SWP 16/97 DIVIDEND YIELDS, BUSINESS OPTIMISM AND THE PREDICTABILITY OF LONG HORIZON RETURNS IN THE UK

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ABSTRACT

This paper examines the relationship between future returns and dividend yields on the London Stock Exchange for the period 1966 to 1997. An additional set of explanatory variables is introduced in the form of the Confederation of British Industries, Industrial Trends Survey data.

A significant relationship was found between dividend yields and future returns when regression statistics were generated by ordinary least squares. The relationship was shown, however, to be attributable only to the period from 1966 to 1981 and in particular to the turbulent era from 1973 to 1975. When allowance was made for the effect of a lagged regressor by use of the Goetzmann and Jorion (1993) simulation model, and for heteroscedasticity as in McQueen (1992), no significant relationship between dividend yields and future returns for the entire sample period from 1966 to 1997 was found.

Ordinary Least Squares estimation of regressions of future returns on the Confederation of British Industries surveys of Business Opinion showed only a modest relationship. This was considerably weakened when the regression coefficients were estimated by the bootstrap technique. In common with dividend yields the relationship was mainly a feature of the 1966 to 1981 period.
1 Introduction

There is conflicting evidence that returns from financial assets can be forecast. By the late 1980's there were indications that longer term returns in the US were positively related to dividend yields, see for example, Campbell and Shiller (1988) and Fama and French (1988). Later, Goetzmann and Jorion (1993) showed for US data that when allowance was made for the statistical difficulties¹ in what have become to be known as return forecasting regressions, it was no longer possible to reject the null hypothesis of no relationship between future returns and dividend yields. In a later article which examined a series of UK returns from 1870 to 1993, they find that even after allowing for these difficulties, a significant relationship between future returns and dividend yields in the UK for the period from 1926 to 1993. Goetzmann and Jorion explain these findings in terms of a survivorship bias and argue in favour of not rejecting the null hypothesis.

This paper considers whether the addition of a further variable, Confederation of British Industries (CBI) Survey Data on Industrial Trends might further explain any relationship between dividend yields and future returns in the UK. Each quarter the CBI sends a questionnaire to its members asking for information on both historic and anticipated business trends. A question in the survey which is of particular interest concerns optimism regarding future business conditions. It asks, 'Are you more, the same or less optimistic than you were four months ago concerning future business

¹ These include biases arising from the use of a lagged regressor as the explanatory variable, serial correlated residuals caused by the overlapping return observations, non-normality and heteroscedasticity in the return series.
conditions’. Since businessmen participating in the survey have access to private information which may not be reflected in stock prices and since they may not be active participants in the market, it was felt possible that some of the information which they possess may only be gradually reflected in stock prices.

The data used in this study covers the period from 1965 to January 1997. Its length was mainly determined by the availability of daily returns on the Financial Times-Actuaries All Share Index from January 1965. The first CBI survey of its members took place in 1958. From 1959 to 1971 three surveys each year were undertaken and four surveys per year from 1972 to the present. Convenience would have suggested that the data should run from 1972 when the pattern of four surveys each year commenced but this would have excluded 6 years of data.

This paper found a significant relationship between dividend yields and future returns when regression statistics were generated by ordinary least squares. The relationship was shown, however, to be attributable only to the period from 1966 to 1981 and in particular to the turbulent era from 1973 to 1975. When allowance was made for the effect of a lagged regressor by use of bootstrap techniques as in Goetzmann and Jorion (1993), and for the effect of heteroscedasticity as in McQueen (1992), no significant relationship between dividend yields and future returns for the entire sample period was found.

Ordinary Least Squares estimation of regressions of future returns on the Confederation of British Industries surveys of Business Opinion showed only a modest
relationship. This was considerably weakened when significance of the regression coefficients was estimated by bootstrapping. In common with dividend yields the relationship was entirely a feature of the 1966\(^2\) to 1981 period.

The organisation of this paper is as follows. The second section discusses return forecasting regressions, the third the CBI data, the fourth the methodology used and the fifth the results of the ordinary least squares regressions. In the sixth section the bootstrap methodology and results are described. The results of split-sample periods are then discussed in section 7. Finally conclusions are presented.

2 Return Forecasting Regressions

Fama and French (1988) model future returns as a function of the preceding period dividend yield as shown in equation 1. If long term returns are related to historic dividend yields the $\beta$ coefficient should be significant in the equation,

$$TR_{t,t+T} = \alpha_T + \beta GDY_t + \varepsilon_{t,t+T},$$

where $TR_{t,t+T}$ is the compound total stock return from month $t$ to month $t-T$, and $GDY_t$ is the ratio $D_t/P_t$, the gross annual dividend up to the time $t$ divided by the stock price at time $t$.

The econometric difficulties arising in equation 1 have been well documented.\(^3\) To increase the number of observations and degrees of freedom, researchers overlap

\(^2\) A year of total returns and capital returns is needed to compute dividend yields and thus regressions are based on returns starting in 1966.

return observations. This induces a moving average process in the residuals. Furthermore stock returns are also known to be non-normal and heteroscedastic. The usual econometric corrections to the standard errors for the effects of serial correlation and heteroscedasticity have poorly understood small sample properties and could not be relied on in sample sizes found in typical return forecasting studies. The share price $P_t$ is reflected in both the return on the left hand side of the equation and dividend yield on the right hand side. Since the stream of annual dividends is a highly autocorrelated series $P_t$ dominates and effectively determines the dividend yield. Thus the dividend yield is not properly exogenous as required in the standard statistical models.

