DID EXPECTED RETURNS FALL IN THE 1990s? THE CASE OF UK SIZE PORTFOLIOS

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Ex-post equity returns were extremely high during the latter part of the 20th Century and in particular during the 1990s. Many observers suggest ex-post returns have been higher than expected returns. However, this paper suggests, in the case of the UK, the largest firms primarily cause the appearance of a shift in expected returns during the 1990s. Our empirical evidence suggests shifts in valuation ratios could be due to moderate changes in either long-term expected returns or expected fundamental growth; distinguishing between the two competing explanations is extremely difficult.

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1. Introduction

"The price index looks like a rocket taking off" remarks Shiller (2000, p5) regarding the US stock market index. Meteoric rises in aggregate stock prices occurred during the 1990s in many countries around the world. In fact it appears the 1990s soar in stock prices can largely explain findings that capital gains (share price appreciation) exceeded fundamental growth during the late 20th Century both in the US (Arnott and Bernstein, 2002; Fama and French, 2002) and Internationally (Dimson et al., 2006). The underlying cause of the rise in prices is commonly attributed to a fall in the market expected equity premium (r_m-r_f).

Lettau et al. (2008, p1654) comment "the recent run-up in stock prices relative to economic fundamentals is sufficiently extreme that econometric tests for structural change … provide overwhelming evidence of a structural break in the mean price-dividend ratio around the middle of the last decade." A recent shift in *market* valuation ratios during the early or mid 1990s is demonstrated in the US by Lettau and Van Nieuwerburgh (2008) and Carlson et al. (2002) and in the UK by Vivian (2007). Lettau et al. (2008) provide evidence of a fall in consumption risk during the early 1990s which they contend drove up equity prices during the 1990s and helps explain the fall in market valuation ratios. In short, Lettau et al. (2008) suggest the market equity premium declined in the 1990s.

Thus far the literature focuses almost exclusively upon the *market* index and neglects to examine the *cross-sectional* implications if a fall in the market equity premium were to occur. A notable exception is Chen et al. (2008), who examine US value portfolios. In this paper we investigate the relationship between fundamentals and prices for 10 UK size portfolios. We choose the UK as our testing ground since it is less susceptible to recent trends affecting fundamental growth than the US. US payout policy has seen a tremendous shift from dividends towards share repurchases over recent decades (Grullon and Michaely, 2002) and more serious instances of earnings management appear to have been detected in the US (see Berenson, 2004) than the UK.

We focus on size portfolios for two main reasons. Firstly, given the run-up in stock prices during the 1990s appears to have been a global phenomenon (*Dimson et al.*, (2003); it seems plausible that the more integrated any particular firm is into the global market the more affected it would be by these global price trends. In particular small firms are likely to be less integrated into the global market for several reasons; small firms are more likely to have a greater domestic focus, less likely to cross-list, international investors will find it more costly to gain reliable information. Huang (2007) provides empirical evidence that large firms are much more integrated into the global market than smaller firms. Consequently, in this paper, we empirically investigate if the equity premium earnt depends upon firm size.

Secondly, if the equity premium declined in the 1990s, as Lettau et al. (2008) claim, this should impact all firms during the 1990s (appendix 1 shows trends in UK consumption volatility are similar to the US). This is of interest to corporate treasurers who should be able to raise equity funds more cheaply. The impact of such a decline in the equity premium for a particular firm should also depend on its characteristics. However, it is also possible that a reduction in equity premium could also be correlated with other factors that impact firm performance. For instance, Fama and French (2004), suggest a sympton of the reduction in equity premium during the late 20th Century is the greater availability of external finance. Since small firms are most likely to face financial constraints and thus their valuations could be particularly affected. Thus, the precise impact of a change in market expected return upon firm cost of capital could well depend on market capitalisation.

However, despite the prior literature tending to view movements in share prices, such as during the 1990s bull market, as primarily driven by expected return behaviour. It is also plausible that changes in expected future cashflows could be responsible for the market movements. In particular, recent research suggests expected cashflows rather than returns could be the primary driver of share price moves both at the aggregate (Larrain and Yogo, (2008)) and at the firm-level (Vuolteenaho, (2002)).

The first aim of this study is to ascertain if a particular subset of firms drive the behaviour of aggregate market portfolios during the 1990s. In particular the behaviour of size portfolios during the 1990s is unlikely to be consistent with both the consumption risk explanation of Lettau et al. (2008) and the global market integration hypothesis of Huang (2007).

The second aim of the study is to examine if the behaviour of the overall sample period is consistent with prior aggregate market studies or indeed with the 1990s behaviour. Do all size portfolios have expected returns that are lower than ex-post returns as found for the aggregate market? (See Fama and French (2002) for US evidence and Vivian (2007) for UK evidence). Are there any shifts in size sorted valuation ratios between 1965-1990 or are there no shifts as suggested by Lettau and Van Nieuwerburgh (2008) for the US and Vivian (2007) for the UK? Empirical evidence will either confirm the interpretations of the prior literature or cast doubt upon them.

Thirdly, the study quantifies the changes in expected cashflows necessary to explain the shifts in valuation ratios we discover. We then assess if such changes in expected fundamental growth could be detected statistically given the volatility of long-term fundamental growth. This provides an alternative interpretation for the findings distinct from the prior literature that emphasises the expected return channel.

2. Data and Methodology

2.1. DATA

Our sample is from Datastream and comprises all UK firms trading on the LSE at any time over 1966-2005. Financial firms are discarded in line with similar studies, due to them having much greater scope for earnings management than ‘real’ economy firms. We also exclude firms with market capitalisation below £20 million (real 2002 £’s) for reasons discussed below and all sample firms are required to trade on LSE for one year prior to portfolio formation. Thus, delisted companies as well as those still trading are included, provided a year of data is available. A total of 3,107 firms are in the sample, of which 1,092 meet data requirements for 2005. For each firm, we collect price, dividend-price, price-earnings and market capitalisation data from Datastream.

We discard the very smallest firms for two main reasons. Very small firms have highly volatile returns due to illiquidity and bid-ask bounce; a particular concern when calculating arithmetic averages (see for example Blume and Stambaugh, 1983; and Jegadeesh and Titman, 2001). Further, Horowitz et al. (2000) find returns on US size portfolios are less anomalous if firms with market capitalisations below $5m are excluded. Secondly, Datastream coverage of UK equities expands during the 1970s and this expansion comprises many small companies. Hence, we exclude the very smallest firms, those with market capitalisations below £20m (real 2002 £’s) from our sample. This enables more congruent decile breakpoints during the 1970s (not reported) as well as limiting the distortive effect of the price volatility of very small firms[2].

We use a one-way sort on market capitalisation to divide firms into ten decile portfolios based upon their market capitalisation at the end of the preceding year t-1 for the purposes of analysis during year t. Portfolios are value-weighted and annually re-balanced. Each firm must have been trading for at least four quarters to be included in the sample. The fundamentals attributed to the portfolios during year t are those which have been reported to the market during year t. Consequently the growth measures used in this study refer to the earnings of portfolio z in time t relative to the earnings of portfolio z in time t-1. Price (P_t), earnings-price (Y_t/P_t), dividend-price (D_t/P_t), dividends (D_t) and earnings (Y_t) are then calculated for all indices. We also calculate net share repurchases, which is gross share repurchases minus share issuance and restricted to be non-negative for each firm as in Skinner (2008). We then construct a broader dividend measure, Dividend Repurchases (DR_t) that includes dividends plus net share repurchases[3].

UK data on the consumer price index and three-month treasury bill rate were gathered from the IMF's International Financial Statistics database. Throughout, we examine the data in real terms since we consider economic agents are primarily concerned about the purchasing power of their income, although our methodology is equally applicable to nominal values.

2.2. EQUITY RETURN AND PREMIA ESTIMATION

[2] Empirical results are broadly consistent if all firms are included regardless of size.
[3] Share repurchase data is from Worldscope provided by Thomson Datastream.

We derive estimates of average stock returns and expected returns implied by fundamentals following Fama and French (2002). The historical average return model (R_t) is the average dividend yield (D_t/P_{t-1}) plus the average capital gain ($GP_t = \Delta P_t / P_{t-1}$).

$$A(R_t) = A(D_t / P_{t-1}) + A(GP_t) \tag{1}$$

If the ratio of fundamental-price is stationary then over extended periods of time the proportional change in prices must be matched by an almost equivalent proportional change in fundamental. We use two measures of fundamentals, dividends and earnings, to estimate the expected growth of the share price.

Consequently, the Fama-French Earnings Growth Model (2) obtains estimates from fundamentals of expected capital gains. The average earnings growth return (RY_t) is the average dividend yield (D_t / P_{t-1}) plus the average earnings growth rate ($GY_t = \Delta Y_t / Y_{t-1}$). The Fama-French Dividend Growth Model (3) simply states the average dividend growth return (RD_t) is the average dividend yield (D_t / P_{t-1}) plus the average dividend growth rate ($GD_t = \Delta D_t / D_{t-1}$).

$$A(RY_t) = A(D_t / P_{t-1}) + A(GY_t) \tag{2}$$

$$A(RD_t) = A(D_t / P_{t-1}) + A(GD_t) \tag{3}$$

Equity premia estimates are calculated as the return (from (1), (2) or (3)) minus the risk-free rate. Importantly, differences between historical average and expected equity premia estimates stem from either differences between rates of price growth and fundamental growth since risk-free rate and dividend yield are common to both measures.

The fundamental growth models rely upon very few underlying assumptions. The main assumption is stationarity of the fundamental-price ratio. Unit root tests indicate annual fundamental-price ratios for all series are stationary but are omitted for space considerations. This indicates fundamental growth appropriately estimates capital gains.

There are benefits and drawbacks relating to each measure of fundamentals. Dividends are actual cash payments to shareholders, which has two main benefits compared to earnings. Firstly, earnings don't by themselves guarantee any future payment to investors. Secondly, earnings can be manipulated and managed by managers without any direct relationship to operating performance (see e.g. Healy and Wahlen, 1999 for a review.) A particular concern is incidences of earnings management appear to have increased over time, especially during the latter part of our sample. (Berenson, 2004). This could potentially lead to recent earnings growth being inflated and thus somewhat overstate true operating performance.

Nevertheless, earnings do have two advantages over dividends. Firstly, dividends are paid at the discretion of corporate executives and thus can be smoothed without fully reflecting changes in operating performance. Secondly and more importantly, dividend payments can be affected by changes in corporate payout policy. Recent US corporate payout policy has seen a sharp increases in zero-dividend firms (Fama and French, 2001) and share repurchases (Grullon and Michaely, 2002). UK payout policy has seen similar trends since the early 1990s. Oswald and Young (2008) note that since 1995 share repurchases have grown in importance in the UK reaching £8bn by 2000, more than 20% of aggregate dividends. Consequently, using dividends to estimate equity premia would understate the expected value in the UK and would do so to an even greater extent in the US.

