium in the UK stock market. They used the arbitrage pricing theory model to state that all factors are significant. Later on, Liow et al. (2006) state that the expected risk premia and the conditional volatilities of the risk premia on property stocks are time-varying, being dynamically linked to the conditional volatilities of macroeconomic risk factors in Singapore, Hong Kong, Japan and the UK.

More recently, Gregoriou et al. (2009) used 3-month Sterling LIBOR futures as the proxy for monetary policy shocks in the UK market, finding negative relationship between interest rate changes and stock returns before the credit crisis period; however, the relationship reversed to a positive one during the credit crisis. Daly and Fayyad (2011) examined the relationship between Gulf Cooperation Council (GCC) countries, the UK and the US stock market returns and oil price by employing vector autoregressive analysis during the period September 2005 to February 2010. They find that when oil prices increase sharply it predicts returns from USA, UAE and Kuwait but not those from UK, Oman, Bahrain and Qatar. Masuduzzaman (2012) investigate the long-run relationship and short-run dynamics, through VECM, among macroeconomic fundamentals (consumer price index, interest rates, exchange rates, money supply and industrial production) and the stock returns of Germany and the UK between the periods of February 1999 to January 2011. Results imply the existence of short-term adjustments and long-term dynamics for both the UK and the German stock markets returns and macroeconomic fundamentals.

Considerable attention has been devoted to the relationship between stock markets and economic growth. Moreover, macroeconomic factors are critical in predicting the variability of stock returns. However, there is still little empirical work on the determinants of stock market for individual company stocks. It is also clear that no standardized set of macroeconomic variables exist, but that inflation rate, exchange rate, interest rate, and unemployment rate are the most popular significant factors in order to explain stock market movements. There may be other influencing factors such as the transmission of shocks (like those of oil) and psychological effects (using as proxy the consumer confidence index) in the determination of stock price movements. Our work also differs from previous ones by taking both sector and company data into account considering the developed UK market.

3. Methodology, hypothesis and data

Following previous authors, we use the APT model which allows including several factors into one regression, in accordance to the following specification:

$$r_{i,t} = \mathsf{a}_i + \mathsf{b}_{i,1}F_{1,t} + \mathsf{b}_{i,2}F_{2,t} + \ldots + \mathsf{b}_{i,k}F_{k,t} + \mathsf{e}_{i,t} \quad (1)$$

where ri,t represents the return on stock i computed as the log difference between consecutive prices, α is the constant term, βi measures the sensitivity of a stock i to a set of n macroeconomic factors, Fn indicates realizations of macroeconomic factors and ε is the error

term with an expected value of zero.

We have collected daily data from the stock market sector indices and 5 different individual companies' stock market data for each of the considered eleven sectors operating in the UK market between March 1993 and February 2013. In total we have collected data for 55 individual companies and 11 sector indices. The daily data was converted into monthly returns using the month last day of trading available data. The five companies considered for each sector were randomly selected where we have decided to collect data from those companies for which we had more years of available data over the sample offered. Data for the considered representative sector indices goes from December 1992 until October 2012, which was converted into monthly series. The sectors here analyzed are Basic Materials (BM), Consumer Goods (CG), Consumer Services (CS), Financials (F) and Banks (B), Healthcare (HC), Industrials (I), Oil and Gas (OG), Technology (Tec), Telecommunications (Tel) and Utilities (U). When analyzing sector market indices the general stock market index for that specific sector has been considered as the proxy for the market index. This data has been collected from several sources including the UK official stock exchange, UK central bank data, Eurostat, EIA, OECD statistics and others whenever necessary.

The Fn variable of equation (1) indicates realizations of macroeconomic factors. We have used in the present analysis variables which have been selected based on the literature review previously presented and were considered to be the most representative ones. Campbell, Lo and MacKinlay (1997), state that it is enough to use three to six factors in the multifactor APT model. Here we use variables which may be classified as reflecting general economic conditions, related to interest rate and monetary policy, concerning the price level and considering investors behavior. As such, we use monthly oil returns, inflation rate, industrial production index, market interest rate, stock market index and consumer confidence index. All price series have been converted into log returns. In the following we try to justify the use of these variables by presenting the main study hypothesis.

- Hypothesis 1. Inflation exerts a negative impact over both stock and sector indices.

  Inflation raises the general price level, reduces the real value of money and the expected cash inflow of an asset through its influence over stock market volatility and risk (Nacuer et al., 2007; Kuwornu and Owusu-Nantwi, 2011). Inflation (π in tables) has been used as a measure of macroeconomic stability and it is expected to affect negatively both stock and sector indices. We use the direct inflation rate provided by the available data. We may have expected or unexpected inflation, being the last the most painful one. If stock returns represent activeness of the market, they may be influenced by other macroeconomic factors besides inflation, like interest rate changes, and thus create a global phenomenon. If inflation may prompt economic activity (because a company's revenues and profits should grow at the same rate as inflation, after an adjustment period) it may also raise companies input costs. Stocks should provide a hedge against inflation, but inflation's varying impact on stocks turns harder the decision to trade already held positions or to enter in new ones. These different perspectives may justify the different conclusions reached in the literature. Nacuer et al. (2007) found that macroeconomic instability (inflation) has a negative and significant relationship with stock market capitalization. In Yartey (2008), no significant relationship between inflation and stock market development was stated. Using an asymmetric model Kolluri and Wahab (2008) examine the liaison between expected inflation and stock returns, concluding for a negative relationship during low inflation regimes, and a positive one during high inflation regimes.

- Hypothesis 2. There exists a negative relationship between interest rates and stocks.

  The banking sector is important for stock market development as it provides investors with liquidity through credit and savings. Both Nacuer et al. (2007) and Yartey (2008) argue for the existence of a positive relationship between the development of the banking sector and that of the stock market. Yartey (2008) states that a very high level of bank sector development may have negative effects because stock markets and banks tend to substitute one another as financing sources. Given that stock markets and banks may be considered as competitors in providing finance (Kemboi and Tarus, 2012), with a well-developed money market, the capital market may be overshadowed leading to slower rates of development. Our measure of the banking sector is the 3-month Treasury bill interest rate (IR in the tables). We know that high interest rates tend to decrease the present value of future cash flows, declines expected earnings and leads to higher costs of borrowing and financing. In turn, it reduces investment attractiveness and according to economic theory, also stock prices. As such, we expect a negative sign between interest rates and stock returns. Chang et al. (2011) conducted a study about monetary policy and stock returns using Federal funds rate, finding a small effect over stock returns, while Gregoriou et al. (2009) found a negative relationship between interest rate changes and stock returns.

- Hypothesis 3. Industrial production positively influences stock returns.