To test the hypothesis that future returns are related to CBI survey data $GDY_t$ in equation 1 is replaced by the relevant CBI variable. Equation 2 then becomes:

$$TR_{t+T} = \alpha_T + \beta_T CBI_t + \epsilon_{t+T}, \quad (2)$$

In addition the marginal significance of including CBI data as an explanatory variable with dividend yield is considered in equation 3:

$$TR_{t+T} = \alpha_T + \beta_T GDY_t + \beta_C CBI_t - \epsilon_{t+T}, \quad (3)$$

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4 See for example Fama (1965) and McQueen (1992).
6 See for example Boudoukh and Richardson (1994) and Goetzmann and Jorion (1993).
7 See comments by Stambaugh (1986). The problem of a lagged dependent variable being used as an explanatory variable has been extensively modelled in Dickey and Fuller (1979).
Since 1957 the CBI has conducted surveys of its members' expectations concerning a number of key economic variables. The surveys take the form of postal questionnaires which are sent to the chief executives of member companies towards the end of the month. They are returned to the CBI by the middle of the following month and the results have, since 1980, normally been published in the last week of the month. The results are therefore based on the expectations of a large number of senior executives who may have information both on their own company's prospects and on the business conditions in their industries, which is not available to the market as a whole. Since the surveys are published within two weeks of the closing date for replies, and only 4 weeks after the questionnaires reach the respondents, the CBI claim that they are an up-to-date guide to the state of manufacturing industry and a useful indicator of movements which will be shown later in the official estimates, (Wood 1992).

Respondents to the surveys are invited to tick boxes which categorise replies into, more, same or less. This procedure has a number of advantages. The surveys are easy to complete, a response rate between 40% and 50% is achieved and the questionnaires are answered by senior members of staff. The survey, a summary of which appears in the Appendix, includes 16 questions.

Any decision as to which variables to include in the study is clearly judgmental. Selection of a large number of variables invites the criticism of data mining and introducing a search bias. In these circumstances, four variables were chosen which
appeared on an *a priori* assessment to contain information which was likely to indicate the future prospects of firms. An obvious question for inclusion was the first, 'Are you more or less optimistic about the general business situation in your industry than you were 4 months ago'. Question 3 which deals with planned changes in the level of capital expenditure on buildings and on plant, was included, since changes in expected capital expenditure might include private information regarding positive net present values of future projects and also indicate changes in business confidence. Question 7 which concerns the expectations on the levels of future orders was also included since these were more likely than any other factors to impact on future profitability. Since the answers to any of these four questions might have some predictive ability, they were all included in the study.

The precise wording of the questions whose responses were included in this thesis were as follows:

**Question 1.** Are you more, or less optimistic than you were four months ago about **THE GENERAL BUSINESS SITUATION IN YOUR INDUSTRY**.

**Question 3.** Do you expect to authorise more or less capital expenditure in the next 12 months than you authorised in the last 12 months on:

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8 An alternative approach would be to calculate the first and second principal components of the four variables. While this has the advantage of reducing the number of regressions, the principal components and the results of the regressions which use them as explanatory variables, lack direct economic interpretation.

9 Upper case and bold are shown above as they appear in the CBI surveys.
a  buildings  
b  plant and machinery.

Question 7  Excluding seasonal variations, . . . what are the expected trends over the NEXT FOUR MONTHS with regard to  
a  Volume of total new orders, up same, down.

The replies to the CBI questionnaires are weighted by the size, measured by number of employees, of the firms responding to the survey and totalled. A score is computed by deducting the weighted figures for less from the weighted figures for more, to give what the CBI describe as the 'balance', and this figure is included as an explanatory variable in the return forecasting regressions. Responses reporting no change in expectations are excluded from the analysis. The computation of the balance figure is shown in Equation 4.

\[
\Delta Q_i = \sum w_i \Delta q^+_{ii} - \sum w_i \Delta q^-_{ii}
\]

where \( \Delta Q_i \) is the balance of firms reporting more over those reporting less expressed as a percentage, \( w_i \) is a weighting depending on the relative size of respondent \( i \) to the total responding and \( \Delta q_{ii} \) is the reply of respondent \( i \) indicated with a - where the reply is more and a - where the reply is less, see Thomas (1995).

A peculiar feature of CBI survey data is that responses are ordinal. Respondents are not required to estimate the expected change in a variable but merely to indicate the change in its direction. In the rational expectations literature, a variety
of methods have been used to convert the ordinal responses to those which might hypothetically have been given if the respondent had been asked to quantify his (or her) reply. Pesaran (1987) compares 4 methods of conversion of expectations of price increases with each other and also with the actual price increases as reflected in the index of 'Wholesale Prices of Manufactured Goods', published by the Central Statistical Office. Pesaran found that each method of conversion produced series which were very closely correlated with one another, coefficients ranging from between 0.940 to 0.997. The methods were also closely correlated with the actual rates of inflation which were subsequently published by the Central Statistical Office, with coefficients of between 0.834 and 0.904.

Studies of rational expectations test whether managers make the optimal use of available data in forming their expectations. In this thesis the problem is different. Businessmen are not asked to forecast future returns, and to attempt to find such a conversion factor by regressing future returns on CBI data would pre-empt the purpose of this study. Furthermore, only the raw CBI balance figure is available to the market place. For this reason, the balance figures published by the CBI are used without further adjustment. It is interesting to note the CBI position on the use of the balance figure.