We incorporate share repurchases into our analysis, however, perhaps unsurprisingly given the discretionary nature of repurchases, even at the portfolio level there is large time-variation in the value of repurchases to price. Consequently, we report results for all three measures of fundamental growth as each gives an indication of the expected equity premium.

3. Size Portfolio Returns (Descriptive Analysis)

3.1. FULL SAMPLE: 1966-2005

[INSERT TABLES I]

In this section we analyse if the aggregate pattern that ex-post returns are above expected returns (Fama and French, 2002; Vivian, 2007) is evident across size portfolios. This is also one of the first papers to estimate expected returns for cross-sectional portfolios using the Fama and French (2002) method. A notable exception is Chen et al. (2008) who estimate expected returns for US value portfolios finding that ex-post returns for all portfolios were above expected returns. In contrast, this paper considers the case of UK size portfolios.

We find a strong positive expected equity premium for all size deciles over 1966-2005. Expected returns increase almost monotonically across size deciles as Table II Panel A demonstrates for both dividend and earnings measures. Historical average equity premium also increase almost monotonically as firm size decreases. This is suggestive of a pervasive relationship between size and returns.

On our central issue for this section, all three fundamental measures of expected return are substantially below the historical average. Dividend returns exhibit the greatest discrepancies of about 4% p.a. for most deciles and this trend is only slightly ameliorated by the dividend repurchase measure. Earnings returns are closer to historical average returns but substantial differences are still evident. At the market level ex-post returns are also substantially above any of the 3 measures of expected returns consistent with prior results of Fama and French (2002) and Vivian (2007).

3.2. IMPACT OF 1974 STOCK MARKET CRASH

[INSERT FIGURE 1:]

The UK stock market crash of 1974 largely reversed the following year. The impact of this on the valuation ratios of the largest and smallest firms is illustrated in Figures 1 and 2. An issue with using the arithmetic average is that its value can be inflated by such an outlying value. Such a substantial decline, followed by a rapid rise could inflate estimated returns based on the arithmetic average. The impact of such a temporary inverse spike in stock prices can be simply illustrated. If there were a 50% fall in stock prices during 1974 followed by a 100% rise in 1975, then prices in December 1975 will be the same as in December 1973 but the arithmetic average would give an average capital gain of 25% p.a. over the two years. Such an extreme movement in share prices can bias upwards the arithmetic average and this remains large, is about 1% p.a. for most portfolios over the full sample. We adjust the outlying values in 1974 and 1975 for capital gains and earnings growth by taking the net change from 1973-1975 and attributing half of this to each of 1974 and 1975 as shown by (5) [4].

$$
\begin{aligned}
GP_{1974} &= GP_{1975} = (P_{1975}/P_{1973} - 1)/2 \\
GY_{1974} &= GY_{1975} = (Y_{1975}/Y_{1973} - 1)/2 \\
GD_{1974} &= GD_{1975} = (D_{1975}/D_{1973} - 1)/2
\end{aligned}
\quad (5)
$$

[4] Naturally, adjustment using the geometric average for 1973-1975 yields qualitatively identical results to those using the adjustment proposed here.

We find for size portfolios that the estimated values of historical returns are substantially biased upwards by the 1974 market crash. The impact of the market turbulence of 1974-5 seems to be most acutely felt by larger stocks. Panel B of Table I reveals the adjustment reduces the largest decile (D1) historical average premia from 6.85% to 5.54%, a difference of 1.31%; whereas for the smallest stocks (D10) the equity premia falls less than one percent from 14.43% to 13.71%.

Estimates of expected returns via any of the fundamental measures are only marginally affected, if at all by the 1974 market crash. In fact, none of the expected equity premia estimates are affected by more than 0.1%. This supports Fama and French's (2002) assertion that fundamentals provide more precise estimates of expected returns since they are relatively insensitive to extreme market movements such as 1974-1975.

After the 1974 spike is neutralised, the historical average model equity premia are more closely aligned with the fundamental model expected equity premia. However, Panel B of Table I indicates for most deciles relatively large discrepancies are apparent for most size deciles, consistent with the prior aggregate studies. Dividend growth estimates diverge from historical average much more than earnings growth estimates. For instance, the largest discrepancy between earnings and historical average returns is for the smallest firms of 1.85% p.a., whereas the minimum discrepancy between dividend and historical average returns is 2.30%. Discrepancies tend to be lower for larger firms but even so these are only less than 0.5% p.a. for the very largest deciles and typically only for the earnings measure. On the central issue of whether or not historical equity returns are expected our results suggest that for most deciles ex-post average returns have been above investors' expectations; in many cases by a substantial margin.

4. Explaining Return Discrepancies

IV.I – Causes of Return discrepancies.

In Section 3 we find fundamental estimates of returns are generally not well aligned historical returns for the full sample period implying ex-post returns deviate from expected returns. Campbell (1991) demonstrates in a log-linear framework that ex-post returns deviate from expected returns if there is a change in expectations of either future fundamental growth or future returns:

$$r_{t+1} - E_t r_{t+1} = (E_{t+1} - E_t)\sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - (E_{t+1} - E_t)\sum_{j=0}^{\infty} \rho^j \Delta r_{t+1+j} \qquad (6)$$

To simply illustrate if there were a change in expected return, assume stock prices merely reflect the value of all future cashflows discounted at a constant rate of return. If a decline (rise) in expected returns occurs then prices will rise (decline) in response but fundamentals will be relatively unaffected; note in such a circumstance there would also be a shift in fundamental-price ratio and thus a shift in fundamental-price ratio could indicate of a change in expected returns[5]. This can be seen in (7).

$$d_t - p_t = E_t \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - E_t \sum_{j=0}^{\infty} \rho^j \Delta r_{t+1+j} \qquad (7)$$

Prior studies find a downward break in aggregate market fundamentals-price ratios for the US (Carlson et al., 2002; Lettau and Van Nieuwerburgh, 2008) and UK

[5] The present value model of Campbell and Shiller (1987) indicates that ratios of fundamental-price contain information about future expected returns and / or future fundamental growth. However, given future fundamental growth is difficult to predict, shifts in fundamental-price are usually interpreted as a shift in expected return. In results not reported here we find changes in future fundamental growth shed little light on our sub-period results.

(Vivian, 2007) during the 1990's. Equation 7 indicates how a change in valuation ratio could be connected to a related literature examining if expected returns have declined recently. Empirical evidence suggests a fall in expected returns during the 1990's for the US (Lettau et al., 2008) and globally (Bansal and Lundblad, 2002). Lettau et al. (2008) provide a model that connects a fall in consumption risk with movements in valuation ratios.

However, the Campbell (1991) decomposition also highlights that deviations of ex-post returns from expectations could also be due to a change in future fundamental growth. At least three different channels for higher future growth have been advanced. Firstly, the ever increasing pace of technological developments has facilitated more rapid productivity growth (Jagannathan et al, 2001). Secondly, the process of globalisation could have lead to long-lasting dynamic gains from resources being allocated more efficiently. Thirdly, substantial declines in inflation during the latter part of the 20th Century in many developed economies has reduced economic uncertainty and perhaps encouraged greater investment and hence higher economic growth in the future. These factors have lead to hopes that higher levels of economic growth can be achieved and sustained long into the future.

This paper provides cross-sectional evidence on shifts in fundamental-price ratios of size portfolios. If the aggregate market results are really in response to a pervasive domestic economic risk factor, we should find breaks in the same direction at a similar time across each portfolio. Consequently our analysis could shed new light upon whether a market fall in fundamental-price ratios is a) due to a change in pervasive domestic risk or b) driven by firm's of a particular size.

We also quantify the magnitude of change in expected return or expected fundamental growth implied by shifts in valuation ratio. Confidence intervals are provided to examine if the net changes in expected return or expected fundamental growth could be detected statistically.

4.2 STRUCTURAL BREAK TESTS: METHOD

We use structural break tests to identify if regime shifts are apparent in the mean of the UK log fundamental-price ratio[6]. In the simplest case of a single break illustrated by (8) then the mean of the earnings-price ratio equals δ^1 prior to the breakpoint (at time *m*) and equals δ^2 from period *m+1* onwards.

$$\begin{aligned} X_t/P_t &= \delta^1{}_t + \varepsilon_t,\ t = 1,\ldots,m, \\ X_t/P_t &= \delta^2{}_t + \varepsilon_t,\ t = m+1,\ldots,T, \\ &\text{where } X_t \text{ is either } D_t, DR_t \text{ or } Y_t. \end{aligned} \tag{8}$$

We test for structural breaks using the recently developed procedure of Bai and Perron (1998, 2003). Firstly, the Bai-Perron test assumes that the break date is unknown, selecting the breakpoint(s) that minimises the sum of squared residuals for the whole period. This test has the particularly attractive feature however is that it allows for the more complex cases where there are multiple regimes as given by (9).

$$X_t/P_t = \delta^j{}_t + \varepsilon_t,\ t = T_{j\text{-}1} + 1,\ \ldots\ ,\ T_j \tag{9}$$

for j=1,…,m+1, where δ^j is the regression co-efficient for the *j*th regime. The *m*-partition (T_1,…,T_m), represents the breakpoints for the different regimes (by convention, T_1 = 0 and T_{m+1} = T). Estimates of the regression co-efficients are produced in order that the sum of squared residuals is minimised. Therefore for however number of breaks is specified the position of the breaks is determined

[6] We use log fundamental-price ratios for the structural break tests given the theoretical framework of Campbell-Shiller (1987) is based upon a log-linearisation.

according to the minimum sum of squares. Separate tests were developed by Bai and Perron in order to determine the appropriate number of breaks for the series.

Bai and Perron (1998) develop a $SupF_T$ testing procedure which tests the null hypothesis of no structural breaks against the alternative of m structural breaks. A maximum F-test is produced which can they be used to assess if the null hypothesis of no structural break can be rejected. Bai and Perron (1998) also develop what they refer to as the $SupF_T(l+1|l)$ statistic to test the null hypothesis of l breaks against the alternative hypothesis of 1+l breaks. It begins with the global minimized sum of squared residuals for a model with l breaks. Each of the intervals defined by the l breaks is then analyzed for an additional structural break. From all of the intervals, the partition allowing for an additional break that results in the largest reduction in the sum of squared residuals is treated as the model with 1+l breaks. The statistic is used to test whether the additional break leads to a significant reduction in the sum of squared residuals. UDmax and WDmax tests are provided to test the null of no breaks against the alternative of at least 1 break.