  GDP may act as a proxy for the purchasing power ability of investors. An increase in GDP reflects that consumers in general have more purchasing power and are more prone to invest additional income in the stock market. However, GDP is only published on a quarterly basis, but we may use the industrial production index as a proxy for economic conditions and activity (Humpe and MacMillan, 2009; Benakovic and Posedel, 2010). Here we also use the industrial production (IP in the tables) growth rate and given previous empirical findings we also expect a positive relationship between industrial production and stock returns, also found by Humpe and MacMillan (2009) in both the US and Japanese markets.

- Hypothesis 4. Oil prices negatively influence stock market returns.

  Some studies have focused on oil prices, considered as a proxy for cost-push inflation. Oil price rises increase the uncertainty in capital markets and the risk of inflationary pressures in the economy (Benakovic and Posedel, 2010), by increasing companies costs like transportation and production, while reducing profits and consequently stock returns. So, oil prices are expected to exert a negative influence over capital markets. The oil price (OP in the tables) series used here is the West Texas Intermediate (WTI), monthly spot price. Fedorova and Pankratov (2010) used Brent oil price to analyze the influence of macroeconomic factors on stock returns of Russia, revealing that Brent is the macroeconomic factor that most affects stock returns. Faff and Brailsford (1999) show that sensitivities to oil prices vary across industries in Australia, finding a negative effect over the oil and gas, paper, packaging and transportation industries. Kilian and Park (2009) find that only oil demand shocks have a significant impact on stock returns.

- Hypothesis 5. Stock returns react positively to market index changes.

  Macroeconomic variables cannot comprise all the information available in capital markets, but stock prices react to information released (Benakovic and Posedel, 2010). As such, it is suggested the inclusion of financial market variables like the stock market index in the factor model. Also Chen et al. (1986) use this variable and we use the UK individual representative stock market index (MI in the tables) as an independent variable. Given that the overall market performance positively influences stock returns, we expect a positive relation between stock returns and the market index.

- Hypothesis 6. Sentiment is positively related to company and sector market returns.

  Consumer confidence acts as a proxy for individual investor sentiment. It attempts to gauge consumers' feelings about the current economy condition and expectations about the economy's future direction. Investor's sentiment, or positive (negative) expectations, has a determining role in stock market price movements (Brown and Cliff, 2004) and affect economic growth in a positive way. So, as a last independent variable, we have included the consumer confidence (CC in the tables) index. Corredor et al. (2013) and Jansen and Nahuis (2003) studied the European market to find that stock returns and changes in sentiment are correlated, none using individual companies' data. Corredor et al. (2013) find that sentiment has a significant influence on returns, varying in intensity across markets, revealing that results are sensitive to the choice of the sentiment proxy. Previously, Lin et al. (2009) found that changes in the consumer sentiment are contemporaneously associated with market returns, concluding that positive (negative) changes in sentiment tend to drive aggregate stock prices higher (lower) in the same period. The authors empirical results based over multivariate analysis, causality tests and VAR models, suggest that changes in sentiment capture variation in average returns in the energy, financial, industrial, information technology and material sectors, which should be somehow expected given that this valuation of stocks tend to be more subjective. Returns in the consumer, health care, property trusts, telecommunication and utility sectors are not affected robustly by sentiment given that these are matured sectors characterized by limited growth and stable earnings and are thus less sensitive to changes in sentiment. However, there have been reduced efforts in the empirical literature to establish this relationship among the two variables. In fact, stock prices should be affected by investor's expectations, when these respond quickly to new economic and political news released to the market.

Given the stated hypothesis we end up with the following APT specification:

$$r_{i,t} = \mathsf{a}_i + \mathsf{b}_i M_{i,t} + \mathsf{b}_i R_{i,t} + \mathsf{b}_i \mathsf{p}_{i,t} + \mathsf{b}_, P_{i,t} + \mathsf{b}_i \Theta_{i,t} + \mathsf{b}_i C_{i,t} + \mathsf{e}_{i,t} \quad (2)$$

4. Empirical findings and policy implications

In the empirical estimations whose results are presented in this section, either company or sector stock returns are the dependent variable, being the macroeconomic variables the independent ones. APT multiple regressions provided six different coefficient sensitivities for each regression, which estimate individual stock or index sector returns sensitivities to changes in the set of macroeconomic factors. Results are to be interpreted as the monthly change in the

stock or index sector stock return when a particular macroeconomic factor changes by one percentage point keeping all other variables constant.

Table 1 presents summary statistics of company returns (5 for each sector) and macroeconomic variables. Results indicate that only all companies from the consumer services and financials sectors have positive means, although for all and independently of the sector, means are very low in percentage. By considering macroeconomic variables, only interest rate and consumer confidence reveal to have negative means, but for all, and considering daily data, mean returns are almost close to zero.

If we measure risk by standard deviation, we see that the company with the highest risk is from the HealthCare sector, while for macroeconomic variables consumer confidence presents the highest risk followed by interest rate. As for skewness and kurtosis values we see that for all returns values are far away from their considered normality values. Given these results, the estimation method used in this multifactor model has been the OLS with White heteroskedastic correction. Among macroeconomic variables consumer confidence reveals to have the highest minimum and maximum values, while for companies the minimum and simultaneously maximum return from all belong to the consumer services sector.

Next we present all the regression estimates by company for each of the considered sectors in table 2. These are identified by numbers (1 to 5) for each of the analyzed sectors. It is clearly evident that it is the stock market index which most affects company individual stock returns and in a positive manner as predicted, independently of the sector analyzed. The obtained sign is positive and statistically significant as initially predicted. So, changes in the market index return impact economies as a whole, without distinction of the sector. Portfolio investors must then be aware that they can use market index return movements to forecast companies' returns.

In reality, the stock market index is the only variable which influences all company stock returns independently of the activity sector, reinforcing strongly our hypothesis 5. Variables like interest rate, whose initial prediction stated in hypothesis 1 were that of a negative influence, only revealed to be statistically significant in three cases: in one company for basic materials and in two companies in the banks sector. When coefficients are negative we have no statistical significance, which occurs in most of the situations. This positive influence is also observed for the variable inflation in the UK market for one company in the Oil & Gas and another one in the Telecommunication sector. Again, when negative, the inflation coefficient is not statistically significant. These values contradict our initial prediction and those of Kandir (2008), with respect to the sign relationship among variables (hypothesis 2) but are in accordance with those obtained by Benakovic and Posedel (2010) for the Croatian market, also considering individual companies results. This may be justified by the fact that when inflation increases, stock prices will consequently increase following the general price pattern. So, this positive sign may be due to the market capitalization increase due to inflationary causes (Kemboi and Tarus, 2012). However, given the results instability and low significance obtained we cannot generalize these findings. Also Kuwornu and Owusu-Nantwi (2011) and Muhammad et al. (2008) obtained a positive sign, justifying this positive impact due to the inadequacy of the hedging role of stocks against inflation. In this case, higher expected returns are needed for higher inflation rate. Our results also favor those of Liow et al. (2006) for the UK market, that unexpected inflation has a positive sign over stock returns.