Despite the quantity of research that has been carried out into the use of more sophisticated variables than the balance to represent survey results, none of the methods suggested has seemed to offer sufficient improvements in understanding to justify their disadvantages in complexity and cost in comparison with the balance. For most
purposes, therefore, CBI staff analysis of the Trends results has tended to use balances. (McWilliams (1983).)

Three, six, twelve, twenty four and thirty six months returns were used as the dependent variable in the return forecasting regressions. All return series except that for three months used overlapping observations.

Data on daily total returns and on daily capital returns was obtained on line from Datastream for the period from 1 January 1965 to 31 January 1997. The results of the CBI surveys were obtained directly from the CBI. The dates of publication of the results of the CBI surveys were extracted by a scrutiny of the Times and the Financial Times over this period. Returns could therefore be computed for the period immediately following the publication of CBI data. The structural stability of the regressions, was tested by splitting the sample period into two sub-periods. The first starts in 1966 and ends in 1981 and the second runs from 1981 to 1997.

4 Methodology

To accommodate the econometric problems which are inherent in return forecasting regressions which use dividend yields as the explanatory variable, the Goetzmann and Jorion simulation methodology was followed. These problems included biases caused by the presence of price, $p_t$, which is a determinant of both return on the left hand side of the equation and of the dividend on the right hand side. Thus the explanatory variable is not truly exogenous. Furthermore the use of overlapping observations
causes a serious moving average error in the residuals. Stock returns are also known
to be non-normal and heteroscedastic.

Total returns for the periods between the CBI surveys were calculated as in
Equation 5 which is reproduced below.

\[ TR_t = \frac{TRI_t - TRI_{t-1}}{TRI_{t-1}} \quad (5) \]

where \( TRI_t \) is the total return index and \( TR_t \) is the total returns at period \( t \). Capital
returns are constructed in a similar manner from the FT-Actuaries All Share price
Index.

\[ CR_t = \frac{PI_t - PI_{t-1}}{PI_{t-1}} \quad (6) \]

where \( PI_t \) is the price index at period \( t \) and \( CR_t \) is the capital return series. Income
returns, \( IR_t \) were calculated,

\[ IR_t = \left[ \frac{1 + TR_t}{1 + CR_t} \right] - 1 \quad (7) \]

Adjusted income return \( AIR_t \) was then calculated to allow for the unequal periods
between the CBI surveys before 1972 as follows.

\[ AIR_t = \frac{IR_t \times 365}{DA \times 12} \quad (8) \]

where \( DA \) is the number of days between CBI surveys.

A price series starting at 100, which excluded the reinvestment of dividends, was
formed by setting \( P_0 \) at 100, then recursively computing \( P_t \)

\[ P_t = P_{t-1} \times (1 + CR_t) \quad (9) \]

Monthly gross dividends, \( GD_t \) were then computed

\[ GD_t = AIR \times P_{t-1} \quad (10) \]
An annual series of gross dividends, $GADIV$, was then calculated,

$$GADIV = GD_1 + GD_2 + \ldots + GD_{n1}$$  \hspace{1cm} (11)

Gross dividend yield, $GDY$ was calculated,

$$GDY = \frac{GADIV}{R_t} \times 100$$  \hspace{1cm} (12)

Total returns were then accumulated to the 3, 6, 12, 24 and 36 months horizons and were regressed against dividend yields.

For the CBI data on businessmen’s expectations the balance figures for each variable were obtained from the CBI and accumulated returns for the various time horizons were regressed against each CBI variable.

5 Results of the OLS Regressions

Univariate Regressions

Table 1 shows the results of the OLS regressions. In common with other studies\(^{10}\), the dividend yield is shown to be strongly related to returns at all time horizons. $R^2$ increases from 0.118 at 3 months to 0.569 at 36 months horizon. In all cases the $\beta$ coefficients were significant at the 1% level. The serial correlation arising from the use of the overlapping observations is reflected in Durbin Watson (DW) statistic decreasing with the time horizon and little reliance should be placed on the $p$ factors derived by the conventional OLS methodology.

\(^{10}\) See for example Fama and French (1988), Goetzmann and Jorion (1993) and (1995).
The correlation matrix, see Table 2, showed that the CBI variables were all closely correlated with one another, coefficients ranging from 0.638 to 0.956. They were also quite closely negatively correlated with dividend yields figures ranging from -0.476 to -0.652. In these circumstances to avoid problems arising from multicollinearity the return series were regressed against each of the four chosen CBI variables separately.

CBI variables show rather modest explanatory power. $R^2$ for the business optimism series increases from 0.048 for 3 months returns to 0.166 series for 36 months returns. Results for the other three series were rather similar. Interestingly the signs on the beta coefficients were opposite from those anticipated. The more confidence shown by businessmen the lower the future returns. This apparent anomaly will be discussed later in the paper. The coefficients of all the CBI series are significant at the 5% level. In view of the unacceptable level of the DW statistic caused by the moving average error induced by the use of overlapping observations and of the biases in the standard errors which may be attributed to heteroscedasticity and non-normality in the data, little reliance can be placed on the $p$ factors which have been generated through the conventional methodology.