An alternative approach to determine the number of structural breaks is to use model selection criteria. The Bayesian approach is usually favoured since it penalises the inclusion of additional variables more heavily than other information criteria. We use a modified Bayesian Information Criterion (BIC) developed by Liu et al. (1997), which Perron (1997) simulations of structural breaks indicate perform better than standard BIC. Consequently, we report the number of breaks implied by the Liu et al. modified BIC (referred to hereafter as LWZ) to check the robustness of the number of breaks selected by the $SupF_T$ tests.

We use procedures developed by Bai and Perron (1998, 2003) to investigate the possibility of multiple regimes in UK earnings-price ratios. Given the 1974 market crash referred to in Section 3.2 we replace the 1974 earnings price value with the average of 1973 and 1975. To determine the number of breaks in the series Bai and Perron (1998) advocate using the $SupF_T(1)$ test followed by sequential $SupF_T(l+1|l)$ tests, referred to as the sequential procedure. Although in Bai and Perron (2003) they acknowledge the sequential procedure can sometimes break down if there are multiple breaks. Thus they also suggest examining UD max or WD max tests to see if at least at 1 break is present and then use $SupF_T(l+1|l)$ tests sequentially to determine precisely how many breaks are present; we refer to this as the modified sequential procedure. However, Bayesian information criteria could be useful in this context and thus we also examine the number of breaks selected by Liu et al. (1997) modified Bayesian information criterion (LWZ) to verify our results.

4.3 STRUCTURAL BREAK TESTS: RESULTS

[INSERT TABLE II]

Table II reports results from Bai-Perron structural breaks tests and LWZ criterion over the period 1965-2005. The UDmax, WDmax, $SupF_T(2)$ and $SupF_T(3)$ often all reject the null of 0 breaks for all valuation ratios. However, $SupF_T(1)$ test fails to reject the null of 0 breaks for almost any series and thus the sequential procedure finds no breaks in any of the series. However, the modified sequential procedure (suggested by Bai and Perron (2003)) overcomes this difficulty and typically finds breaks are present in the series. The advantage of the modified sequential procedure is that it can allow for the possibility that valuation ratios appearing to go through a higher regime (e.g. during the 1970s) before reverting back towards a previous lower mean (e.g. in the 1980s or 1990s).

The number of structural breaks depends upon the fundamental-price ratio examined. For earnings-price there are two breaks for almost every series by both the modified sequential and LWZ criterion. The only exceptions are for the value-weighted market and the largest firm portfolio, where there are (possibly) three breaks. For dividend-price and dividend-price repurchases there tend to be fewer breaks, commonly zero or one break is identified. However, for the dividend series there is less agreement between the modified sequential and LWZ over the actual number of breaks.

[INSERT TABLE III AND FIGURES 3,4 and 5:]

Firstly, in stark contrast, to studies of the aggregate market (see Lettau and Van Nieuwerburgh, 2008; Carlson et al., 2002; Vivian, 2007) we find very limited evidence of a break in valuation ratios during the 1990's. Where breaks in the 1990s are identified they occur for the value weighted market portfolio and only for the largest size portfolios (D1 and, for dividend-price, D2). This suggests the findings of downward breaks in aggregate fundamental-price ratios during the 1990s appear to be driven primarily by the largest firms. This questions if these shifts in valuation ratio are due to a change in expected return stemming from a change in pervasive systematic risk. Since, this shift appears concentrated in only the largest firms it appears inconsistent with the consumption risk explanation of Lettau et al. (2008), but could be consistent with Huang (2007) suggestion that large firms are more integrated and sensitive to global factors. The results are also possibly consistent with portfolio specific shifts in expected fundamental growth.

Secondly, for many size portfolios there is a downward break in valuation ratios prior to the 1990s. In particular, for earnings-price ratio there are two breaks that occur at common times across all size and market portfolios. There is an upward break during the early 1970's around the time of the first OPEC oil crisis in 1974 and the ensuing period of high inflation and economic instability and uncertainty in the UK economy. There is also a downward break in 1981 that largely counteracts the earlier break, which could potentially be linked to resolution of economic uncertainty. The upward break is of particular interest since there is no prior evidence of an upward break in fundamental-price ratios in the literature.

However, for dividend-price ratios the results are not uniform. For the three smallest decile portfolios there are no breaks at all detected by either dividend measure. For mid-sized firms, there is some evidence of a downward break during the 1980s and particularly when repurchases are included some evidence of an upward break during the 1970s. Nevertheless, for dividend-price measures there is no evidence of synchronised breaks across portfolios, contrary to the earnings-price measures.

Finally, we examine the overall change in valuation ratio mean. If ex-post returns are above those implied by fundamentals (as suggested by Fama and French , 2002 amongst others), we should find a net fall in valuation ratio mean. The statistical significance of overall changes are assessed via two methods. Firstly we use the non-parametric wilcoxon rank test. Secondly, we estimate confidence intervals using full-sample standard errors.

For earnings-price ratios we find that in all cases that the net change in valuation ratio mean is positive, but in the majority of cases the change is not statistically significant. This implies that the relationship between fundamentals and prices is similar at the end of the sample to the beginning. For the full sample period there has not been a fall in mean contrary to prior aggregate findings.

For dividend-price the net changes in valuation ratios is negative (if at least one break is detected) and statistically significant, however when repurchases are included the statistical significance for some portfolios is reduced. For ratios where breaks are detected, the results are consistent with the descriptive analysis in Section III. For the smaller portfolios where no breaks are detected could be reconciled with Section III results by the sharp drop in dividend-price ratio at the very end of the sample, which may not be detected by structural break tests that do not identify breakpoints in the first or last 15% of data.

Structural break tests provide little evidence of a pervasive shift in valuation ratios during the 1990s across size portfolios. Our results suggest the 1990s shift in valuation ratio is confined to value-weighted market indices and large firm portfolios and absent from equally-weighted market index and smaller firms. Our other evidence is much more mixed. Evidence is mixed on whether there were pervasive shifts in valuations ratios prior to the 1990s; earnings price ratios suggest there were, whilst dividend-price ratios provide little support for the notion. Evidence is also mixed on whether overall the mean of valuation ratio fell during the sample; dividend-price measures suggest they did for most portfolios whilst for earnings-price there is no evidence supporting a fall.

However, a key question is how large a change in expected returns or expected fundamental growth would be necessary to create these shifts in valuation ratios?

4.4 IMPLIED CHANGES IN EXPECTED RETURNS

[INSERT TABLES IV AND V:]

In table IV, we calculate the change in long-run average return implied by shifts in valuation ratio *a la* Lettau and Van Nieuwerburgh (2008). In order to do this we assume that expected fundamental growth is held constant and thus all the adjustment in valuation ratio is assumed due to movements in expected return. (In table V we examine the implied shifts in expected fundamental growth if expected returns were held constant). Thus, (10) states that the long-run average return equals the long-run dividend (earnings) growth rate plus the product of 1 plus the constant long-run dividend (earnings) growth rate and the long-run average dividend-price ratio (average earnings-price ratio multiplied by the constant average payout ratio). Estimates of expected returns are based on the assumption that it causes all of the change in dividend-price ratio. Confidence intervals are calculated for the full-sample change in long-term expected return. Since the model implies changes in long-term returns we use 10-year averages of geometric returns (rather than annual averages) to calculate the standard errors for confidence intervals.

$$\begin{aligned} \overline{r_t} &= \overline{\Delta d} + (1+\overline{\Delta d})\overline{DP_t} \\ \overline{r_t} &= \overline{\Delta y} + (1+\overline{\Delta y})\overline{YP_t}\,\overline{D/Y} \end{aligned} \tag{10}$$

Table 6 show the implied changes in expected returns during the sample. For earnings-price a substantial increase in almost all industries is found in around 1974 and a substantial decrease later either in the 1980s or 1990s. However, the net changes (comparing the final regime with the initial) are smaller; nevertheless for a number of portfolios the decline is more than 100 basis points, an economically substantial margin. A cautionary note though must be added in that for none of the net changes in expected returns are statistically significant at the 5% level; this is due to the high volatility of returns (even ten-year average returns) and points to the difficulty in determining the cause of the shift in valuation ratio.

For dividend-price measures where there are breaks the net change always implies a decline in expected returns of at least 0.75% for pure dividends and at least 0.39% when repurchases are included. However, despite these implied changes being substantial economically, none of them are statistically significant at the 5% level. In fact, the smallest confidence interval is 1.50%, which would be a huge change economically

4.5 IMPLIED CHANGES IN FUNDAMENTAL GROWTH

Thus, (11) states that the long-run average dividend (earnings) growth rate equals the constant long-run average expected return minus the average dividend-price ratio (average earnings-price ratio multiplied by the constant average payout ratio) all divided by 1 plus the average dividend-price ratio (average earnings-price ratio multiplied by the constant average payout ratio). In (11), we assume that expected return is held constant and thus all the adjustment in valuation ratio is assumed due to movements in expected fundamental growth. Confidence intervals are calculated for long-term fundamental growth based on 10-year geometric averages of the series.

$$\Delta\overline{d}_t = \frac{\overline{r} - \overline{DP_t}}{(1 + \overline{DP_t})}$$
$$\Delta\overline{y}_t = \frac{\overline{r} - \overline{YP_t}\,\overline{D/Y}}{(1 + \overline{YP_t}\,\overline{D/Y})} \qquad (11)$$

Table V, uses (11) to calculate the change in long-run fundamental growth implied by shifts in valuation ratio. A substantial decrease in expected fundamental growth for almost all portfolios is found in around 1974 and a substantial increase later either in the 1980s or 1990s. However, the net changes (comparing the final regime with the initial) are smaller; nevertheless for a number of portfolios the increase is more than 100 basis points, an economically substantial margin. However given the high volatility of fundamental growth, none of these implied long-run changes in expected fundamental growth are statistically significant at conventional significance levels. Thus, even instances where net changes in valuation ratios are statistically significant it is very difficult to determine whether these are due to a shift in expected returns or expected future fundamental growth. This is because the shift in long-term average expected return (or fundamental growth) is so small relative to the standard error of the process.

For dividend-price measures several portfolios especially the smallest size portfolios have no breaks. However, where there are breaks the net change always implies an increase in expected fundamental of at least 0.74% for pure dividends and at least 0.39% when repurchases are included. However, the implied changes are statistically significant in many cases for the pure dividend measure; although when repurchases are included the statistical significance disappears in the majority of cases. Nevertheless, the confidence intervals are substantial typically requiring a change in long-term growth of around 0.8% p.a.