With respect to consumer confidence, we see a higher impact for UK individual company stocks in sectors like financials, oil & gas, telecommunications and utilities, although only for just one company for each sector. However, these positive statistical coefficient signs favor our hypothesis 6. Compared to Corredor et al. (2013), Jansen and Nahuis (2003) and Lin et al. (2009) we found random evidence that changes in consumer sentiment are contemporaneously associated with market returns. So, positive (negative) changes in sentiment tend to drive individual companies stock prices higher (lower) in the same period, at least for company

Table 1: Descriptive statistics of company stock characteristics and macroeconomic variables

		Mean	St. - Dev.	Kurtosis	Skewness	Minimum	Maximum	Observ.
Basic Materials	*Alumasc*	-0.01%	0.89%	64.20	-2.47	-17.87%	8.04%	5216
	Aukett Fitzroy RBS.GP.	-0.01%	2.15%	26.85	0.91	-18.56%	30.10%	5216
	Balfour Beatty	0.00%	0.99%	10.03	0.00	-12.28%	8.07%	5216
	Boot (Henry)	0.01%	0.76%	25.91	-0.41	-13.03%	6.37%	5216
	Clarke	0.01%	1.05%	14.80	-0.32	-10.91%	8.81%	5216
Consumer Goods	*AGA Rangemaster Group*	-0.01%	1.07%	5.07	0.03	-8.25%	7.06%	5216
	Airea	-0.02%	1.13%	50.22	0.35	-15.31%	17.61%	5216
	Barrat Developments	0.01%	1.26%	15.98	-0.02	-15.36%	14.81%	5216
	Bellway	0.01%	0.88%	6.64	0.36	-5.19%	8.05%	5216
	Berkeley Group HDG.(THE)	0.02%	0.83%	11.07	0.71	-5.75%	11.13%	5216
Consumer Services	*Acal*	0.00%	0.91%	22.79	-0.97	-13.35%	9.25%	5216
	Andrews Sykes Group	0.02%	1.07%	34.80	0.53	-15.26%	15.17%	5216
	Ashtead Group	0.03%	1.72%	310.05	-8.70	-52.29%	30.10%	5216
	Berendsen	0.01%	0.68%	10.16	0.16	-7.71%	6.53%	5216
	Bunzl	0.02%	0.67%	3.69	-0.04	-4.88%	4.12%	5216
Financials	*Aberdeen Asset Man.*	0.02%	1.14%	16.65	-0.54	-13.26%	10.81%	5216
	Charles Stanley Group	0.03%	1.00%	29.44	1.94	-10.24%	15.70%	5216
	City of London Group	0.00%	1.31%	47.04	2.42	-11.87%	21.07%	5216
	Camellia	0.02%	0.89%	19.97	0.12	-10.60%	10.56%	5216
	Arbuthnot Banking Group	0.00%	0.57%	20.77	0.59	-5.50%	6.27%	5216
Banks	*Barclays*	0.01%	1.23%	34.70	1.06	-12.00%	23.28%	5216
	Royal Bank of SCTL.GP.	-0.01%	1.42%	270.58	-8.03	-48.27%	13.38%	5216
	HSBC HDG.	0.01%	0.84%	8.74	-0.23	-9.35%	6.47%	5216
	Standard Chartered	0.02%	1.10%	9.13	0.18	-7.97%	12.05%	5216
	BCB Holdings	-0.02%	1.24%	22.43	0.18	-15.13%	12.96%	5216
Health Care	*Surgical Innovations GP.*	-0.03%	3.27%	36.96	-0.22	-38.02%	30.10%	5216
	Consort Medical	0.00%	0.81%	57.66	-2.57	-17.50%	7.72%	5216
	Smith & Nephew	0.01%	0.76%	4.91	0.11	-5.85%	4.78%	5216
	Bioquell	0.01%	1.04%	12.46	0.77	-8.80%	8.94%	5216
	Glaxosmithkline	0.01%	0.74%	5.95	0.18	-5.85%	8.07%	5216
Industrials	*BBA Aviation*	0.04%	0.93%	8.92	-0.03	-10.09%	7.67%	5216
	Ocean Wilsons Holdings	0.03%	0.75%	17.44	-0.28	-7.91%	6.75%	5216
	Fisher(James)& Sons	0.03%	0.99%	113.89	-1.43	-21.76%	20.59%	5216
	Sutton Harbour HDG.	-0.01%	1.03%	715.57	-16.12	-45.03%	8.21%	5216
	Clarkson	0.02%	1.00%	10.69	0.54	-7.59%	9.78%	5216
Oil & Gas	*BG Group*	0.02%	0.89%	3.69	-0.10	-6.25%	5.98%	5216
	BP	0.01%	0.76%	4.36	-0.05	-5.69%	5.34%	5216
	Brit.PTL.WTS.92	-0.01%	0.62%	1097.09	-22.42	-30.10%	1.64%	5216
	Cairn Energy	0.03%	1.28%	13.46	0.71	-10.47%	17.37%	5216
	Fortune Oil	0.00%	2.48%	29.81	-0.37	-34.24%	30.10%	5216
Technology	*Northamber*	0.00%	1.09%	19.69	0.70	-12.23%	10.47%	5216
	CML Microsystems	0.00%	1.07%	41.47	-1.41	-17.73%	9.91%	5216
	Spirent Communications	0.00%	1.60%	175.25	-4.53	-47.71%	24.99%	5216
	Belgravium Techs.	-0.02%	2.18%	21.62	-0.02	-17.61%	22.18%	5216
	Laird	0.00%	1.12%	30.02	-0.60	-18.43%	13.93%	5216
Telecommunications	*Vodafone Group*	0.02%	0.97%	3.08	0.04	-6.20%	6.00%	5216
	4Imprint Group	0.00%	0.99%	34.27	1.01	-11.90%	12.17%	5216
	Cable & Wireless Comms.	-0.01%	1.17%	51.72	-2.51	-23.89%	8.94%	5216
	BT Group	0.00%	0.95%	6.19	-0.30	-8.88%	5.26%	5216
	AEGIS Group	0.02%	1.11%	29.07	-0.08	-18.71%	15.89%	5216
Utilities	*Sea Energy*	-0.01%	1.97%	74.04	-2.65	-39.95%	20.41%	5216
	Domino Printing Sciences	0.01%	0.85%	13.89	0.07	-8.12%	7.31%	5216
	Densitron Technologies	0.00%	1.86%	26.18	1.48	-17.61%	22.18%	5216
	Dewhurst	0.02%	0.63%	39.41	0.12	-9.24%	8.23%	5216
	SSE	0.01%	0.67%	6.39	-0.13	-5.74%	6.59%	5216
	IR monthly	-0.32%	2.05%	23.76	-3.76	-15.70%	4.71%	239
	MI monthly	0.16%	1.79%	1.06	-0.83	-6.26%	3.95%	239
	CC monthly	-0.08%	26.84%	5.45	0.56	-93.79%	112.06%	239
	IP monthly	0.00%	0.38%	4.18	-0.90	-2.09%	1.27%	239
	π monthly	0.02%	6.59%	2.40	0.23	-24.30%	26.32%	239
	OP daily	0.01%	1.01%	5.31	0.03	-6.19%	9.96%	5216

NOTE: Means, Standard deviation, minimum and maximum values are presented in percentage terms. Skewness and kurtosis values are in absolute terms. The selected period of analysis is March 1993 until February 2013. Summary statistics are presented for 5 identified firms in each sector.