Multiple Regressions

In view of the rather modest explanatory power of the CBI variables on their own and the high level of collinearity with dividend yields it was not anticipated that they would add significantly to dividend yields in explaining future returns. The CBI business optimism series was included with dividend yield as an explanatory variable as
shown in equation (3). The results appear in Table 3. While the coefficients on the dividend yield series all appear significant, none of those for the CBI variables are significant. It is quite possible that the dividend yield series has the effect of capturing the some of the explanatory power of the CBI series. To test whether the addition of CBI data could be justified in equation (3), three model selection criteria which appear widely in the literature were selected and the appropriate statistics computed. They were $R^2$, Akaike Information Criteria, AIC, see Akaike (1973) or the Bayesian Information Criteria, SBC, see Schwarz (1978). The results of the statistics are shown in Table 4. The inclusion of the CBI variable was merited in only two of the 5 regressions when the $R^2$ criteria was applied. When the AIC or SBC criteria were applied, inclusion of the CBI variable was justified for only one and zero series respectively. The multiple regressions were carried out for the other three CBI variables. Very similar results were obtained as for the CBI optimism variable and to save space these results are not presented in this paper. It seems from the results that not much is to be added by including CBI data with dividend yields in the OLS regressions.

6 Bootstrap Methodology and Results

To allow for the biases arising from the use of serial correlated residuals, the presence of a lagged version of the dependent variable being used as an explanatory variable and non-normality in the return series, the bootstrap technique, see Noreen (1989), was used to estimate the marginal probability of the ordinary least squares beta being obtained by chance.
The OLS betas were first calculated. For the dividend yield series the
Goetzmann and Jorion (1993) methodology was adopted.

1. Monthly total returns and monthly capital returns were jointly bootstrapped.
2. A price series starting at 100 was formed by setting \( P_0 \) at 100, then recursively
   computing \( P_t \), as follows,
   \[
   P_t^* = P_{t-1} \times (1 + Cr_t)
   \]  
   (13)
3. Gross dividend yield was then calculated
   \[
   GDY = \frac{GDIV}{P_t^*} \times 100
   \]  
   (14)

The effect of steps 1-3 is to ensure that the dividend yield reflects the historic
series of prices which is generated by the bootstrap process.

4. Compute the dependent variable, future returns to the desired time horizon by
   arithmetically compounding randomised total returns.
5. The bootstrap total returns were then regressed against dividend yields and the
   \( \beta \) calculated. This result is denoted as \( \beta^* \).
6. If the \( \beta^* \) exceeds \( \beta \) add 1 to \( x_l \) which is a counter.
7. Repeat steps 1 through 6 \( n \) times. In this case \( n \) was taken as 1,000.
8. Compute the empirical \( p \) factor of the \( \beta \).
   \[
   p = \frac{x + 1}{n + 1}
   \]

The bootstrap betas include the biases which afflict the OLS betas. This is a
desirable feature since it enables the proportion of occurrences the bootstrap test
statistic which exceeds the conventional test statistic to be calculated. It is therefore a
measure of the probability of the conventional test statistic occurring by chance.
The same procedure was adopted for each of the four CBI variables with the difference that since the CBI data is determined exogenously steps 2 and 3 are unnecessary.

To allow for the biases which arise from heteroscedasticity in the series of returns a further estimate was made of the \( p \) factor for the \( \beta \) by following the weighted least squares methodology in McQueen (1992). The period from 1966 to 1997 includes one of the most dramatic episodes encountered in stock market history. The FT Actuaries All-Share index fell from a peak of over 220 in August 1972 to a low of 63.2 in January 1975. In February the it recovered to 101.9 an increase of 61\%. In contrast the second period from 1981 to 1997 was relatively stable, even the stock market crash of 1987 is dwarfed by the 1972 to 1975 decline and its speedy recovery.

Under the null hypothesis, monthly returns are independent so the variance of long horizon returns is the sum of the variances of monthly returns. In addition, if prices follow a random walk, then \( \beta_T \) in Equations 1 and 2 is zero; and therefore, estimates of the standard deviation of the long horizon total returns \( TR_{t_1,T} \) are also estimates of the standard deviation of the errors.

Following French, Schwert and Stambaugh (1987), daily values of the FT-Actuaries All Share Index were used to estimate the monthly variance of stock market returns from January 1965 to October 1994. The estimate of the monthly variance is,
\[ \hat{\sigma}^2_t = \sum_{i=1}^{N_t} TR_{i,t}^2 + 2 \sum_{i=1}^{N_{t-1}} TR_{i,t}TR_{i+1,t}, \]  

where \( N_t \) is the number of trading days in the month \( t \), \( TR_{i,t} \) is the total return on the FT-Actuaries All Share Index on day 1 in month \( t \). In Equation 15 the cross product term adjusts for non-synchronous trading of securities.

Under the null hypothesis of a random walk, the estimate of the standard deviations of the errors term in equation 1 and 2 is given by,

\[ \hat{\sigma}_{t+k} = \left[ \hat{\sigma}^2_t + \hat{\sigma}^2_{t+1} + \cdots + \hat{\sigma}^2_{t+k} \right]^{\frac{1}{2}} \]  

The WLS bootstrap test follows steps 1 to 8 above. The only difference is that the monthly returns are bootstrapped together with their respective variance estimates. The bootstrapped returns and variances are then summed to form the longer horizon returns and variances. The reciprocal of the long-horizon standard deviations are used as weights, and the WLS \( \beta \) and correlation coefficient is recalculated for each shuffling.