Fama and French (2002) contend that the best forecast of future fundamental growth is the historical average. Since the historical average doesn't imply a change in fundamental growth, they conclude that changes in expected fundamental growth cannot be responsible for their equity premium findings. However, our results from Table 7 question their interpretation. The change in long-run expected fundamental growth necessary to explain the shifts in valuation ratios, especially for earnings-price are small relative to the volatility of fundamental growth so it is likely that they would not be easily statistically distinguishable. Thus, it is plausible that movements in fundamental-price ratio were caused by changes in expected fundamental growth.

Finally since structural break tests indicate fundamental-price ratios often follow different regimes, then ex-post returns are a noisy measure of ex-ante returns. In such circumstances the Section 3 results for fundamentals are likely to be more accurate measures of real ex-ante returns than ex-post returns (Fama and French, 2002). This is because current fundamentals are insensitive to shifts in expectations of returns and are less affected by shifts in expectations of future fundamentals than current returns.

5. Conclusion

The extant literature proposes that the aggregate expected equity premium has fallen over recent decades in the US (Fama and French, 2002) and Internationally (Dimson et al., 2006). Furthermore it is claimed that this decline in aggregate equity premium occurred during the 1990s (Lettau et al., 2008); the evidence in this paper challenges this claim in the case of the UK. We draw on cross-sectional evidence arguing if the decline in aggregate valuation ratios is caused by a decline in domestic consumption volatility then all portfolios should be affected. In the UK we find the appearance of a fall in aggregate expected returns *during* the 1990s is primarily driven by the very largest firms. Hence this result is inconsistent with it being caused by a fall in UK consumption volatility during the 1990s. The results are more consistent with either large corporations being more integrated into the world market than small firms (Huang, 2007) or with valuations being caused by changes in (portfolio specific) fundamentals (Vuolteenaho, 2002)

The paper also investigates if over the full-sample ex-post returns are above expected returns. This hypothesis receives widespread support at the aggregate level both for the US (Fama and French, 2002) and Internationally (Dimson et al., 2006). Supportive evidence is provided in the cross-section by Chen et al. (2008) for US value sorted portfolios. However empirical evidence for UK size-sorted portfolios is mixed. For dividend-price measures typically the prior results are upheld using arithmetic averages and to a considerable extent by structural break tests. However, for earnings-price measures average ex-post returns are much closer to expected returns and furthermore structural break tests suggest overall that movements in prices have been matched by growth in earnings. Thus our results provide mixed evidence on whether ex-post returns exceeded expectations over 1966-2005.

We further caution the interpretations of prior studies that a decline in the discount rate is primarily responsible for findings of a) ex-post returns exceed expectations and b) downward breaks in fundamental-price ratios.

In particular, a change in long-term expected fundamental growth of around 1% p.a. could create the results we find. Given the high volatility of fundamental growth even at the 10-year horizon, it proves difficult to detect statistically if such whether a change in fundamental growth or in fact a change in expected returns has occurred. Hence this paper suggests the debate over whether expected fundamentals (Vuolteenaho, 2002; Larrain and Yogo, 2008) or expected returns (see Campbell and Shiller, 1987 amongst others) primarily cause movements in fundamental-price ratios has yet to be resolved and remains an issue for further research.

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TABLE I: Estimates of Fundamental Growth And Equity Returns

Panel A: 1966-2005: All Unadj.

	Ft	DYt	GDt	GDRt	GYt	GPt	RXDt	RXDRt	RXYt	RXt	RXt-RXDt	RXt-RXDRt	RXt-RXYt
VW Mkt	1.55%	4.51%	0.82%	2.59%	2.82%	4.72%	3.78%	5.55%	5.78%	7.68%	3.90%	2.13%	1.90%
EW Mkt	1.55%	4.96%	1.61%	2.33%	4.07%	6.87%	5.01%	5.73%	7.47%	10.27%	5.26%	4.54%	2.80%
BIG	1.55%	4.35%	0.42%	2.43%	2.38%	4.04%	3.22%	5.23%	5.19%	6.85%	3.63%	1.62%	1.66%
D2	1.55%	4.95%	1.68%	2.57%	4.16%	6.08%	5.08%	5.97%	7.55%	9.48%	4.40%	3.50%	1.92%
D3	1.55%	4.78%	2.13%	2.97%	4.35%	7.18%	5.36%	6.20%	7.58%	10.41%	5.06%	4.21%	2.84%
D4	1.55%	4.81%	2.34%	2.70%	4.45%	7.76%	5.60%	5.96%	7.71%	11.01%	5.42%	5.06%	3.30%
D5	1.55%	4.83%	1.46%	2.55%	4.20%	6.40%	4.75%	5.83%	7.49%	9.68%	4.93%	3.85%	2.19%
D6	1.55%	5.06%	3.61%	3.90%	5.35%	8.07%	7.12%	7.41%	8.86%	11.59%	4.47%	4.17%	2.73%
D7	1.55%	5.17%	3.26%	3.49%	5.89%	8.59%	6.88%	7.11%	9.51%	12.21%	5.33%	5.10%	2.70%
D8	1.55%	5.09%	3.26%	3.80%	6.73%	7.71%	6.80%	7.34%	10.27%	11.25%	4.45%	3.91%	0.98%
D9	1.55%	5.36%	4.59%	4.72%	7.31%	10.16%	8.40%	8.53%	11.13%	13.97%	5.58%	5.44%	2.85%
SMALL	1.53%	5.06%	4.90%	6.24%	8.73%	10.91%	8.43%	9.76%	12.25%	14.43%	6.00%	4.67%	2.18%

Notes: Inf_t is the rate of inflation for year t, $(CPI_t / CPI_{t-1}) – 1$. F_t is the real return on Treasury Bills. d_t and p_t are nominal dividends and prices at time t. D_t / P_{t-1} is the real dividend yield, defined as: $(d_t / p_{t-1})*(CPI_{t-1} / CPI_t)$. GD_t is the real growth of dividends for t, $(d_t / d_{t-1})*(CPI_{t-1} / CPI_t) – 1$. GY_t is the real growth of earnings for t, $(y_t / y_{t-1})*(CPI_{t-1} / CPI_t) – 1$. GP_t is the real capital gain for t, $(p_t / p_{t-1})*(CPI_{t-1} / CPI_t)$. RD_t is the earnings growth model estimate of equity returns for t, $(D_t / P_{t-1}) + GD_t$. RD_t is the dividend growth model estimate of equity returns for t, $(D_t / P_{t-1}) + GD_t$. RY_t is the earnings growth model estimate of equity returns for t, $(D_t / P_{t-1}) + GY_t$. R_t is the historical average model estimate of equity returns for t, $(D_t / P_{t-1}) + GP_t$. RD_t is the earnings growth model estimate of the equity premium for t, $RY_t - F_t$. RY_t is the earnings growth model estimate of the equity premium for t, $RY_t - F_t$. RX_t is the realised equity premium at time t, $R_t - F_t$.

Panel B: 1966-2005 – All Spike adjusted

	Ft	DYt	GDt	GDRt	GYt	GPt	RXDt	RXDRt	RXYt	RXt	RXt-RXDt	RXt-RXDRt	RXt-RXYt
VW Mkt	1.55%	4.51%	0.84%	2.61%	2.86%	3.35%	3.80%	5.57%	5.82%	6.31%	2.51%	0.74%	0.48%
EW Mkt	1.55%	4.96%	1.63%	2.35%	4.14%	5.48%	5.03%	5.76%	7.55%	8.88%	3.85%	3.12%	1.33%
BIG	1.55%	4.35%	0.45%	2.45%	2.42%	2.79%	3.25%	5.26%	5.23%	5.59%	2.35%	0.34%	0.37%
D2	1.55%	4.95%	1.68%	2.57%	4.19%	4.91%	5.08%	5.97%	7.59%	8.31%	3.23%	2.33%	0.72%
D3	1.55%	4.78%	2.15%	3.00%	4.42%	5.50%	5.38%	6.23%	7.65%	8.73%	3.34%	2.50%	1.08%
D4	1.55%	4.81%	2.38%	2.74%	4.56%	6.12%	5.64%	6.00%	7.82%	9.37%	3.73%	3.38%	1.55%
D5	1.55%	4.83%	1.54%	2.62%	4.32%	5.43%	4.82%	5.91%	7.60%	8.71%	3.89%	2.80%	1.11%
D6	1.55%	5.06%	3.66%	3.96%	5.41%	6.83%	7.18%	7.47%	8.93%	10.34%	3.17%	2.87%	1.42%
D7	1.55%	5.17%	3.27%	3.50%	5.96%	7.31%	6.89%	7.12%	9.58%	10.93%	4.04%	3.81%	1.35%
D8	1.55%	5.09%	3.21%	3.75%	6.84%	6.56%	6.75%	7.29%	10.38%	10.10%	3.35%	2.81%	-0.28%
D9	1.55%	5.36%	4.61%	4.74%	7.34%	8.68%	8.42%	8.56%	11.15%	12.49%	4.07%	3.94%	1.34%
SMALL	1.53%	5.06%	5.25%	6.23%	8.52%	10.28%	8.77%	9.76%	12.04%	13.81%	5.03%	4.05%	1.77%

Notes: see Panel A for variable descriptions.