Table 2: UK individual companies stock returns by activity sector regression results

	Basic Materials					Consumer Goods					Consumer Services				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Constant	3.37	-1.48	1.84	1.01	-3.32	-2.17	-13.03	-5.49	-1.41	-0.32	-1.22	0.05	2.55	0.45	0.77
	(3.26)	(6.10)	(3.32)	(2.50)	(2.96)	(2.93)	(6.49)	(4.13)	(2.88)	(2.58)	(3.07)	(4.10)	(5.25)	(2.04)	(1.95)
MI	1.02 ***	1.14 ***	0.86 ***	0.92 ***	0.93 ***	1.09 ***	2.15 ***	1.48 ***	0.90 ***	0.93 ***	1.24 ***	0.83 ***	1.92 ***	0.63 ***	0.61 ***
	(0.14)	(0.27)	(0.14)	(0.11)	(0.13)	(0.13)	(0.28)	(0.18)	(0.13)	(0.11)	(0.13)	(0.18)	(0.23)	(0.09)	(0.08)
IR	-0.37	-0.28	-0.10	-0.27	1.02 **	0.30	1.53	0.66	0.30	-0.04	0.18	0.19	-0.54	0.00	-0.07
	(0.14)	(0.27)	(0.14)	(0.11)	(0.13)	(0.13)	(0.28)	(0.18)	(0.13)	(0.11)	(0.13)	(0.18)	(0.23)	(0.09)	(0.08)
π	-1.68	2.38	-1.05	0.17	-0.79	-0.66	0.89	0.41	-0.35	0.46	-0.48	-0.83	0.15	-0.24	0.22
	(0.90)	(1.68)	(0.92)	(0.69)	(0.82)	(0.81)	(1.79)	(1.14)	(0.80)	(0.71)	(0.85)	(1.13)	(1.45)	(0.56)	(0.54)
CC	-0.15	0.31	-0.06	0.03	-0.02	-0.11	-0.27	-0.19	-0.13	0.00	-0.07	-0.24	-0.04	-0.04	0.05
	(0.12)	(0.22)	(0.12)	(0.09)	(0.11)	(0.11)	(0.24)	(0.15)	(0.10)	(0.09)	(0.11)	(0.15)	(0.19)	(0.07)	(0.07)
IP	0.14	-0.06	0.10	-0.15	-0.34	-0.15	-0.73	-0.28	0.01	0.22	-0.08	0.32	-0.09	-0.12	0.03
	(0.24)	(0.45)	(0.24)	(0.18)	(0.22)	(0.22)	(0.48)	(0.30)	(0.21)	(0.19)	(0.23)	(0.30)	(0.39)	(0.15)	(0.14)
OP	-0.10	-0.03	0.04	0.01	0.08	0.01	-0.11	-0.10	0.01	0.04	0.09	0.06	0.11	-0.08	0.02 **
	(0.07)	(0.14)	(0.08)	(0.06)	(0.07)	(0.07)	(0.15)	(0.09)	(0.07)	(0.06)	(0.07)	(0.09)	(0.12)	(0.05)	(0.04)
Sample Size	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223
Rsqrt	0.22	0.09	0.15	0.26	0.22	0.26	0.24	0.27	0.20	0.24	0.29	0.10	0.26	0.22	0.20
	Financials					**Banks**					**Health Care**				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Constant	0.94	0.37	1.93	-4.82	4.72	-4.35	-0.22	-1.69	2.40	-4.40	0.88	-1.84	1.84	5.04	-1.42
	(3.60)	(2.22)	(2.27)	(4.19)	(5.75)	(3.15)	(4.47)	(2.13)	(3.16)	(2.85)	(4.13)	(2.58)	(2.34)	(7.86)	(1.84)
MI	1.35 ***	0.68 ***	0.56 ***	1.74 ***	1.01 ***	1.47 ***	0.80 ***	1.01 ***	1.51 ***	1.17 ***	0.87 ***	0.79 ***	0.59 ***	1.70 ***	0.27 ***
	(0.16)	(0.10)	(0.10)	(0.18)	(0.25)	(0.14)	(0.19)	(0.09)	(0.14)	(0.12)	(0.18)	(0.11)	(0.10)	(0.34)	(0.08)
IR	-0.30	-0.18	-0.31	0.76	-0.65	0.81 *	0.17	0.39	0.09	0.79 *	0.14	-0.05	-0.07	-0.79	0.18
	(0.16)	(0.10)	(0.10)	(0.18)	(0.25)	(0.14)	(0.19)	(0.09)	(0.14)	(0.12)	(0.18)	(0.11)	(0.10)	(0.34)	(0.08)
π	0.65	0.17	0.58	0.93	-0.32	-0.49	-0.21	-0.34	-1.93	0.07	-0.39	1.16	-0.57	-0.11	0.40
	(0.99)	(0.61)	(0.63)	(1.16)	(1.59)	(0.87)	(1.23)	(0.59)	(0.87)	(0.79)	(1.14)	(0.71)	(0.65)	(2.17)	(0.51)
CC	0.07	0.00	0.16 *	0.09	0.14	-0.17	0.20	-0.05	-0.04	-0.10	0.01	0.05	0.00	0.09	0.00
	(0.13)	(0.08)	(0.08)	(0.15)	(0.21)	(0.11)	(0.16)	(0.08)	(0.12)	(0.10)	(0.15)	(0.09)	(0.09)	(0.29)	(0.07)
IP	0.34	-0.30	-0.15	-0.05	0.02	-0.23	-0.27	-0.02	-0.05	-0.12	0.34	0.26	-0.01	-0.80	0.20
	(0.26)	(0.16)	(0.17)	(0.31)	(0.42)	(0.23)	(0.33)	(0.16)	(0.23)	(0.21)	(0.30)	(0.19)	(0.17)	(0.58)	(0.14)
OP	0.03	-0.07	-0.07	0.15	0.11	-0.17	0.00	0.02	-0.18	-0.04	0.00	0.02	0.02	-0.13	0.01
	(0.08)	(0.05)	(0.05)	(0.10)	(0.13)	(0.07)	(0.10)	(0.05)	(0.07)	(0.06)	(0.09)	(0.06)	(0.05)	(0.18)	(0.04)
Sample Size	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223
Rsqrt	0.26	0.23	0.16	0.30	0.08	0.39	0.09	0.36	0.40	0.31	0.11	0.20	0.14	0.13	0.06
	Industrials					**Oil & Gas**					**Technology**				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Constant	-2.36	6.88 **	1.73	2.63	1.80	1.17	-2.02	-0.58	2.62	4.84	-3.98	12.30 ***	0.63	0.92	-5.55