The results of the bootstrap estimates of the \( p \) factors is shown in Table 5. Column 4 shows the OLS bootstrap \( p \) factors and column 5 the WLS bootstrap \( p \) factors. The table shows that making allowance for the effect of the lagged regressor, serial correlation in the error term and the lack of normality in the data causes the \( p \) factors to increase dramatically. None of the \( p \) factors for dividend yields are significant at the 5% level. However for the 3, 6 and 12 months data, the bootstrap OLS \( p \) factors are only just in excess of the 5% level. Thus while they do not meet the
criteria generally set by econometricians for rejecting the null hypothesis, these variables may well possess economic significance in terms of developing forecasting models. The bootstrap WLS statistics generally show some further increases in the $p$ factors suggesting that heteroscedasticity may cause the conventional standard errors to be understated.

The $p$ factors of the regression coefficients for the CBI variables also increased when they were estimated by bootstrapping. A number of the $\beta$'s were however still significant. Correction for heteroscedasticity greatly reduces this number and only very few of the coefficients remain significant. Given the rather modest $R^2$ for the CBI data which for the business optimism series ranges from 0.048 for 3 months returns to 0.166 for 36 months returns, it seems unlikely that CBI data might be usefully used to forecast future returns.

7 Results for Split Samples

The sample period was split into two approximately equal sub-samples so that the stability of the regression coefficients could be examined. The first sample period ran from 1966 to 1981 and the second from 1981 to 1997. Results for each of the sub-samples are shown in Table 6. Since the results for all four CBI series are broadly similar only those for the business optimism series are shown.

The explanatory power of the dividend yield variable was found to be exceptional in the first period. $R^2$ increased from 0.145 for 3 months returns to 0.772
for 36 months returns. In the second period explanatory power was relatively low $R^2$ increased from 0.030 to 0.274. The $p$ factors derived from the conventional OLS regressions were all highly significant in both periods. However when the $p$ factors were estimated by bootstrapping, none of the $\beta$ coefficients in either period were significant.

A rather similar picture emerges for the CBI variable. $R^2$ increased from 0.046 for 3 months horizons to 0.336 for 36 months horizons in the 1966 to 1981 period but were nearly zero in the second. The $p$ factors in the first sub-period were generally significant when estimated by conventional means, but were rather less significant when estimated by bootstrapping.

In marked contrast to the 1966 to 1981 period, none of the coefficients of the CBI optimism variable were significant in the 1981 to 1997 period when either conventional or bootstrap methodology was employed. It is clear that any relationship between future returns and CBI data is entirely a feature of the first sub-period.

To further explore the impact of individual observations on the regression results the leverage measure of the regression as in Belsley et al. (1980) was computed. This is given by:

$$h_i - \frac{1}{n} = \tilde{h}_i - \tilde{x}_i (\tilde{X}^T \tilde{X})^{-1} \tilde{x}_i^T$$

(17)
where $X$ is the $n \times p$ matrix of explanatory variables, and the matrix is transposed by the superscript $T$. $\tilde{X}$ indicates the matrix formed by centring the columns of $X$ about their respective column means.\footnote{Belsley et al. (1980) suggest 3 different methods by which influential observations might be identified and argue that as with all empirical procedures, this question is ultimately answered by judgement and intuition in choosing reasonable cut-offs most suitable for the problem at hand guided wherever possible by statistical theory. The three methods are external scaling, internal scaling and gaps. For external scaling they argue that a suitable cut-off would be that where $h_i > 2\sqrt{p/n}$, where $p$ equals the number of regressors and $n$ equals the number of observations in the sample. For external scaling they suggest the interquartile range $\tilde{S}$ for each series is computed. Extreme values are those which exceed $(7/2) \tilde{S}$. If these diagnostics were Gaussian they would occur less than 1% of the time. Finally they suggest that the researcher identifies points at which the diagnostic measure appears to be singularly different from the others.}

The leverage measure of the regressions of 3 months returns on dividend yields is shown in Figure 1. The graph dramatically demonstrates that the most important observations occurred in the period prior to May 1975. The calculation was repeated replacing 3 months returns with 12 and 36 months returns. In both cases very similar results to those revealed in Figure 1 were obtained.

Figure 2 shows the leverage measures of the regression for 3 months returns on CBI data. The figure indicates that the observation including the results of the April 1980 survey were extremely influential.

Earlier in the paper reference was made to the unexpected negative sign for the coefficient of each of the CBI variables. To explore this apparent anomaly further a scattergraph showing the CBI optimism series against three months future returns was prepared. This is shown in Figure 3. It is clear from this the two observations appear as outliers and dominate the results. They appear in the bottom on right hand side of this figure and relate to the 3 months returns following the publication of the CBI surveys in November 1974 and February 1975. Over the previous two years the
stock market had suffered the largest falls in its history\textsuperscript{12}. The Government had attempted to reduce the rapid inflation which followed the Oil crises by introducing strict price controls. This, accompanied by the effect of taxation on illusory stock holding gains, lead to a liquidity crisis. The Banking system itself was under considerable pressure from the collapse of property values and therefore afforded little further support to industry. Furthermore some members of the government appeared to be openly hostile to the free market system. In the event the government decided in November 1974 to afford a degree of relief to companies by relaxing price controls and removing the tax charge on illusory stock holding gains. The highly pessimistic CBI business optimism returns in November 1974 and February 1975 were followed by a dramatic recovery in the market in early 1975. The Financial Times-Actuaries All Share Index increased from 63.3 in January 1975 to 149.8 in June 1975. Investors who had the foresight or luck to predict this recovery were certainly well rewarded.