TABLE II: Bai-Perron Tests of Multiple Structural Breaks

Panel A: Earnings-Price Ratio

Sample 1965-2005	SupFT(1)	SupFT(2)	SupFT(3)	SupF(2|1)	SupF(3|2)	UDMax	WDMax	No. of Breaks Selected: Sequential	Modified Sequential	LWZ
Market Aggregates										
EW Market	3.42	51.58	37.34	66.11	1.76	51.58	62.00	0	2	2
VW Market	3.48	11.22	34.06	14.44	33.86	34.06	52.38	0	3	3
Size Deciles										
D1 (Big)	3.46	14.42	17.53	16.04	17.24	17.53	26.95	0	3	2
D2	10.51	23.52	15.57	22.52	1.55	23.52	28.28	2	2	2
D3	7.35	30.50	19.95	41.58	1.70	30.50	36.67	2	2	2
D4	3.15	26.90	18.68	37.17	0.53	26.90	32.34	0	2	2
D5	4.90	15.66	10.33	23.72	0.82	15.66	18.82	0	2	2
D6	4.29	49.08	32.31	39.62	0.29	49.08	59.00	0	2	2
D7	5.48	32.19	20.49	43.04	0.01	32.19	38.69	0	2	2
D8	4.49	23.67	15.05	26.58	1.36	23.67	28.46	0	2	2
D9	1.91	33.18	28.00	39.80	0.27	33.18	43.06	0	2	2
D10 (Small)	2.10	17.93	11.89	16.73	0.51	17.93	21.55	0	2	2

Panel B: Dividend-Price Ratio

Sample 1965-2005	SupFT(1)	SupFT(2)	SupFT(3)	SupF(2|1)	SupF(3|2)	UDMax	WDMax	No. of Breaks Selected: Sequential	Modified Sequential	LWZ
Market Aggregates										
EW Market	2.72	7.08	4.97	5.26	0.57	7.08	8.52	0	1	1
VW Market	18.88	12.03	14.39	0.97	2.76	18.88	22.12	0	1	1
Size Deciles										
D1 (Big)	25.94	15.11	14.48	0.57	6.42	25.94	25.94	1	1	1
D2	3.35	6.31	5.13	1.45	1.65	6.31	7.88	0	1	1
D3	4.38	10.37	8.98	3.77	1.89	10.37	13.80	0	1	2
D4	4.26	10.50	7.54	10.07	0.68	10.50	12.63	0	2	1
D5	2.72	4.60	4.26	0.16	0.18	4.60	6.55	0	0	1
D6	4.34	12.42	9.87	1.72	1.44	12.42	15.17	0	1	1
D7	2.72	8.19	6.81	2.59	0.20	8.19	10.47	0	1	1
D8	2.54	2.00	1.10	1.43	7.50	3.85	5.92	0	0	1
D9	1.35	0.60	2.25	1.75	4.56	2.25	3.46	0	0	1
D10 (Small)	0.79	3.56	5.86	0.77	4.03	5.86	9.02	0	0	1

Panel C: Dividend-Price Repurchases Ratio

Sample 1965-2005	SupFT(1)	SupFT(2)	SupFT(3)	SupF(2|1)	SupF(3|2)	UDMax	WDMax	No. of Breaks Selected: Sequential	Modified Sequential	LWZ
Market Aggregates										
EW Market	3.53	10.86	8.58	7.45	0.47	10.86	13.19	0	2	2
VW Market	2.99	5.26	4.74	1.11	1.65	5.26	7.29	0	0	0
Size Deciles										
D1 (Big)	1.77	1.90	2.11	1.07	1.19	2.11	3.24	0	0	0
D2	0.91	0.91	4.95	4.62	0.45	6.64	7.98	0	1	2
D3	2.50	9.24	6.41	4.52	0.43	9.24	11.10	0	1	2
D4	4.02	11.39	6.45	10.07	0.40	11.39	13.69	0	2	1
D5	5.67	12.65	8.63	2.40	0.20	12.65	15.21	0	1	1
D6	4.28	13.26	9.43	11.07	0.75	13.26	15.94	0	2	1
D7	1.91	7.23	5.44	7.18	0.08	7.23	8.69	0	2	0
D8	3.05	4.26	3.52	1.20	0.31	4.26	5.41	0	0	0
D9	0.92	0.73	2.37	1.75	4.56	2.37	3.64	0	0	1
D10 (Small)	0.50	2.56	4.89	0.77	0.21	2.37	7.52	0	0	1

Notes: * denotes significance at the 1% level and ** at the 5% level**.** The 5% significance level is used when applying the sequential and modified sequential procedure. **T**he sequential procedure chooses the number of breaks by examining if $SupF_T(1)$ rejects the null of 0 breaks in favour of 1 and then proceeds to conduct $SupF_T(l+1|l)$, until it fails to reject the null. Given the nature of the data we find in many cases the $SupF_T(1)$ test fails to reject the null but UDMax, WDMax, $SupF_T(2)$ and $SupF_T(3)$ tests suggest there are multiple rather than no structural breaks. We therefore modify the sequential procedure as Bai-Perron (2003) suggest to first test if there is 1 or more breaks using UDmax and WDmax to identify if there is at least one break and then use $SupF_T(l+1|l)$ sequentially until it fails to reject the null. LWZ is the Liu et al. (1997) modified Bayesian information criteria.

TABLE III: Structural Break Timings and Magnitudes

Panel A: Earnings-Price Ratio

1965-2005	No. of	BREAK 1			BREAK 2			BREAK 3			OVERALL		5% CI	Wilcoxon
	Break	DATE	+ or -	SIZE	DATE	+ or -	SIZE	DATE	+ or -	SIZE	+ or -	CHANGE	CHANGE	P-Val
Market Aggregates														
EW Market		1973	Up	0.67	1981	Down	-0.53				Up	0.14	0.14	**0.05**
VW Market		1973	Up	0.64	1981	Down	-0.27	1991	Down	-0.30	Up	0.07	0.15	0.35
Size Deciles														
D1 (Big)	2	1973	Up	0.62	1981	Down	-0.22	1991	Down	-0.36	Up	0.04	0.16	0.71
D2	2	1973	Up	0.66	1981	Down	-0.36				Up	0.30	**0.16**	**0.00**
D3	2	1973	Up	0.69	1981	Down	-0.45				Up	0.24	**0.17**	**0.02**
D4	2	1973	Up	0.56	1981	Down	-0.45				Up	0.11	0.17	0.22
D5	2	1973	Up	0.62	1981	Down	-0.44				Up	0.18	0.15	
D6	2	1973	Up	0.63	1981	Down	-0.47				Up	0.16	0.14	**0.05**
D7	2	1973	Up	0.56	1981	Down	-0.42				Up	0.14	0.14	0.12
D8	3	1973	Up	0.54	1981	Down	-0.40				Up	0.14	0.15	
D9	2	1973	Up	0.51	1981	Down	-0.49				Up	0.02	0.17	
D10 (Small)	2	1973	Up	0.45	1981	Down	-0.45				Up	0.00	0.15	

Panel B: Dividend-Price Ratio

1965-2005	No. of	BREAK 1			BREAK 2			BREAK 3			OVERALL		5% CI	Wilcoxon
	Break	DATE	+ or -	SIZE	DATE	+ or -	SIZE	DATE	+ or -	SIZE	+ or -	CHANGE	CHANGE	P-Val
Market Aggregates														
EW Market	1	1984	Down	-0.36							Down	-0.36	**0.15**	**0.00**
VW Market	1	1997	Down	-0.39							Down	-0.39	**0.11**	**0.00**
Size Deciles														
D1 (Big)	1	1997	Down	-0.41							Down	-0.41	**0.11**	**0.00**
D2	1	1993	Down	-0.28							Down	-0.28	**0.13**	**0.00**
D3	1	1985	Down	-0.28							Down	-0.28	**0.15**	**0.00**
D4	2	1975	Up	0.34	1983	Down	-0.53				Down	-0.19	**0.16**	**0.00**
D5	0	1993										0.00	0.16	
D6	1	1993	Down	-0.34							Down	-0.34	**0.17**	**0.00**
D7	1	1985	Down	-0.29							Down	-0.29	**0.15**	**0.00**
D8	0	1984										0.00	0.15	
D9	1	1984										0.00	0.17	
D10 (Small)	1	1985										0.00	0.17	

Panel C: Dividend-Price Repurchases Ratio

1965-2005	No. of	BREAK 1			BREAK 2			BREAK 3			OVERALL		5% CI	Wilcoxon
	Break	DATE	+ or -	SIZE	DATE	+ or -	SIZE	DATE	+ or -	SIZE	+ or -	CHANGE	CHANGE	P-Val
Market Aggregates														
EW Market	2	1973	Up	0.35	1983	Down	-0.45				Down	-0.10	0.17	0.26
VW Market	0											0.00	0.13	
Size Deciles														
D1 (Big)	0											0.00	0.15	
D2	1	1985	Down	-0.13							Down	-0.13	**0.13**	**0.03**
D3	2	1984	Down	-0.19							Down	-0.19	**0.14**	**0.01**
D4	1	1976	Up	0.34	1984	Down	-0.49				Down	-0.15	0.17	**0.04**
D5	1	1983	Down	-0.28							Down	-0.28	**0.14**	**0.00**
D6	1	1973	Up	0.32	1982	Down	-0.42				Down	-0.10	0.16	0.21
D7	2	1974	Up	0.30	1983	Down	-0.40				Down	-0.09	0.18	0.40
D8	0											0.00	0.15	
D9	0											0.00	0.16	
D10 (Small)	0											0.00	0.16	

Notes: Table IV reports the timing and magnitude of the individual breaks in earnings-price ratios selected by the modified sequential procedure given in Table III. The final two columns report whether the net impact of these breaks was upwards or downwards and the magnitude of the net change.

TABLE IV: Change in Expected Return Implied by Structural Break Tests

Panel A: Earnings-Price Ratio

1965-2005	Constant Average GYt	No. of Regimes	REGIME 1		REGIME 2		REGIME 3		REGIME 4		CHANGE IN E(Rt)			OVERALL CHANGE	5% CIs
			DATE	E(Rt)	DATE	E(Rt)	DATE	E(Rt)	DATE	E(Rt)	A	B	C		
Market Aggregates															
EW Market	3.70%	3	65-72	7.38%	73-80	10.87%	81-05	7.92%			3.49%	-2.95%		0.54%	1.89%
VW Market	1.98%	4	65-72	5.01%	73-80	7.72%	81-90	6.35%	91-05	5.22%	2.71%	-1.37%	-1.13%	0.21%	1.80%
Size Deciles															
D1 (Big)	1.67%	4	65-72	4.61%	73-80	7.12%	81-90	6.03%	91-05	4.71%	2.51%	-1.08%	-1.32%	0.11%	1.93%
D2	2.87%	3	65-72	5.89%	73-80	8.71%	81-05	6.96%			2.82%	-1.75%		1.07%	2.04%
D3	2.58%	3	65-72	5.67%	73-80	8.73%	81-05	6.50%			3.06%	-2.23%		0.83%	1.86%
D4	2.78%	3	65-72	6.17%	73-80	8.74%	81-05	6.58%			2.56%	-2.16%		0.40%	2.32%
D5	1.98%	3	65-72	5.34%	73-80	8.22%	81-05	6.01%			2.89%	-2.21%		0.68%	1.85%
D6	3.94%	3	65-72	7.47%	73-80	10.54%	81-05	8.06%			3.07%	-2.48%		0.59%	1.79%
D7	3.85%	3	65-72	7.47%	73-80	10.22%	81-05	8.02%			2.75%	-2.20%		0.55%	1.94%
D8	3.54%	3	65-72	7.19%	73-80	9.80%	81-05	7.72%			2.61%	-2.08%		0.53%	1.72%
D9	5.00%	3	65-72	9.13%	73-80	11.89%	81-05	9.22%			2.76%	-2.67%		0.08%	1.50%
D10 (Small)	7.78%	3	65-72	11.94%	73-80	14.32%	81-05	11.96%			2.38%	-2.36%		0.02%	1.81%