	(2.27)	(2.84)	(2.95)	(2.38)	(3.03)	(2.07)	(2.07)	(0.82)	(3.90)	(5.58)	(5.65)	(4.63)	(3.69)	(3.55)	(4.23)
MI	1.30 ***	1.00 ***	0.87 ***	0.81 ***	0.62 ***	0.51 ***	0.61 ***	0.20 ***	1.02 ***	1.33 ***	1.98 ***	1.24 ***	1.47 ***	0.73 ***	1.71 ***
	(0.10)	(0.12)	(0.13)	(0.10)	(0.13)	(0.09)	(0.09)	(0.04)	(0.17)	(0.24)	(0.25)	(0.20)	(0.16)	(0.15)	(0.18)
IR	0.29	-0.58	-0.07	-0.31	-0.11	-0.13	0.38	0.02	0.22	-0.75	0.16	-2.09	-0.22	0.07	0.52
	(0.10)	(0.12)	(0.13)	(0.10)	(0.13)	(0.09)	(0.09)	(0.04)	(0.17)	(0.24)	(0.25)	(0.20)	(0.16)	(0.15)	(0.18)
π	-0.24	-2.15	-0.45	0.12	-0.51	0.99 *	0.16	0.21	-1.17	-1.09	1.22	-0.35	-0.49	-1.04	1.18
	(0.63)	(0.78)	(0.81)	(0.66)	(0.84)	(0.57)	(0.57)	(0.23)	(1.08)	(1.54)	(1.56)	(1.28)	(1.02)	(0.98)	(1.17)
CC	-0.12	-0.17	-0.08	0.08	0.09	0.24 ***	0.02	0.02	-0.03	-0.14	0.10	0.23	-0.13	-0.10	-0.01
	(0.08)	(0.10)	(0.11)	(0.09)	(0.11)	(0.08)	(0.08)	(0.03)	(0.14)	(0.20)	(0.21)	(0.17)	(0.13)	(0.13)	(0.15)
IP	-0.23	0.25	0.06	-0.04	-0.19	0.06	0.02	0.00	-0.13	0.49	-0.02	0.34	0.05	0.14	-0.19
	(0.17)	(0.21)	(0.22)	(0.18)	(0.22)	(0.15)	(0.15)	(0.06)	(0.29)	(0.41)	(0.42)	(0.34)	(0.27)	(0.26)	(0.31)
OP	-0.14	-0.05	-0.13	-0.07	-0.08	-0.04	-0.03	0.01	-0.05	0.17	0.04	0.16	-0.21	-0.01	0.19 *
	(0.05)	(0.06)	(0.07)	(0.05)	(0.07)	(0.05)	(0.05)	(0.02)	(0.09)	(0.13)	(0.13)	(0.11)	(0.08)	(0.08)	(0.10)
Sample Size	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223
Rsqrt	0.49	0.27	0.20	0.24	0.12	0.18	0.19	0.13	0.16	0.14	0.23	0.20	0.32	0.10	0.29
	Telecommunications					**Utilities**									
	1	2	3	4	5	1	2	3	4	5					
Constant	-3.30	-0.63	-4.69	4.69	-4.81	-10.84	2.27	4.88	2.54	3.26					
	(2.50)	(2.62)	(3.39)	(3.70)	(2.97)	(7.24)	(1.82)	(6.10)	(2.56)	(2.69)					
MI	0.56 ***	0.92 ***	1.11 ***	1.31 ***	1.22 ***	1.23 ***	0.37 ***	1.62 ***	0.53 ***	1.08 ***					
	(0.11)	(0.11)	(0.15)	(0.16)	(0.13)	(0.32)	(0.08)	(0.27)	(0.11)	(0.12)					
IR	0.44	-0.16	0.38	-0.93	0.57	1.35	-0.32	-1.04	-0.29	-0.45					
	(0.11)	(0.11)	(0.15)	(0.16)	(0.13)	(0.32)	(0.08)	(0.27)	(0.11)	(0.12)					
π	1.34 *	0.66	1.22	-0.47	1.17	0.93	0.42	0.01	-0.58	-0.04					
	(0.69)	(0.72)	(0.94)	(1.02)	(0.82)	(2.00)	(0.50)	(1.68)	(0.71)	(0.74)					
CC	0.16 *	0.08	0.10	-0.01	0.01	-0.34	0.15 **	0.04	-0.08	0.10					
	(0.09)	(0.10)	(0.12)	(0.13)	(0.11)	(0.26)	(0.07)	(0.22)	(0.09)	(0.10)					
IP	-0.03	-0.08	0.08	0.08	-0.15	0.55	0.14	0.67	0.05	-0.17					
	(0.18)	(0.19)	(0.25)	(0.27)	(0.22)	(0.53)	(0.13)	(0.45)	(0.19)	(0.20)					
OP	0.06	0.05	0.08	-0.03	-0.02	0.10	-0.05	0.06	0.03	-0.02					
	(0.06)	(0.06)	(0.08)	(0.08)	(0.07)	(0.16)	(0.04)	(0.14)	(0.06)	(0.06)					
Sample Size	223	223	223	223	223	223	223	223	223	223					
Rsqrt	0.13	0.24	0.21	0.26	0.30	0.08	0.13	0.16	0.11	0.30					

Source: Own regression results. NOTE: Equation (2) is applied for each individual company. The estimation method used in this multifactor model has been the OLS with White heteroskedastic correction. Standard errors are in parentheses. ***= significant at 1% level; ** = significant at 5% level; * = significant at 10% level. α represents the constant term; MI the market index; IR the interest rate; π the inflation rate; CC the consumer confidence; IP industrial production and OP the oil return. Rsqrt stands for R2.

sector returns like financials, oil & gas, telecommunications and utilities in UK. Also, the idea that some sectors may not be affected by sentiment due to their maturity stage (Lin et al., 2009) isn't confirmed by our results given that sentiment affects significantly and positively individual company's stock returns from the oil & gas, telecommunications and utilities sector. In our estimations, when we have a negative sign influence we have no statistical significance and so results may be ignored.