To assess the effect of this episode on the results relating to the CBI data the observations for November 1974 and February 1975 were deleted. This $\beta$ coefficient in Table 1 for the CBI optimism series for 3 months returns halved and the OLS $p$ factor increases to 0.20. It is clear that the negative coefficients for the CBI data are largely caused by a small number of observations in this dramatic era in UK stock market history.

8 \hspace{2cm} \textbf{Summary and Conclusions}

The 1966 to 1997 period provides interesting data on which to test the relationship between the explanatory variables, dividend yields and CBI survey data on business trends and future returns. The market in this period was influenced by two major episodes. In the first half of the sample period it collapsed following the oil price increase and a liquidity crisis. The fall was gradual and started in August 1972 when

\textsuperscript{12} The falls were even larger than those in the two years prior to the fall of Dunkirk in May 1940.
the FT-Actuaries index was 220 and ended in January 1992 when it reached a low of 63.2. In February of that year the index recovered to 101.9 a dramatic increase of 61%. In contrast despite the 1987 crash when the stock market fell by 29% over 6 trading days, the market in the UK was relatively stable in the 1981 to 1997 period.

The results of the ordinary least squares regressions suggest a highly significant relationship between dividend yields and future returns. When adequate allowance was made for econometric difficulties in the data by using appropriate numerical techniques, the relationship was no longer significant at conventional levels. Furthermore the relationship was shown to be mainly a feature of the 1966 to 1981 period and to be particularly heavily influenced by the recovery of the market in 1975.

Confederation of Business Industries Survey data was only modestly related to future returns. Allowance for the econometric difficulties in the data further lessened the statistical significance of its regression coefficients which were opposite from those hypothesised. Again most of the relationship was derived from the first sample period. The negative coefficients for the CBI variables were shown to be almost entirely due to business optimism being extremely low in the period prior to the market recovery in 1975.

It is well known that failure to reject a null hypothesis does not imply that it is true. Nevertheless the extremely high $p$ factors derived from the bootstrap technique together with the evidence that regression results are highly dependent on a unique era in stock market history which seems unlikely to be repeated, suggests that these two variables are unlikely to be useful in developing forecasting models which can generate excess returns.
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McQueen, G. (1992). "Long Horizon Mean Reverting Stock Prices Revisited".

Twenty Five Years of 'ups and 'downs', Confederation of British Industries
London, 11 - 22.


APPENDIX

Abbreviated Version of CBI Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Optimism over the general business situation, more, same, less</th>
<th>Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Optimism over export prospects more, same, less</td>
<td>Excluded</td>
</tr>
<tr>
<td>3</td>
<td>More, same or less capital expenditure on</td>
<td>Included</td>
</tr>
<tr>
<td></td>
<td>a plant</td>
<td>Included</td>
</tr>
<tr>
<td></td>
<td>b buildings</td>
<td>Included</td>
</tr>
<tr>
<td>4</td>
<td>Is your present level of output below capacity, yes, no?</td>
<td>Excluded</td>
</tr>
<tr>
<td>5</td>
<td>Present order book, above normal, normal, below normal</td>
<td>Excluded</td>
</tr>
<tr>
<td>6</td>
<td>Numbers employed, up, same, down</td>
<td>Excluded</td>
</tr>
<tr>
<td>7</td>
<td>Volume of total new orders, up, same, down</td>
<td>Included</td>
</tr>
<tr>
<td></td>
<td>a trend over last 4 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b expected trend over next 4 months</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Volume of output, up, same, down</td>
<td>Excluded</td>
</tr>
<tr>
<td></td>
<td>a trend over last 4 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b expected trend over next 4 months</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Volume of deliveries, up same down</td>
<td>Excluded</td>
</tr>
<tr>
<td>10</td>
<td>Volume of stocks, up, same, down</td>
<td>Excluded</td>
</tr>
<tr>
<td>11</td>
<td>Average costs per unit of output, up, same, down</td>
<td>Excluded</td>
</tr>
<tr>
<td>12</td>
<td>Average prices, up, same, down</td>
<td>Excluded</td>
</tr>
<tr>
<td>13</td>
<td>Month's production accounted for by present order book</td>
<td>Excluded</td>
</tr>
<tr>
<td>14</td>
<td>Factors likely to limit output</td>
<td>Excluded</td>
</tr>
<tr>
<td>15</td>
<td>Factors likely to limit export orders</td>
<td>Excluded</td>
</tr>
<tr>
<td>16</td>
<td>Is your capacity - more than adequate, adequate, less than adequate?</td>
<td>Excluded</td>
</tr>
</tbody>
</table>
TABLE 1
OLS Regression Results

\[ TR_{t+T} = \alpha_T + \beta_T GDY_t + \varepsilon_{t+T}, \]  
(1)

\[ TR_{t+T} = \alpha_T + \beta_T CBI_t + \varepsilon_{t+T}, \]  
(2)