Panel B: Dividend-Price Ratio

1965-2005	Constant Average GDt	No. of Regimes	REGIME 1 DATE	REGIME 1 E(Rt)	REGIME 2 DATE	REGIME 2 E(Rt)	REGIME 3 DATE	REGIME 3 E(Rt)	REGIME 4 DATE	REGIME 4 E(Rt)	CHANGE IN E(Rt) A	CHANGE IN E(Rt) B	CHANGE IN E(Rt) C	OVERALL CHANGE	5% CIs
Market Aggregates															
EW Market	2.02%	2	65-83	7.56%	84-05	5.89%					-1.67%			-1.67%	1.89%
VW Market	0.52%	2	65-96	4.79%	97-05	3.41%					-1.38%	-3.41%		-4.79%	**1.80%**
Size Deciles															
D1 (Big)	0.30%	2	65-96	4.47%	97-05	3.08%					-1.39%			-1.39%	1.93%
D2	1.28%	2	65-92	5.96%	93-05	4.80%					-1.16%			-1.16%	2.04%
D3	1.33%	3	65-84	6.04%	85-05	4.90%					-1.13%			-1.13%	1.86%
D4	1.38%	2	65-74	5.62%	75-82	7.31%	83-05	4.87%			1.69%	-2.44%		-0.75%	2.32%
D5	0.67%	2	65-05	4.80%										0.00%	1.85%
D6	2.25%	2	65-92	7.06%	93-05	5.67%					-1.39%			-1.39%	1.79%
D7	1.59%	2	65-84	6.66%	85-05	5.40%					-1.27%			-1.27%	1.94%
D8	1.96%	2	65-05	6.35%										0.00%	1.72%
D9	2.43%	2	65-05	6.93%										0.00%	1.50%
D10 (Small)	5.69%	2	65-05	10.33%										0.00%	1.81%

Panel C: Dividend-Price Repurchases Ratio

1965-2005	Constant Average GDt	No. of Regimes	REGIME 1		REGIME 2		REGIME 3		REGIME 4		CHANGE IN E(Rt)			OVERALL CHANGE	5% CIs
			DATE	E(Rt)	DATE	E(Rt)	DATE	E(Rt)	DATE	E(Rt)	A	B	C		
Market Aggregates															
EW Market	2.02%	2	65-73	6.62%	74-83	8.54%	84-05	6.17%			1.92%	-2.38%		-0.45%	1.89%
VW Market	0.52%	2	65-05	5.18%										0.00%	1.80%
Size Deciles															
D1 (Big)	0.30%	2	65-05	4.38%										0.00%	1.93%
D2	1.28%	2	65-84	6.07%	85-05	5.47%					-0.60%			-0.60%	2.04%
D3	1.33%	3	65-83	6.04%	84-05	5.22%					-0.82%			-0.82%	1.86%
D4	1.38%	2	65-75	5.62%	76-83	7.31%	84-05	5.02%			1.69%	-2.30%		-0.60%	2.32%
D5	0.67%	2	65-82	5.63%	83-05	4.43%					-1.20%			-1.20%	1.85%
D6	2.25%	2	65-72	6.64%	73-81	8.30%	82-05	6.21%			1.66%	-2.09%		-0.43%	1.79%
D7	1.59%	2	65-73	6.01%	74-82	7.57%	83-05	5.62%			1.56%	-1.95%		-0.39%	1.94%
D8	1.96%	2	65-05	6.69%										0.00%	1.72%
D9	2.43%	2	65-05	7.00%										0.00%	1.50%
D10 (Small)	5.69%	2	65-05	10.44%										0.00%	1.81%

TABLE V: Change in Fundamental Implied by Structural Break Tests

Panel A: Earnings-Price Ratio

1965-2005	Constant Average Rt	No. of Regimes	REGIME 1 DATE	REGIME 1 E(GYt)	REGIME 2 DATE	REGIME 2 E(GYt)	REGIME 3 DATE	REGIME 3 E(GYt)	REGIME 4 DATE	REGIME 4 E(GYt)	CHANGE IN E(GYt) A	CHANGE IN E(GYt) B	CHANGE IN E(GYt) C	OVERALL CHANGE	5% CIs
Market Aggregates															
EW Market	9.24%	3	65-72	5.50%	73-80	2.18%	81-05	4.97%			-3.32%	2.79%		-0.53%	0.82%
VW Market	6.41%	4	65-72	3.34%	73-80	0.74%	81-91	2.04%	92-05	3.14%	-2.60%	1.30%	1.09%	-0.20%	1.17%
Size Deciles															
D1 (Big)	6.15%	4	65-72	3.17%	73-80	0.75%	81-91	1.78%	92-05	3.06%	-2.42%	1.03%	1.29%	-0.10%	0.77%
D2	7.83%	3	65-72	4.76%	73-80	2.04%	81-05	3.71%			-2.72%	1.67%		-1.05%	1.09%
D3	8.17%	3	65-72	5.00%	73-80	2.05%	81-05	4.19%			-2.95%	2.14%		-0.82%	1.13%
D4	8.42%	3	65-72	4.96%	73-80	2.49%	81-05	4.56%			-2.47%	2.08%		-0.40%	1.49%
D5	8.03%	3	65-72	4.59%	73-80	1.80%	81-05	3.92%			-2.79%	2.12%		-0.67%	1.36%
D6	9.34%	3	65-72	5.75%	73-80	2.81%	81-05	5.17%			-2.94%	2.36%		-0.58%	1.41%
D7	9.92%	3	65-72	6.21%	73-80	3.56%	81-05	5.67%			-2.65%	2.11%		-0.54%	1.35%
D8	9.22%	3	65-72	5.50%	73-80	2.99%	81-05	4.98%			-2.51%	1.99%		-0.52%	1.75%
D9	11.25%	3	65-72	7.03%	73-80	4.39%	81-05	6.95%			-2.64%	2.56%		-0.08%	1.58%
D10 (Small)	14.17%	3	65-72	9.93%	73-80	7.64%	81-05	9.91%			-2.29%	2.27%		-0.02%	1.59%

Panel B: Dividend-Price Ratio

1965-2005	Constant Average Rt	No. of Regimes	REGIME 1		REGIME 2		REGIME 3		REGIME 4		CHANGE IN E(GDt)			OVERALL CHANGE	5% CIs
			DATE	E(GDt)	DATE	E(GDt)	DATE	E(GDt)	DATE	E(GDt)	A	B	C		
Market Aggregates															
EW Market	9.24%	2	65-83	3.62%	84-05	5.25%					1.63%			1.63%	**0.96%**
VW Market	6.41%	2	65-96	2.07%	97-05	3.43%					1.36%			1.36%	**0.74%**
Size Deciles															
D1 (Big)	6.15%	2	65-96	1.92%	97-05	3.29%					1.37%			1.37%	**1.10%**
D2	7.83%	2	65-92	3.07%	93-05	4.20%					1.14%			1.14%	**0.98%**
D3	8.17%	3	65-84	3.36%	85-05	4.48%					1.12%			1.12%	**0.57%**
D4	8.42%	2	65-74	4.07%	75-82	2.43%	83-05	4.81%			-1.64%	2.38%		0.74%	1.05%
D5	8.03%	2	65-05	3.78%										0.00%	1.19%
D6	9.34%	2	65-92	4.43%	93-05	5.80%					1.37%			1.37%	**0.80%**
D7	9.92%	2	65-84	4.69%	85-05	5.94%					1.26%			1.26%	**0.71%**
D8	9.22%	2	65-05	4.71%										0.00%	0.91%
D9	11.25%	2	65-05	6.56%										0.00%	0.81%
D10 (Small)	14.17%	2	65-05	9.37%										0.00%	1.21%

Panel C: Dividend-Price Repurchases Ratio

1965-2005	Constant Average Rt	No. of Regimes	REGIME 1 DATE	REGIME 1 E(GDt)	REGIME 2 DATE	REGIME 2 E(GDt)	REGIME 3 DATE	REGIME 3 E(GDt)	REGIME 4 DATE	REGIME 4 E(GDt)	CHANGE IN E(GDt) A	CHANGE IN E(GDt) B	CHANGE IN E(GDt) C	OVERALL CHANGE	5% CIs
Market Aggregates															
EW Market	9.24%	2	65-73	4.53%	74-83	2.68%	84-05	4.98%			-1.85%	2.30%		0.45%	0.97%
VW Market	6.41%	2	65-05	1.70%							-1.70%			-1.70%	0.68%
Size Deciles															
D1 (Big)	6.15%	2	65-05	2.00%										0.00%	1.11%
D2	7.83%	2	65-84	2.96%	85-05	3.55%					0.59%			0.59%	0.93%
D3	8.17%	3	65-83	3.36%	84-05	4.17%					0.81%			0.81%	**0.52%**
D4	8.42%	2	65-75	4.07%	76-83	2.43%	84-05	4.67%			-1.64%	2.24%		0.60%	1.01%
D5	8.03%	2	65-82	2.96%	83-05	4.14%					1.18%			1.18%	**1.17%**
D6	9.34%	2	65-72	4.84%	73-81	3.23%	82-05	5.26%			-1.61%	2.03%		0.42%	0.79%
D7	9.92%	2	65-73	5.33%	74-82	3.80%	83-05	5.72%			-1.53%	1.92%		0.39%	0.77%
D8	9.22%	2	65-05	4.38%										0.00%	0.97%
D9	11.25%	2	65-05	6.50%										0.00%	0.84%
D10 (Small)	14.17%	2	65-05	9.26%										0.00%	1.09%