In a recent study, Kemboi and Tarus (2012), state that higher investors' confidence and industrial production are related to higher income, maybe because investors' willingness to save and invest is proportional to disposable income increases. However, for UK we see no influence of industrial production over company returns. As such, it seems there is no need

to encourage these companies sectors for the promotion of industrial production as a way to develop securities market. We cannot forget that we are analyzing a country which already has a well-developed financial market. As stated by Tangjitprom (2012) production index growth is consistent with the average growth of firms' sales and cash flows, which will then influence stock returns. So, we may need to take a short period analysis in order to understand the influence of IP over individual company returns, which may be related to business cycles. Our hypothesis 3 cannot be confirmed within the context of individual company returns analysis for the UK market.

With respect to oil prices, previous empirical findings indicate that oil returns may have asymmetric effects depending on the sector under analysis. Here we have only attained a positive significant relationship in the UK for the technology sector and another one for the consumer services sector. In the US market oil prices seem to negatively affect consumer goods, health care, industrials, oil and gas and the utilities sector, but these results are not statistically significant. Curiously, oil price increases seem to decrease the oil & gas individual company's returns in most of the companies, although not statistically significant, when we should expect the opposite in this specific sector. Our initial prediction for oil prices was that of a negative influence over stock returns. An increase in the price of oil would depress economic activity, by means of lower real economic activity (Kuwornu and Owusu-Nantwi, 2011), and so a negative sign would be justified. Our results for this positive sign are consistent with those obtained by Benakovic and Posedel (2010). While discussing their results the authors attribute differences in significance obtained for Croatia and those of Chen et al. (1986) for the US market, who found a negative impact, by stating that US capital market is one of the most developed markets in the world, respond quickly to all publicly disclosed information and to the fact they have less available data for Croatia. We have almost 20 years of monthly returns for UK, one of the most developed markets in the world, and results were very similar to those obtained by Benakovic and Posedel (2010). Faff and Brailsford (1999) found negative effects over the oil and gas, paper, packaging and transportation industries. Although not statistically significant, we have obtained a negative relationship for companies in the consumer goods, financials, banks, industrials, oil & gas and utilities sectors, which is consistent with the economic reasoning concerning this sectors nature, except that of oil & gas. To sum up, we cannot clearly state for the UK, that oil returns and company stock returns have a significant relationship, contrary to Clare and Thomas (1994), Priestley (1996), Kilian and Park (2009) and Fedorova and Pankratov (2010).

In table 1 we also present the R2 values with respect to estimations and we see that these are very small for all sectors and companies considered. As such, we may argue for the inappropriateness of the macroeconomic variables under analysis, but provided the above literature review, these variables choice may not be the most influencing factor. We may have disguised lag or even clockwise effects. Given these possible effects we should also explore dynamics and nonlinear effects which might be happening among these variables. We could observe, for example, oil prices influencing inflation and interest rates, and only then these will influence industrial production and stock returns, or some similar kind of relationship. These effects, together with a separate analysis between the pre and post-worldwide financial crisis, would be an interesting avenue for future research. For example, Gregoriou et al. (2009) found a negative relationship between interest rate changes and stock returns before the credit crisis period, where the relationship reversed to a positive one during the credit crisis.

Having previously argued for the weak influence of macroeconomic variables over individual company stock returns, we went to see if results change analyzing just the general sector index return. In table 3 we test the significance and explanatory power of all the macroeconomic variables previously described plus the world respective stock index sector return (as representative of the market index) over 10 sector stock index returns in the UK. Equation (2) is thus applied having the index i as being the UK respective sector index.

Table 3: Sector index stock returns by activity sector in the UK

Sector	BM	CG	CS	F	HC	I	OG	Tec	Tel	U
α	-0.48	0.01	-1.04	-0.03	0.21	-0.22	-1.20	0.86	-0.36	-1.32
	(1.36)	(1.38)	(1.34)	(2.07)	(1.19)	(1.48)	(2.19)	(1.99)	(1.92)	(1.42)
SI	1.02 ***	0.93 ***	0.58 ***	0.83 ***	0.63 ***	0.89 ***	0.87 ***	0.79 ***	0.80 ***	0.22 ***
	(0.04)	(0.06)	(0.06)	(0.08)	(0.07)	(0.06)	(0.08)	(0.06)	(0.07)	(0.07)
IR	0.12	0.04	-0.02	-0.21	-0.08	-0.05	0.12	-0.18	-0.12	0.27
	(0.19)	(0.20)	(0.19)	(0.30)	(0.17)	(0.21)	(0.31)	(0.29)	(0.28)	(0.20)
π	0.04	-0.06	0.50	0.28	0.15	0.17	-0.31	-0.05	0.40	0.07
	(0.38)	(0.38)	(0.37)	(0.58)	(0.33)	(0.41)	(0.60)	(0.55)	(0.53)	(0.39)
CC	0.02	0.04	0.05	0.03	0.06	0.04	-0.08	0.06	0.03	0.08
	(0.05)	(0.05)	(0.05)	(0.08)	(0.04)	(0.05)	(0.08)	(0.07)	(0.07)	(0.05)
IP	-0.16	-0.03	-0.01	0.09	-0.06	-0.09	0.02	-0.08	0.02	-0.14
	(0.10)	(0.10)	(0.10)	(0.15)	(0.09)	(0.11)	(0.16)	(0.15)	(0.14)	(0.11)
OP	0.02	0.03	0.05	0.00	0.03	0.01	-0.08	0.02	0.02	0.05
	(0.03)	(0.03)	(0.03)	(0.05)	(0.03)	(0.03)	(0.05)	(0.05)	(0.04)	(0.03)

Source: Own regression results. NOTE: Equation (2) is applied for each sector index. The estimation method used in this multifactor model has been the OLS with White heteroskedastic correction. Standard errors are in parentheses. ***= significant at 1% level; ** = significant at 5% level; * = significant at 10% level. α represents the constant term; SI the world sector index; IR the interest rate; π the inflation rate; CC the consumer confidence; IP industrial production and OP the oil return. The sectors here analyzed are Basic Materials (BM), Consumer Goods (CG), Consumer Services (CS), Financials and Banks (F), Healthcare (HC), Industrials (I), Oil and Gas (OG), Technology (Tec), Telecommunications (Tel) and Utilities (U).