<table>
<thead>
<tr>
<th>Months</th>
<th>( \beta )</th>
<th>( t )</th>
<th>( p )</th>
<th>( R^2 )</th>
<th>DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividend yield</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3.967</td>
<td>4.062</td>
<td>0.000</td>
<td>0.118</td>
<td>1.95</td>
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<td>0.000</td>
<td>0.367</td>
<td>0.60</td>
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<tr>
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<td>11.823</td>
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<td>0.39</td>
</tr>
<tr>
<td>CBI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
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<td>2.04</td>
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<tr>
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<td>-4.679</td>
<td>0.000</td>
<td>0.166</td>
<td>0.52</td>
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<tr>
<td>CBI Inv. in Buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-0.213</td>
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<td>0.008</td>
<td>0.052</td>
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<td>6</td>
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<td>0.000</td>
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<td>0.49</td>
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<td>0.50</td>
</tr>
<tr>
<td>CBI Inv. in Plant</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>0.002</td>
<td>0.076</td>
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<td>36</td>
<td>-0.598</td>
<td>-2.771</td>
<td>0.007</td>
<td>0.060</td>
<td>0.49</td>
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<tr>
<td>CBI Inv. in Future Orders</td>
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<td></td>
<td></td>
<td></td>
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<td>3</td>
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<td>-3.297</td>
<td>0.001</td>
<td>0.080</td>
<td>0.80</td>
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<td>24</td>
<td>-0.555</td>
<td>-4.125</td>
<td>0.000</td>
<td>0.128</td>
<td>0.52</td>
</tr>
<tr>
<td>36</td>
<td>-1.009</td>
<td>-5.278</td>
<td>0.000</td>
<td>0.204</td>
<td>0.58</td>
</tr>
</tbody>
</table>

1 The \( p \) column shows the marginal probability of \( \beta \) calculated by the classical ordinary least squares methodology.
2 DW is the Durbin Watson test statistic.
### TABLE 2

**Correlation Matrix**

<table>
<thead>
<tr>
<th></th>
<th>3 months returns</th>
<th>Dividend yield</th>
<th>CBI Optimism</th>
<th>CBI Buildings</th>
<th>CBI Plant</th>
<th>CBI F. Orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months returns</td>
<td>1.000</td>
<td>0.354</td>
<td>-0.238</td>
<td>-0.245</td>
<td>-0.230</td>
<td>-0.203</td>
</tr>
<tr>
<td>Dividend yield</td>
<td>0.354</td>
<td>1.000</td>
<td>-0.652</td>
<td>-0.496</td>
<td>-0.476</td>
<td>-0.577</td>
</tr>
<tr>
<td>CBI optimism</td>
<td>-0.238</td>
<td>-0.652</td>
<td>1.000</td>
<td>0.638</td>
<td>0.696</td>
<td>0.879</td>
</tr>
<tr>
<td>CBI buildings</td>
<td>-0.246</td>
<td>-0.497</td>
<td>0.638</td>
<td>1.000</td>
<td>0.956</td>
<td>0.744</td>
</tr>
<tr>
<td>CBI plant</td>
<td>-0.230</td>
<td>-0.477</td>
<td>0.691</td>
<td>0.956</td>
<td>1.000</td>
<td>0.782</td>
</tr>
<tr>
<td>CBI F. Orders</td>
<td>-0.203</td>
<td>-0.577</td>
<td>0.879</td>
<td>0.743</td>
<td>0.782</td>
<td>1.000</td>
</tr>
</tbody>
</table>

### TABLE 3

**OLS Multiple Regression Results**

\[ TR_{t+T} = \alpha_t + \beta_t GDY_t + \beta_t CBI_t + \epsilon_{t+T}, \]  

(3)

<table>
<thead>
<tr>
<th></th>
<th>Dividend yield</th>
<th>CBI Business Optimism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months</td>
<td>( \beta )</td>
<td>( \beta p )</td>
</tr>
<tr>
<td>3</td>
<td>3.878</td>
<td>0.003</td>
</tr>
<tr>
<td>6</td>
<td>9.020</td>
<td>0.000</td>
</tr>
<tr>
<td>12</td>
<td>15.500</td>
<td>0.000</td>
</tr>
<tr>
<td>24</td>
<td>17.794</td>
<td>0.000</td>
</tr>
<tr>
<td>36</td>
<td>33.183</td>
<td>0.000</td>
</tr>
</tbody>
</table>

1 The \( p \) column shows the marginal probability of \( \beta \) calculated by the classical ordinary least squares methodology.
TABLE 4

Model selection criteria

Univariate regression

\[ R_{t,t+T} = \alpha_T + \beta_T GDY_t + \varepsilon_{t,t+T} \]  \hspace{1cm} (1)

<table>
<thead>
<tr>
<th>Months</th>
<th>$\overline{R}^2$</th>
<th>A.I.C.</th>
<th>S.B.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.118</td>
<td>53.2</td>
<td>58.7</td>
</tr>
<tr>
<td>6</td>
<td>0.242</td>
<td>118.8</td>
<td>124.3</td>
</tr>
<tr>
<td>12</td>
<td>0.367</td>
<td>173.8</td>
<td>179.3</td>
</tr>
<tr>
<td>24</td>
<td>0.383</td>
<td>200.5</td>
<td>205.9</td>
</tr>
<tr>
<td>36</td>
<td>0.569</td>
<td>234.1</td>
<td>239.5</td>
</tr>
</tbody>
</table>

Multiple regression

\[ R_{t,t+T} = \alpha_T + \beta_T GDY_t + \beta_T CBI_t + \varepsilon_{t,t+T} \]  \hspace{1cm} (3)