FIGURE 1: Extreme Size Portfolio Fundamental-Price Ratios

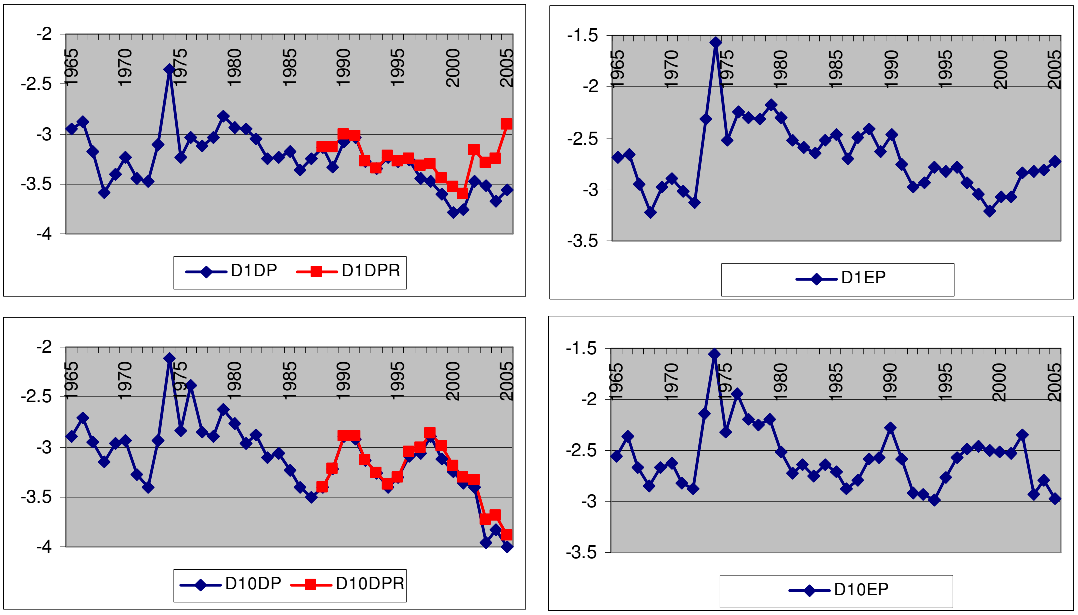
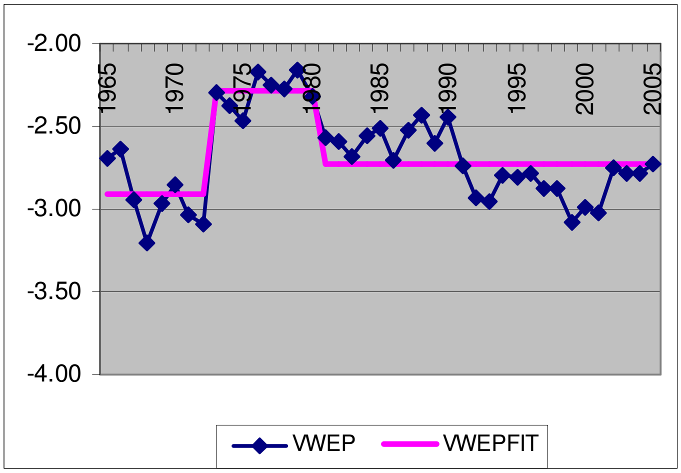
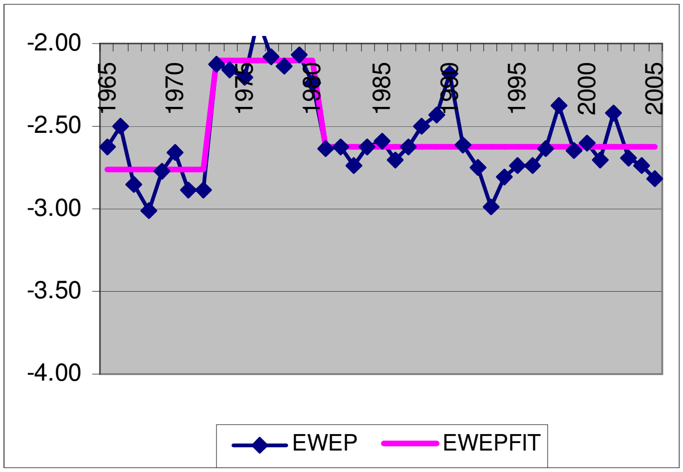


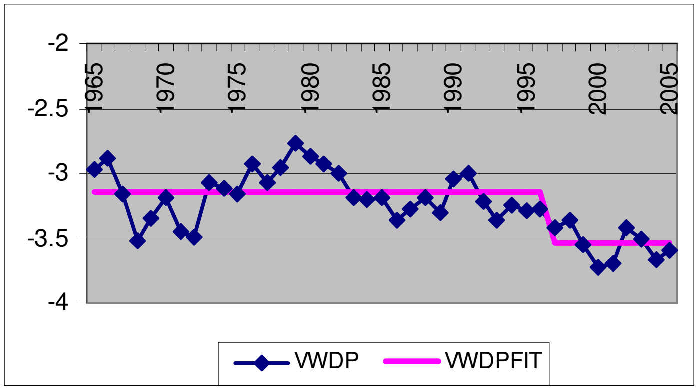
FIGURE 2:Market Earnings-Price Ratios

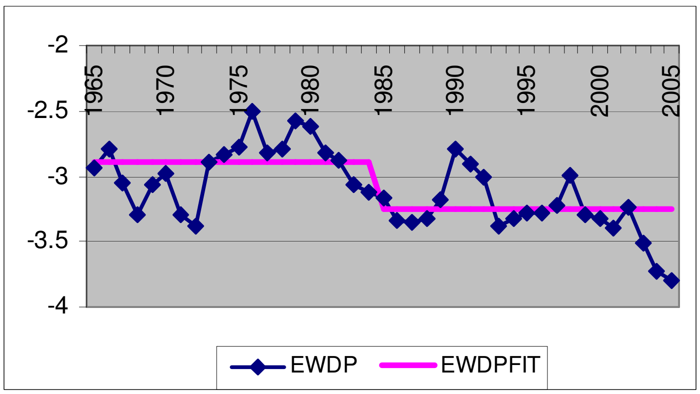


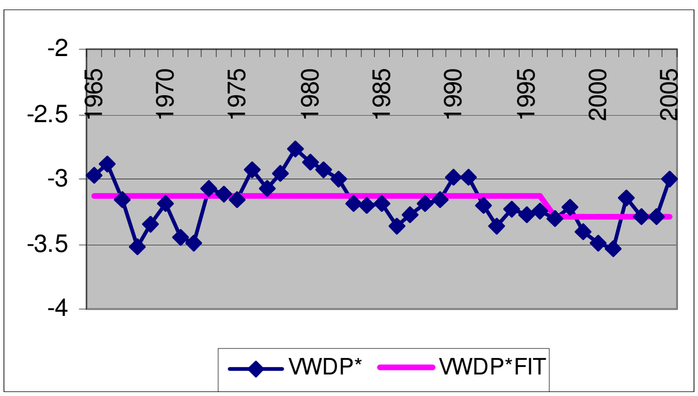


Notes: Q5EP is the smallest firm quintile earnings-price ratio and Q1EP is the largest firm quintile earnings-price ratio.

FIGURE 3: Market Dividend-Price Ratios







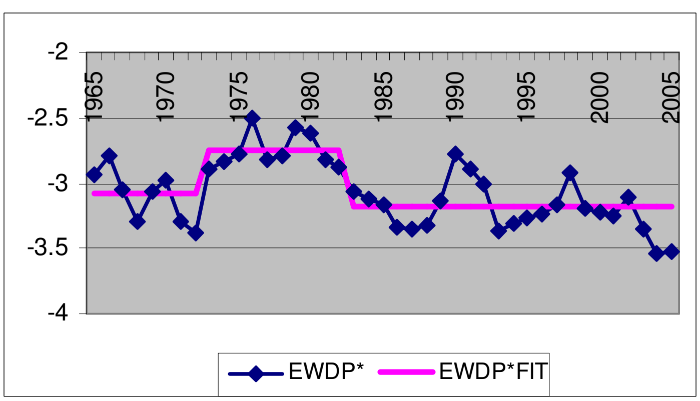
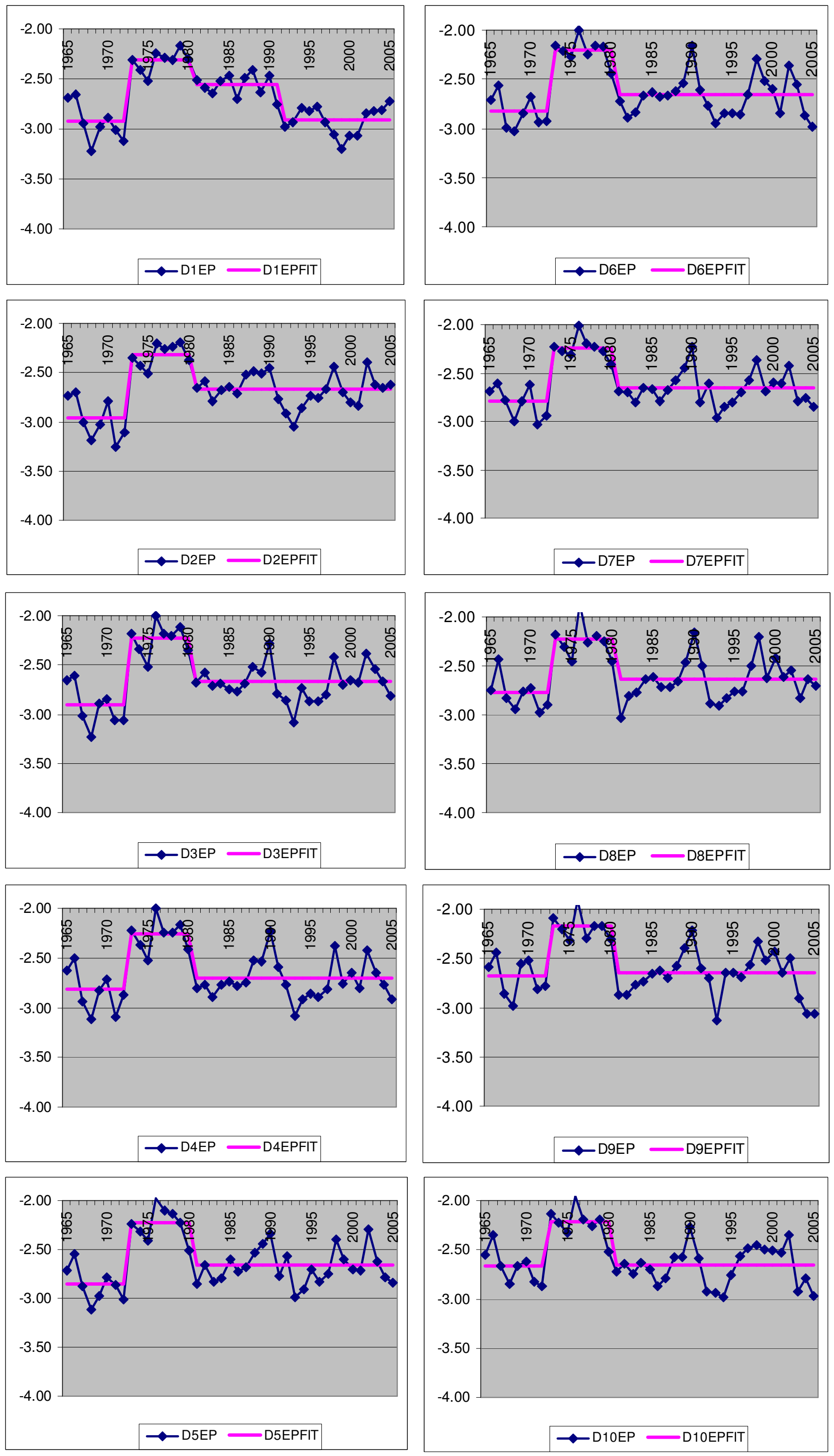


FIGURE 3: Size Deciles Earnings-Price Ratios With Multiple Breaks



Notes: Best fit line is given by the equation $Y_t/P_t = \delta^j{}_t + \varepsilon_t,\ t = T_{j\text{-}1}+1,\ \ldots,\ T_j$ where Y_t/P_t is the earnings-price ratio adjusted for the 1974 outlier and δ^j is the mean earnings-price ratio for regime j.