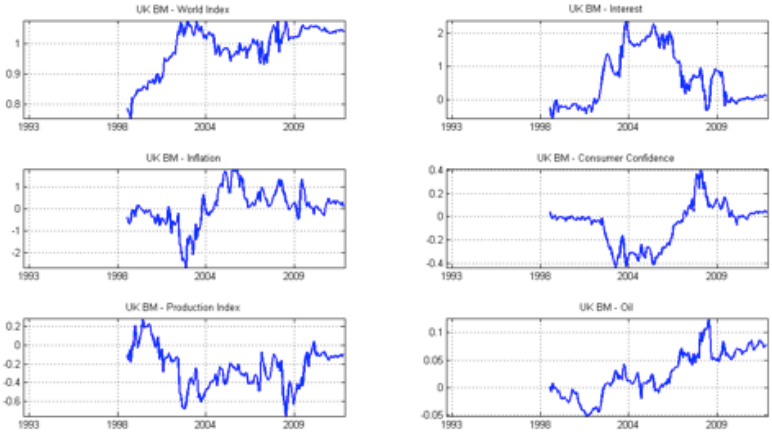
Again we see that the world respective sector return index is the one which influences positively individual UK sector returns. In fact, for the UK market only this variable seems to have a statistically significant impact over sector index returns. Unfortunately, we haven't got many different results as those already obtained for individual companies operating in each of these sectors, or we may say they are even worse.

Given the attained statistically insignificant results in UK, even worse in terms of sectors than for individual companies stock returns, we tried to see if these results are due to a bad choice of macroeconomic variables or if these depend upon periods or model choice. To do this we have applied moving average windows estimation technique for periods of 60 month windows for each of the sector stock indices returns. Figure 1 shows beta estimates for the ten sectors considered to build table 3. Coefficients estimates representations through time are based on moving windows estimates, where regressions for each index are done considering the same explained and explanatory variables for small samples of 60 months each. With this we get beta coefficients estimates for each macroeconomic variable considered through time given that each month the last 60 monthly observations are used to compute these same coefficients evolution through time. So, we can also observe if results statistical insignificance is always verified through time intervals samples of 60 months or even if the model specification used is the most correct one.

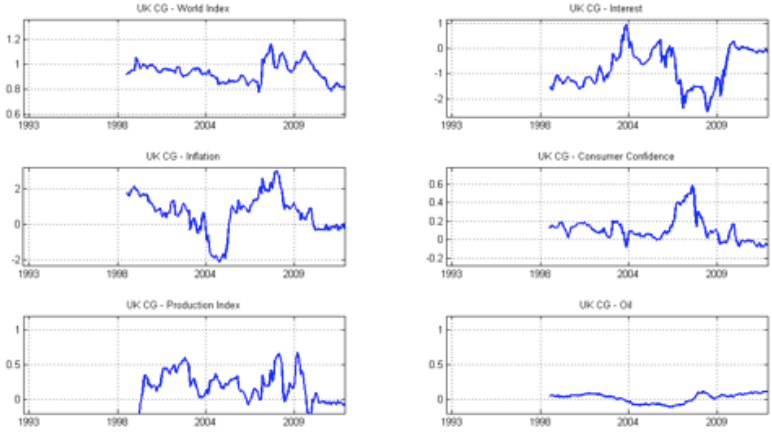
Figure 1 reveals that the macroeconomic variables chosen do have effects over the specific sector stock market index return, but these effects change through time and that's why the aggregate effect presented previously turned out to be so highly statistically insignificant in general. Thus, we do not have a stable relationship through time because it changes of sign. This means for example that until 2003 the interest rate has negatively influenced the financial sector returns but between 2003 and 2004 this effect turned out to be positive, or else that oil prices do not seem to have any statistical significant effect over the financial sector for the entire period for the UK market. Therefore, changes of sign are not linear because for several periods we have high significance and for others there is simply no significance verified between

Figure 1: Moving windows estimates for 60 months' time intervals regressions: sector stock market indices in the UK market

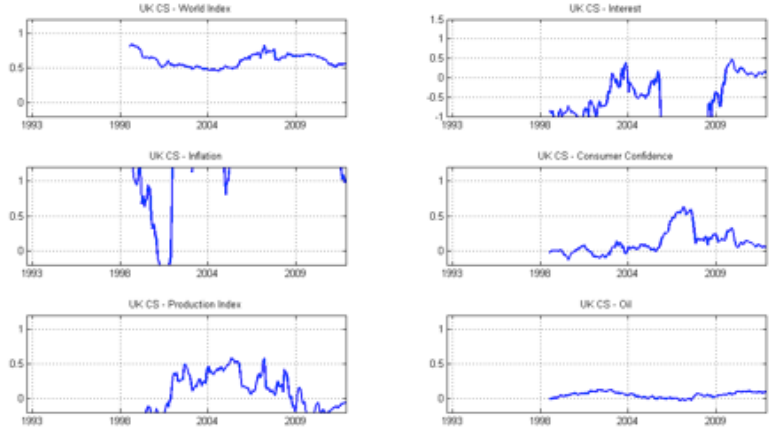
BM – Basic Materials (a)



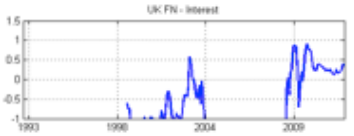
CG – Consumer Goods (b)

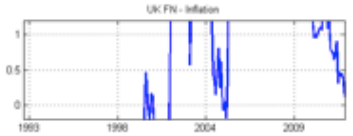


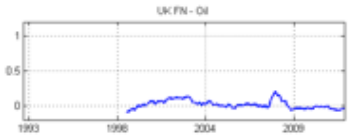
CS – Consumer Services (c)



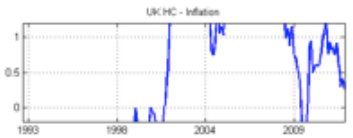
FN – Financials and Banks (d)

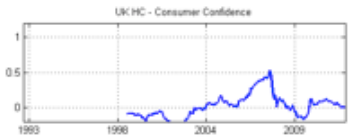


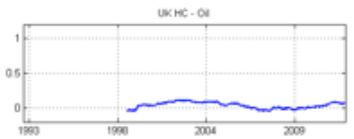




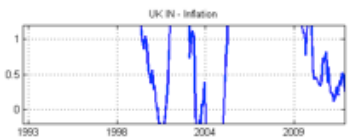
HC – Health Care (e)

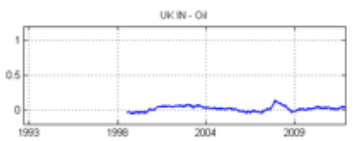




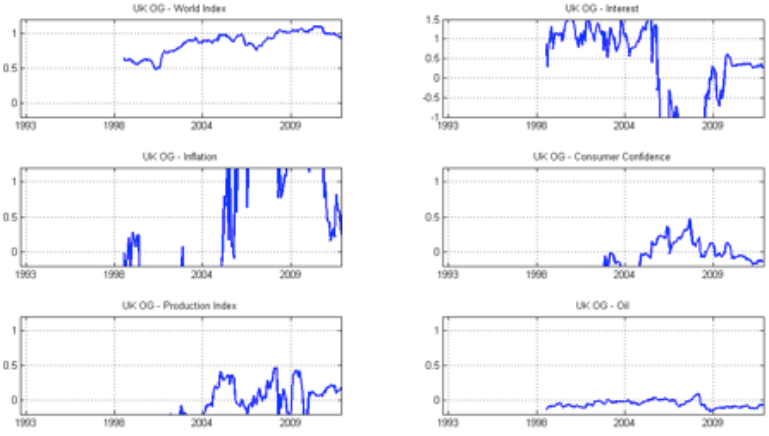


IN – Industrials (f)