<table>
<thead>
<tr>
<th>Months</th>
<th>$\overline{R}^2$</th>
<th>A.I.C.</th>
<th>S.B.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.110</td>
<td>55.2</td>
<td>63.4</td>
</tr>
<tr>
<td>6</td>
<td>0.240</td>
<td>119.9</td>
<td>128.2</td>
</tr>
<tr>
<td>12</td>
<td>0.369</td>
<td>174.4</td>
<td>182.6</td>
</tr>
<tr>
<td>24</td>
<td>0.379</td>
<td>202.1</td>
<td>210.2</td>
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<tr>
<td>36</td>
<td>0.576</td>
<td>233.4</td>
<td>241.4</td>
</tr>
</tbody>
</table>

Inclusion of CBI variable justified

<table>
<thead>
<tr>
<th>Months</th>
<th>$\overline{R}^2$</th>
<th>A.I.C.</th>
<th>S.B.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
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<td>No</td>
<td>No</td>
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<td>24</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>36</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

1 A.I.C. is Akaike's Information Criterion, see Akaike (1973).
2 B.I.C. is the Bayesian Information Criterion, see Schwarz (1978).
3 The criteria require that $R^2$ is maximised or A.I.C. and S.B.C. are minimised.
Table 5

Bootstrap $p$

\[ TR_{t,T} = \alpha_t + \beta_t GDY_t + \epsilon_{t,T}, \]  
\[ TR_{t,T} = \alpha_t + \beta_t CBI_t + \epsilon_{t,T}, \]

<table>
<thead>
<tr>
<th>Months</th>
<th>$\beta$</th>
<th>$\beta_p$</th>
<th>OLS $p$</th>
<th>Bootstrap</th>
<th>Bootstrap</th>
<th>$\bar{R}^2$</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividend</td>
<td>3</td>
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<td>0.000</td>
<td>0.054</td>
<td>0.128</td>
<td>0.118</td>
</tr>
<tr>
<td>Yield</td>
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<td>0.000</td>
<td>0.053</td>
<td>0.083</td>
<td>0.242</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>13.801</td>
<td>0.000</td>
<td>0.088</td>
<td>0.143</td>
<td>0.367</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>16.664</td>
<td>0.000</td>
<td>0.278</td>
<td>0.265</td>
<td>0.383</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>29.653</td>
<td>0.000</td>
<td>0.244</td>
<td>0.330</td>
<td>0.569</td>
</tr>
<tr>
<td>CBI</td>
<td>3</td>
<td>-0.120</td>
<td>0.010</td>
<td>0.008</td>
<td>0.108</td>
<td>0.048</td>
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<td>0.072</td>
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<td>0.000</td>
<td>0.097</td>
<td>0.159</td>
<td>0.133</td>
</tr>
<tr>
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<td>36</td>
<td>-0.729</td>
<td>0.000</td>
<td>0.073</td>
<td>0.137</td>
<td>0.166</td>
</tr>
<tr>
<td>CBI</td>
<td>3</td>
<td>-0.213</td>
<td>0.008</td>
<td>0.009</td>
<td>0.118</td>
<td>0.052</td>
</tr>
<tr>
<td>Investment in Buildings</td>
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<td>-0.420</td>
<td>0.000</td>
<td>0.009</td>
<td>0.024</td>
<td>0.106</td>
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<td></td>
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<td>0.000</td>
<td>0.020</td>
<td>0.033</td>
<td>0.160</td>
</tr>
<tr>
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<td>24</td>
<td>-0.720</td>
<td>0.000</td>
<td>0.126</td>
<td>0.143</td>
<td>0.111</td>
</tr>
<tr>
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<td>0.000</td>
<td>0.122</td>
<td>0.115</td>
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</tr>
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<td>0.014</td>
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<td>0.001</td>
<td>0.039</td>
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<td>0.034</td>
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<td>0.002</td>
<td>0.159</td>
<td>0.199</td>
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<td>0.170</td>
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<td>0.053</td>
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<td>0.080</td>
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<td></td>
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<td>0.000</td>
<td>0.109</td>
<td>0.138</td>
<td>0.128</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>-1.009</td>
<td>0.000</td>
<td>0.076</td>
<td>0.067</td>
<td>0.204</td>
</tr>
</tbody>
</table>

1. $\beta$, OLS $\beta$, and $\bar{R}^2$ are the OLS statistics taken from table 1.
2. Bootstrap OLS $p$ is the marginal probability of the OLS $\beta$ computed by the bootstrap technique.
3. Bootstrap WLS $p$ is the marginal probability of $\beta$ computed by the bootstrap WLS technique.
### TABLE 6

Results for sub-sample 1

1966 - 1981

\[
R_{t+T} = \alpha_T + \beta_T GDY_t + \varepsilon_{t+T},
\]

\[
R_{t+T} = \alpha_T + \beta_T CBI_t + \varepsilon_{t+T},
\]

<table>
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<tr>
<th>Months</th>
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<th>( p_{bootstrap} )</th>
<th>( R^2 )</th>
<th>DW</th>
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Results for sub-sample 2

1981 - 1997

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1. \( \beta \), OLS \( p \), \( R^2 \) and DW are the OLS statistics.
2. Bootstrap OLS \( p \) is the marginal probability of \( \beta \) computed by the bootstrap technique described in section 6.
Figure 1

3 Months Returns and Dividend Yield
Influential data points

Figure 2

3 Months Returns and CBI Business Optimism
Influential Data Points

Figure 3

CBI Optimism v 3 months future returns
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