FIGURE 4: Size Deciles Dividend-Price Ratios With Multiple Breaks

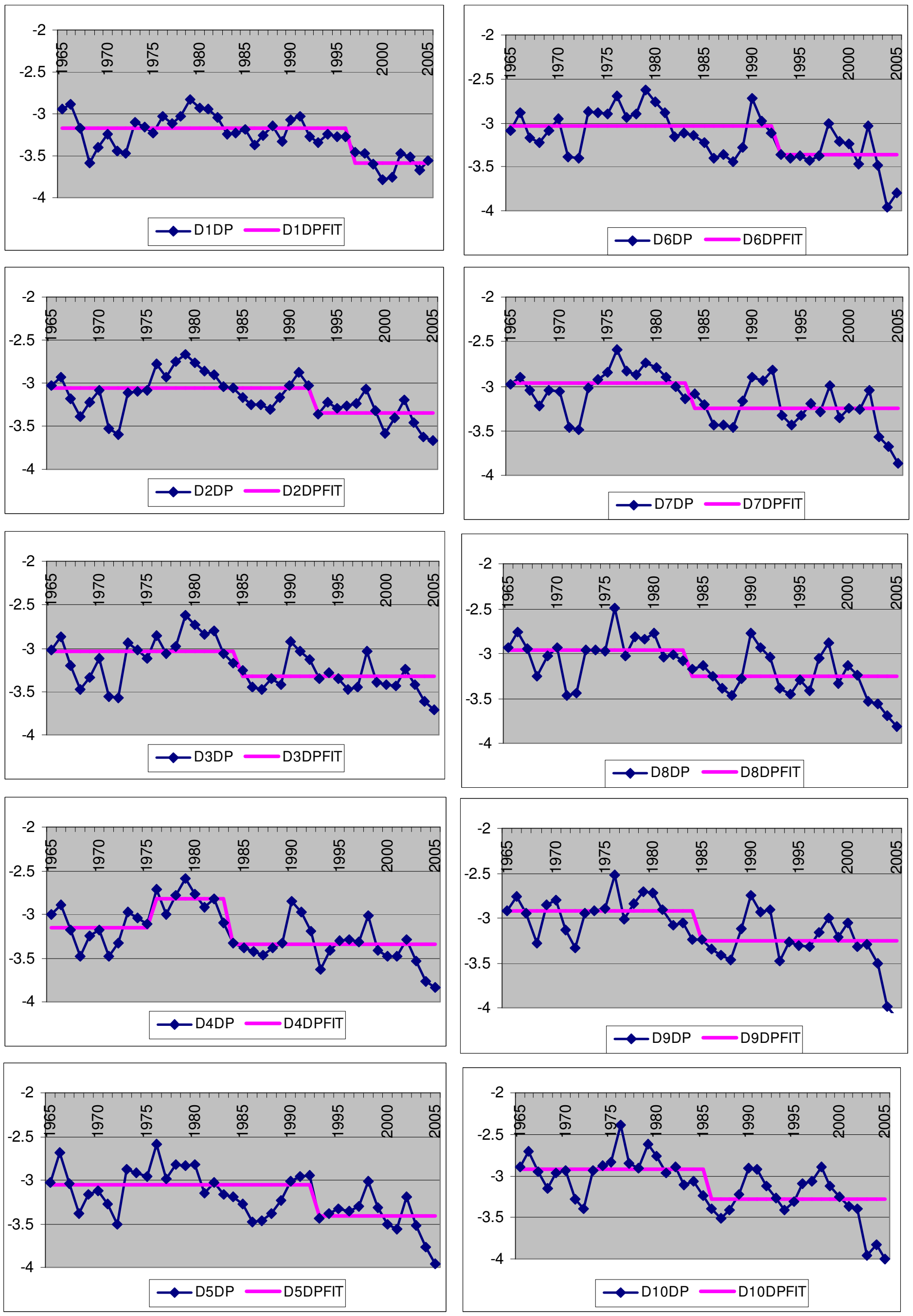
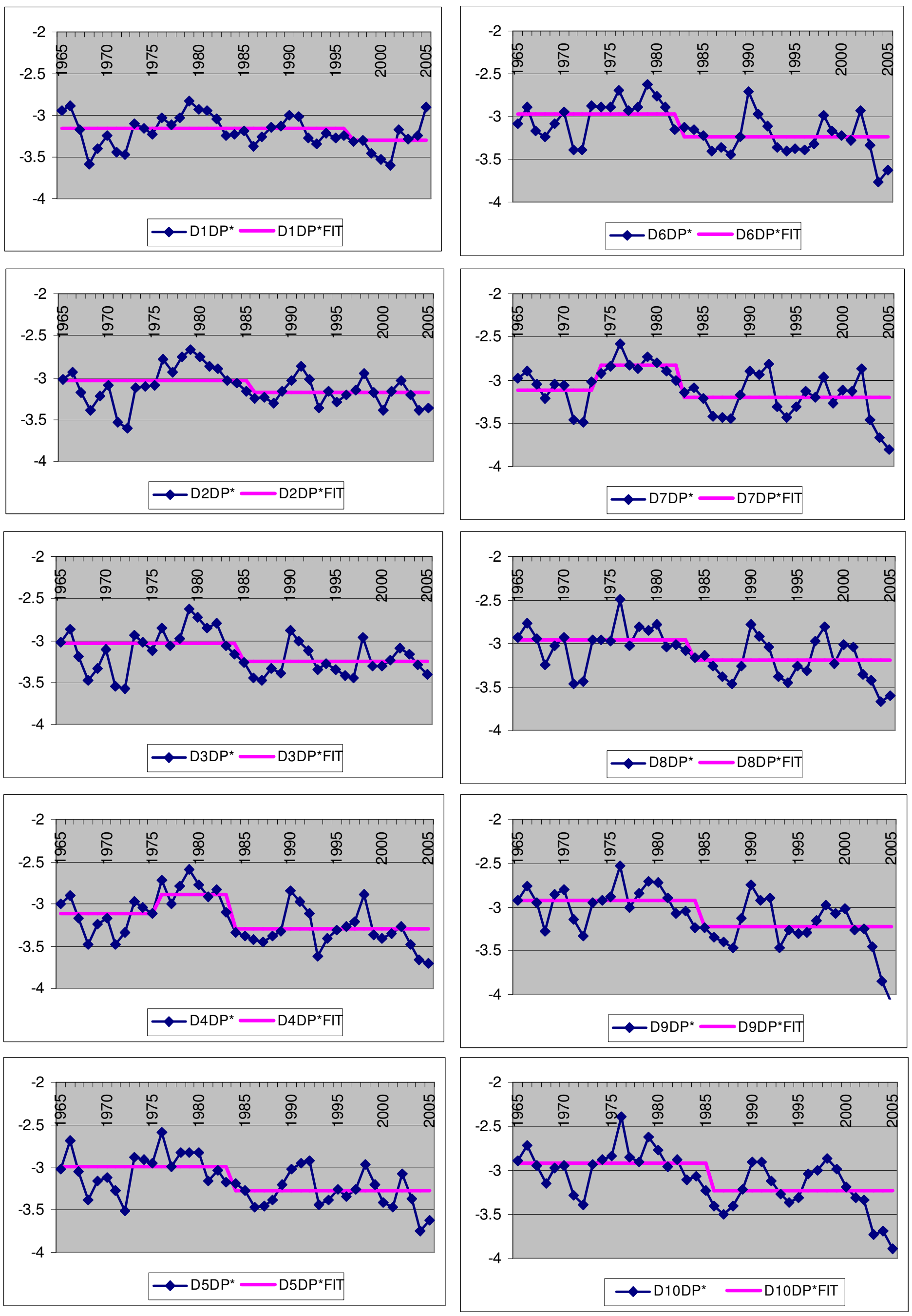
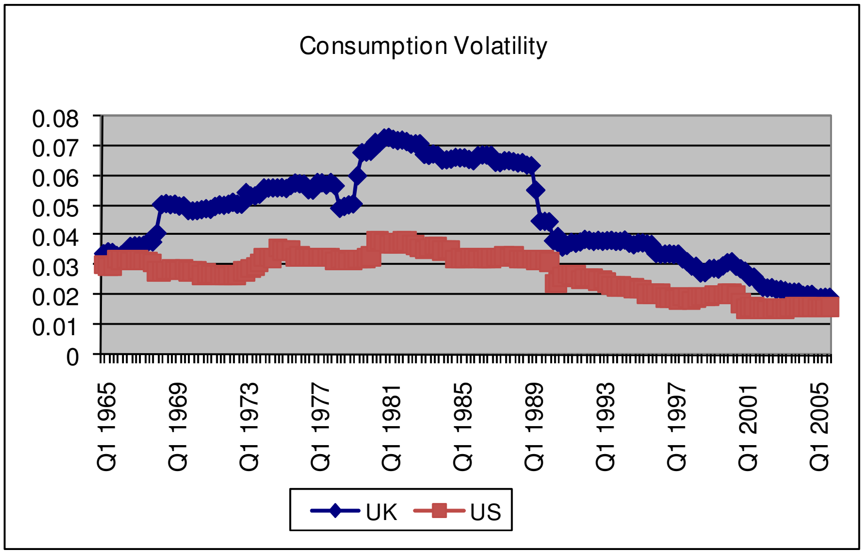


FIGURE 5: Size Deciles Dividend Repurchases-Price Ratios With Multiple Breaks



APPENDIX 1: UK and US Consumption Volatility



Notes: Plots rolling moving averages of consumption standard deviations for the 20 quarter through to time t.