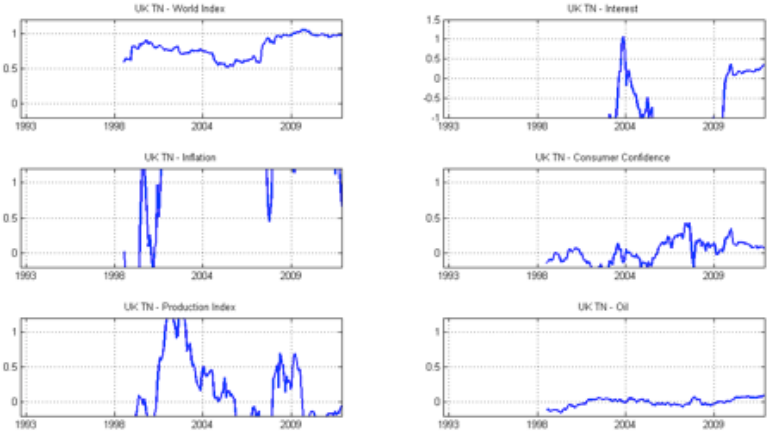




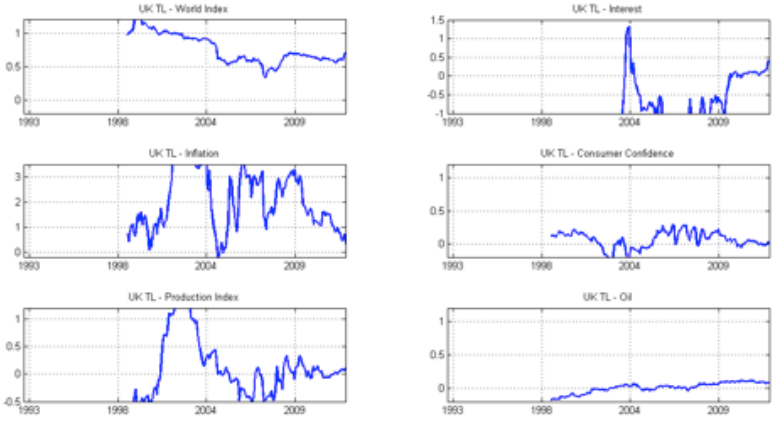
OG – Oil & Gas (g)



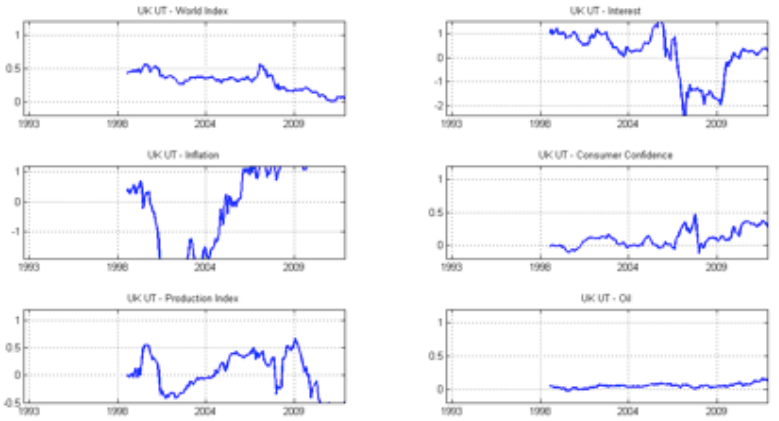
TN – Technology (h)



TL – Telecommunications (i)



UT – Utilities (j)



Source: Own produced results. Notes: These figures present beta coefficients estimates obtained for sector index stock returns in the UK market, by using small moving windows regression estimates based on the last 60 months observations. The x axis shows the betas evolution through time for the time period analyzed and also into account in each month estimate the previous 60 months values. The y axis represents the beta coefficients estimated values which goes from 0 (no sensibility of the stock index sector return to that macroeconomic variable) until 2 (high sensibility of the stock index sector return to that macroeconomic variable – positive or negative).

the variables under analysis. Curiously for all other sectors, besides that of basic materials, oil prices seem to have no effect over sector stock returns, and this result deserves a deeper future analysis. In all sectors we observe the highly statistical influence of the world respective index over sector returns, turning even more evident our previous results presented in tables 2 and 3.

Inflation revealed to have a negative influence over basic materials before 2004 and a highly irregular behavior for consumer services, health care, industrials, oil & gas, technology, telecommunications and utilities for the entire sample period. Consumer confidence shows a negative influence over sector stock returns for most of the sectors before 2005, decreasing again between 2008 and 2009, but quickly reverting to positive values in subsequent years. Interest rates show similar increasing and decreasing patters for basic materials, consumer goods, health care and industrials, but very high beta coefficient estimates when we consider the oil & gas sector, consistent with our hypothesis relating oil price changes to inflation and interest rates. Finally, and considering industrial production we observe persistent negative impacts over basic materials for almost the entire sample period, but considering the rest of the sectors, with more up or down moves we see that it in fact impacts positively stock returns. As such, stock returns can be used as a hedge against industrial production depending on the period under analysis. This type of conclusions leaves room for a deeper understanding of these variables effect over companies and sector index stock returns.

5. Conclusion

We study macroeconomic variables impacts between March 1993 and February 2013 over individual companies and sector stock returns in the UK, by using a multifactor APT model and study the beta coefficients estimates stability through time using rolling windows. Our results can be useful for policy makers, responsible for managing the economy, but also for individual company's managers and portfolio investors.

Empirical findings seem to indicate that changes in the market index return are a good predictor to forecast stock returns not only for individual company but also for sector stock returns. Results indicate that higher expected returns are needed for higher inflation rate and that sentiment, as measured by consumer confidence, is a relevant variable to be included when considering impacts over company stock returns. Overall evidence also indicates that when considering individual company and sector stock returns to analyze macroeconomic variables impacts over stock returns, these cannot be used as a hedge against industrial production, interest rate, inflation and oil prices.

Finally, it is argued that coefficients estimates obtained are not due to a bad choice of regressor, but yes to the instability of beta coefficients estimates throughout time. As such, future research should consider these different periods analysis and also the use of nonlinear models able to capture these unstable effects.

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